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*A Professional Medical Journal*

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# C-reactive Protein Level in Bangladeshi Preeclamptic Patients and Its Comparison with Trimester-Matched Normal Pregnancy

Shah Fahmida Siddiqua<sup>\*1</sup>, Sabera Khatun<sup>2</sup>, Ahmed Abu Saleh<sup>3</sup>, Ishrat Jahan Karim<sup>4</sup>, Rezwana Mirza<sup>5</sup>, Sultana Jahan<sup>6</sup>

## Abstract

**Introduction with objective:** Preeclampsia is a major cause of maternal and fetal morbidity and mortality in Bangladesh. This study aimed to estimate C-reactive protein (CRP) level among patients with preeclampsia and to compare with those of trimester-matched normal pregnancy. **Materials and Methods:** : This cross-sectional study was done from January 2005 to December 2006 at the different tertiary care hospital at Dhaka. A total of 33 preeclamptic and 33 normal pregnant women in the third trimester were enrolled in the study. The PE patients were divided into two groups: mild hypertension [diastolic blood pressure (DBP) <110 mm Hg] and severe hypertension (DBP ≥110 mm Hg). Similarly the patients were divided into two groups on the basis of proteinuria, group I ( $2^+ \geq 1\text{gm/l}$ ) and group II ( $3^+ \geq 3\text{gm/l}$ ). Both PE and control groups were matched for their age and parity. Estimation of serum CRP was done by Turbulometry method. **Results:** CRP concentration (mg/l) was  $4.55 \pm 2.83$  in control group and  $23.52 \pm 24.85$  in PE group which was significantly higher than in control group. CRP level was significantly higher ( $p < 0.001$ ) in severe PE than in mild PE group. Significant difference was also seen between the groups subdivided on the basis of proteinuria ( $p < 0.05$ ). In the whole population CRP values showed significant positive correlation with systolic and diastolic blood pressure ( $p < 0.001$ ) and significant negative correlation with gestational age at delivery and birth weight (gestational age:  $p < 0.05$ , birth weight:  $p < 0.001$ ). **Conclusion:** Maternal CRP concentration was higher in patients with preeclampsia and was correlated with disease severity.

**Keywords:** Preeclampsia, C-reactive protein, Blood pressure, Proteinuria.

**Number of Tables:** 04; **Number of Figures:** 03; **Number of References:** 19; **Number of Correspondences:** 04.

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## Introduction:

Preeclampsia (PE) is a disease unique to pregnancy, characterized by hypertension and proteinuria, seen in 5% to 8% of all pregnancies<sup>1</sup>. Hypertension is the most frequent medical complication of pregnancy, occurring in 10% of pregnancies and being the main cause of perinatal mortality and morbidity<sup>2</sup>. Pregnancy induced hypertension (PIH) occurs in around 16- 24% of first pregnancy and 12-15% of subsequent pregnancies. Preeclampsia complicates 3-5% of first pregnancy and 1% of subsequent pregnancies with around 5-10% being severe<sup>3</sup>. Preeclampsia and hypertensive disorder of pregnancy are major causes of maternal, fetal and neonatal morbidity worldwide. The disease may be mild and inconsequential or cause death or significant maternal morbidity from stroke, seizures, cerebral edema, hepatic failure, renal failure, disseminated intravascular coagulation or placental abruption. Fetal and neonatal consequences include intrauterine growth restriction (IUGR), stillbirth and severe prematurity due to premature termination of pregnancy for maternal indications<sup>2</sup>. In developing countries, due to the lack of proper antenatal check up, poverty, ignorance and poor education, the incidence of PE is much higher in comparison to the developed nations. In Bangladesh, the incidence is high. It is about 8.2% of

pregnancies<sup>4</sup>. Clinical features of PE include hypertension, proteinuria and varying degrees of ischemic endorgan damage, which are thought to result from diffuse endothelial dysfunction. Although the etiology of endothelial dysfunction in preeclampsia is unknown, it has been postulated to be part of an exaggerated maternal inflammatory response to pregnancy<sup>5</sup>. Redman and colleagues suggest that preeclampsia is not an intrinsically different state of pregnancy but represents the extreme maternal response to pregnancy. According to them, some diseases in pregnancy and especially preeclampsia, are part of a more generalized intravascular inflammatory reaction involving intravascular leucocytes as well as the clotting and complement systems<sup>5</sup>. Activated circulating leucocytes<sup>6,7</sup>, increased production of reactive oxygen species<sup>8</sup> and increased release of inflammatory cytokines<sup>9,10</sup>, such as tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-6 (IL-6), as well as abnormal activation of the clotting system<sup>11</sup> in women with preeclampsia compared with normotensive women. C-reactive protein (CRP) is used mainly as a marker of inflammation. After onset of inflammatory or acute tissue injury, CRP synthesis increases with 4 to 6 hours, doubling every 8 hours and peak at 36 to 50 hours<sup>4</sup>. In this respect CRP can be a potential marker and play a role in eliciting the inflammatory response characteristic of preeclampsia. The hepatic synthesis of CRP increases in response to inflammatory cytokines such as IL-1, IL-6 and TNF- $\alpha$ , which are responsible for inflammatory response and maternal endothelial activation in preeclampsia. Higher level of CRP may increase blood pressure by reducing nitric oxide production in endothelial cells, causing vasoconstriction and increasing endothelin-1, coagulation function<sup>12</sup>. Although systemic inflammation has been implicated in the pathogenesis of preeclampsia, available data from studies of maternal CRP concentrations and preeclampsia risk have been conflicting. A cross-sectional study reported that CRP concentrations were 66% higher in women with preeclampsia as compared with controls<sup>13</sup>. Another prospective nested case-control study reported that women with CRP concentrations  $>4.1\text{mg/L}$  experienced 3.5-fold increased risk of preeclampsia as compared with women whose CRP concentrations were  $<1.1\text{mg/L}$ <sup>14</sup>. The above evidences have shown that there is significant association of elevated maternal serum CRP concentration in peripheral circulation and increased risk of PE and are believed to correlate with preeclamptic process severity, preterm delivery and poor neonatal outcome. Thus remain a need for more exploratory work to be done in this field. This research work intended to determine the association of elevated maternal serum CRP with risk of PE and negative obstetrical outcome. Hence this is being undertaken to explore the association of serum CRP with preeclampsia and the effect of CRP on fetal outcome.

#### Materials and Methods:

This cross-sectional study was done from January 2005 to December 2006, at Department of Obstetrics and Gynaecology in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka Medical College Hospital (DMCH), Sir

Salimullah Medical College and Mitford Hospital (SSMCH) and Department of Microbiology and immunology, BSMMU. Study population was pregnant women of third trimester, preeclamptic (case group) and normotensive (control group) were selected for the study. A total of 66 pregnant women of third trimester were included consecutively for the study. Convenient sampling was applied here. The researcher interviewed the respondents according to her convenience. Patients were divided into two groups; Out of sixty six, PE group consisting of thirty three women with preeclampsia in third trimester of pregnancy with following criteria, blood pressure  $\geq 140/90$  mm Hg taken on two occasions 6 hours apart and urinary protein of 0.3gm/l or more were case group and control group consisting of thirty three women with normal pregnancy in third trimester with following criteria, normal blood pressure throughout pregnancy and no proteinuria were control group. Exclusion criteria were history of hypertension and proteinuria prior to conception or before 20 weeks of gestation, diabetes mellitus, thyroid disease. The cases were further subdivided into mild (BP  $>140/90$  mmHg but  $<160/110$  mmHg with proteinuria of 2+ on dipstick reagent strip) and severe (BP  $\geq 160/110$  mmHg with proteinuria of 3+ or more on reagent strip) PE group according to degree of proteinuria and severity of blood pressure. The interpretation of dipstick test is 0.3gm/l to  $<1\text{gm/l}$  =1+, 1 gm/l to  $<3\text{gm/l}$  =2+ and 3gm/l or more = 3+. Two ml of venous blood was drawn from each of the cases and control subjects taking aseptic precautions. The blood was transferred into a clean, dry test tube and taken to laboratory. Blood was allowed stand still for about 30 minutes to clot. Clot was then separated from the test tube by wooden stick and was centrifuged within 1 hour of collection at 2000 rpm for 5 minutes. The separated serum was carefully drawn by micropipette and was stored in micro-centrifuged tube at  $-70^{\circ}\text{C}$  until the analysis was done. Random urine sample was collected in a clean test tube and assayed for presence of protein by dipstick reagent strip. Estimation of serum CRP concentrations was done by liquid phase immunoprecipitation assay by Turbulometry. Ethical clearance was taken from IRB board of BSMMU. Data was collected by interviewing the patients and doing physical examination and relevant biochemical tests were carried out. The results of investigations were reviewed and recorded in a checklist. All these patients were followed up till delivery. Collected data was placed in a master sheet. The descriptive and analytic assessments were done using the software SPSS for Windows. The data are expressed as mean with standard deviation ( $\pm\text{SD}$ ). P value  $<0.05$  was taken as statistically significant.

#### Results:

A total of 66 pregnant women participated in the study. Among them 33 were cases of PE and 33 were normotensive pregnant women. Table I showing analysis of age and blood pressure of study populations. The age range in control group was 19-35 years and in the case group (PE group) was 20-33 years. Most of them were between 21-30 years in both the groups. The mean age with standard deviation ( $\pm\text{SD}$ ) in the

case group was  $25.45 \pm 4.06$  years and in the control group was  $25.09 \pm 4.27$  years ( $p > .50$ ns). Both the study groups matched in regard to their age range and thereby there was no statistical difference of age in these groups of patients (Table: I). The mean ( $\pm$ SD) SBP in the study group (PE group) was  $153.64 \pm 14.65$  mmHg and in the control group the mean ( $\pm$ SD) SBP was  $108.03 \pm 9.28$  mmHg. The women with PE had significantly higher level of SBP ( $p < 0.001$ ) in comparison to the control group. The mean DBP ( $\pm$ SD) in the control group was  $74.85 \pm 7.45$  mmHg and in the study group (PE group) was  $104.70 \pm 8.65$  mmHg respectively. The preeclamptic group had significantly higher DBP ( $p < 0.001$ ) as compared to the control group. In control group 21 (63.6%) were nullipara, 36% were multipara and in the PE group 51.5% were nullipara, 48.5% were multipara. Both the study groups matched in regard to their parity range and thereby there was no statistically significant difference ( $p > 0.10$ ) of parity in these groups of patients (Table: I).

**Table-I: Grouping of study subjects with age, blood pressure and parity distribution**

| Parameter   | Case<br>(n=33)<br>Mean $\pm$ SD | Control<br>(n=33)<br>Mean $\pm$ SD | t value | P value      |
|-------------|---------------------------------|------------------------------------|---------|--------------|
| Age (years) | $25.45 \pm 4.0$                 | $25.09 \pm 4.2$                    | -0.355  | $>0.50^{ns}$ |
| SBP (mmHg)  | $153.64 \pm 14.6$               | $108.03 \pm 9.2$                   | -15.117 | $<0.001^*$   |
| DBP (mmHg)  | $104.70 \pm 8.6$                | $74.85 \pm 7.4$                    | -15.018 | $<0.001^*$   |
| Nulliparous | 21 (63.6%)                      | 17 (51.5%)                         |         | $>0.10^{**}$ |
| Multiparous | 12 (36.4%)                      | 16 (48.5%)                         |         |              |

\*Chi-square test, \*\*Chi-square test

Table II showing analysis of gestational age and birth weight in study populations. The mean gestational age during delivery in the control group was  $39.18 \pm 0.92$  weeks and in the case group (PE group) was  $35.52 \pm 2.40$  weeks. The PE patients had significantly shorter gestational age ( $p < 0.001$ ) than the control group during delivery. Mean CRP concentration in the control group was  $4.55 \pm 2.83$  mg/L and in the case group (PE group) was  $23.52 \pm 24.85$  mg/L. There was statistically significant ( $p < 0.001$ ) difference in mean serum CRP concentration in PE group than control group. Mean birth weight in study group (PE group) was  $2.10 \pm 0.38$  and in normotensive patients (control group) was  $2.86 \pm 0.21$  respectively, which was significant (Table:II).

**Table-II: Comparison of Gestational age at delivery, C-reactive protein levels, birth weight between case and control**

|                         | Control<br>(n=33)<br>Mean $\pm$ SD | Case<br>(n=33)<br>Mean $\pm$ SD | t value | P value    |
|-------------------------|------------------------------------|---------------------------------|---------|------------|
| Gestational age (weeks) |                                    |                                 |         |            |
| At delivery             | $39.18 \pm 0.92$                   | $35.52 \pm 2.40$                | 8.2000  | $<0.001^*$ |

|               | Control<br>(n=33)<br>Mean $\pm$ SD | Case<br>(n=33)<br>Mean $\pm$ SD | t value | P value    |
|---------------|------------------------------------|---------------------------------|---------|------------|
| CRP (mg/L)    |                                    |                                 |         |            |
| Mean $\pm$ SD | $4.55 \pm 2.83$                    | $23.52 \pm 24.85$               | -4.357  | $<0.001^*$ |
| Birth weight  |                                    |                                 |         |            |
| Mean $\pm$ SD | $2.10 \pm 0.38$                    | $2.86 \pm 0.21$                 | 9.944   | $<0.001^*$ |

\*Unpaired Student's 't' test,

Table III showing analysis of C-reactive protein and birth weight status in preeclampsia cases. The mean C-reactive protein concentration with standard deviation ( $\pm$ SD) in mild PE was  $12.48 \pm 9.11$  mg/L and in severe PE was  $42.83 \pm 31.72$  mg/L which was statistically significantly higher ( $p < 0.001$ ) than mild PE. Mean birth weight in mild PE group was  $2.18 \pm 0.37$  kg and that in severe PE group was  $1.95 \pm 0.38$  kg. The severe PE group had lower birth weight ( $p > 0.10^{ns}$ ) in comparison to mild PE group but the difference is not significant (Table: III).

**Table III: C-reactive protein and Birth weight levels among preeclampsia cases**

|                   | Mild PE<br>(n=21)<br>Mean $\pm$ SD | Severe PE<br>(n=12)<br>Mean $\pm$ SD | t value | P value        |
|-------------------|------------------------------------|--------------------------------------|---------|----------------|
| CRP (mg/L)        |                                    |                                      |         |                |
| Mean $\pm$ SD     | $12.48 \pm 9.1$                    | $42.83 \pm 31.7$                     | -4.140  | $<0.001^{***}$ |
| Birth weight (kg) |                                    |                                      |         |                |
| Mean $\pm$ SD     | $2.18 \pm 0.3$                     | $1.95 \pm 0.3$                       | +1.577  | $>0.10^{ns}$   |

Unpaired Student's 't' test, \*\*\* = Significant

These scattered diagrams showing relation between CRP, birth weight and blood pressure. In the total population systolic and diastolic blood pressure were the only variables that showed significant positive correlation with CRP (SBP:  $r = +0.608$ ,  $P < 0.001$ ; DBP:  $r = +0.632$ ,  $p < 0.001$ ) (Fig 1, 2).

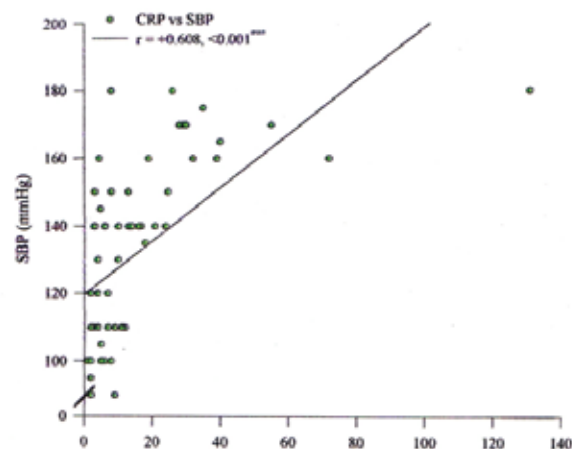


**Fig. 1: Relationship between CRP and SBP (Total population, n=66)**

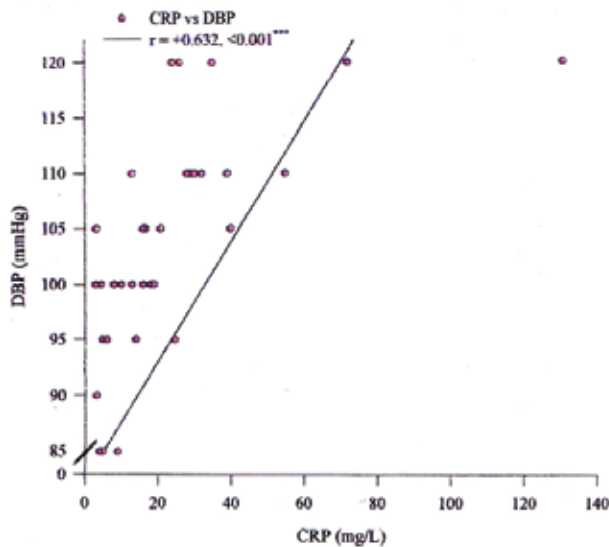


**Fig. 2: Relationship between CRP and DBP (Total population, n=66)**

Systolic and diastolic blood pressure values were inversely correlated with birth weight of the newborn (SBP:  $r = -0.744$ ,  $p < 0.001$ ; DBP  $r = -0.795$ ,  $p < 0.001$ ) (Fig 3). In the whole population multiple regression analysis showed that CRP values were the variables showed significant negative correlation with birth weight (Birth weight:  $r = -0.492$ ,  $p < 0.001$ ).

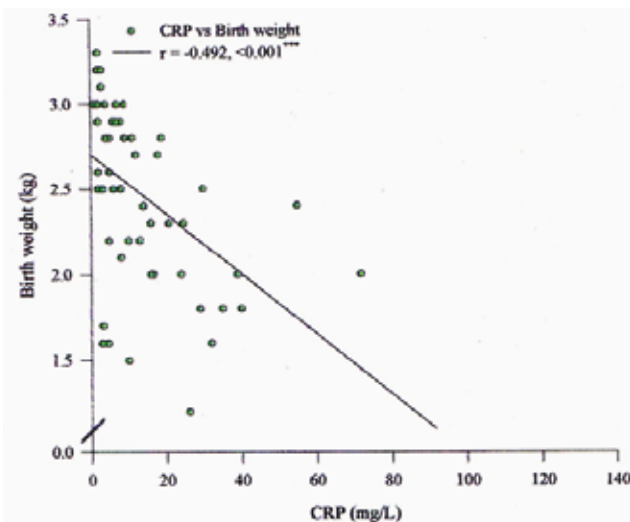


**Fig. 3: Relationship between CRP and birth weight (Total population, n=64) There were two stillbirths**

#### Discussion:

Despite intense study, preeclampsia remains a major cause of maternal and perinatal morbidity and mortality and cause remains obscure. In the present study, a total of 66 subjects out of which 33 were preeclamptic and 33 were normal pregnant women. The study group was further classified into 21 mild (DBP < 110 mmHg) and 12 severe cases (DBP  $\geq 110$  mmHg) according to level of blood pressure. Mean age of the preeclamptic patients (study group) was

25.45 $\pm$ 4.06 years with 20 years as minimum and 33 years as maximum. Mean age of normotensive pregnant women (control group) was 25.09 $\pm$ 4.27 years with 19 years as minimum and 35 years as maximum. Most of the women were between 21-30 years, which is consistent with the findings by Paternoster et al.<sup>15</sup>. They found both the groups matched in regard to age and there was no statistically significant difference with respect to age. Assessing 253 patients in their study they obtained the mean age in preeclamptic patients (n=63) was 32 $\pm$ 7 years and in control group (n=190) was 31 $\pm$ 5 years. In a prospective case control study by Teran et al. traced in their study mean age in preeclamptic patients 24.5 $\pm$ 1.6 years and 24.4 $\pm$ 1.3 years in normal pregnant women<sup>13</sup>. Their finding is almost similar to the findings of this study. Wolf et al. in 2001 explored mean age 29.5 years for normal gestation and in women with preeclampsia<sup>14</sup>. Chunfang et al. in a prospective study analyzed 566 patients and they recorded 70% patients in case group and 72.5% patients in control group and were in the age range of 20-34 years<sup>16</sup>. All these studies showed that there was no statistically significant difference between the groups in respect to age. In this research work, more than half of the women of both groups were nulliparous. In the study group 51.5% were nulliparous and 48.5% were multiparous whereas in control group it was 63.6% and 36.4% respectively. Paternoster et al. assessed 253 patients and showed 43% nulliparous and 57% multipara in control group and 51% and 49% in study group respectively<sup>15</sup>. Chunfang et al. observed 70% nulliparous and 30% multipara in the PE group and 88.3% and 11.7% in the control group respectively<sup>16</sup>. There was no significant statistical difference in parity between the groups in all of these studies, which is consistent with the present study. Mean parity was 2.54 $\pm$ 2.04 obtained by Teran et al. in their series<sup>13</sup>. In all the above-mentioned studies subjects were matched in respect to their parity, which corroborate with the findings of the current study. But mean gestational age at delivery for the study group was 35.52 $\pm$ 2.40 weeks and 39.18 $\pm$ 0.92

weeks in the control group. Preeclamptic patients delivered at a significantly shorter gestational age ( $t = 8.20$ ,  $p < 0.001$ ). Paternoster et al. observed similar picture in their study. They found gestational age at delivery for the study group and control group were 30.71 $\pm$ 3.69 weeks and 38.01 $\pm$ 2.7 respectively<sup>15</sup>. Wolf et al. showed that gestational age at delivery in study group 38 $\pm$ 3 weeks and in control group 40 $\pm$ 2 weeks. The preeclamptic women delivered at an earlier period of gestation as compared to the normotensive women ( $p < 0.01$ )<sup>14</sup>. Taking into account of the blood pressure, the study findings showed significant increase in both systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the preeclamptic patients compared to normotensive women with chronological age and gestational age ( $p < 0.001$ ) enrolled in the study. The mean SBP with standard deviation ( $\pm$  SD) was 153.64 $\pm$ 14.65 mm of Hg for the study group and 108.03 $\pm$ 9.28 mm of Hg for the control. The mean DBP with standard deviation ( $\pm$  SD) was

104.70±8.65 mm of Hg for study group and 74.85±7.45 mm of Hg for control. Similar blood pressure recordings were observed by many authors. Paternoster et al. found significant difference in SBP and DBP between preeclamptic and normotensive women ( $p<0.005$ )<sup>15</sup>. According to Teran et al. preeclamptic patients have significantly higher SBP and DBP in comparison to control group<sup>13</sup>. In their prospective study they were convinced by the results that the findings were consistent with other studies. Findings of all these studies are consistent with the present study. The present study was conducted to assess whether CRP level is raised in preeclampsia and to reflect its relation with disease progression. In this study mean CRP in study group is 23.52±24.85 and in control group is 4.55±2.83 mg/L. There is statistically significant difference ( $p<0.001$ ) in CRP concentration between study group and control group. Mean serum CRP was 12.48±9.11 mg/l in mild PE and in severe PE was 42.83±31.72 mg/l. Significant difference ( $p<0.001$ ) in serum CRP concentrations between severe PE and mild PE group was also found. Paternoster et al. showed maternal serum CRP levels were higher in PE group than in the normotensive control group which was statistically significant ( $p<0.001$ )<sup>15</sup>. Their findings came out similar direction as that of current study. Batashki et al. observed a significant difference in plasma concentration of CRP between preeclampsia and those with normal pregnancy in the third trimester ( $t=2.92$ ,  $p<0.01$ )<sup>17</sup>. They concluded that CRP values would be higher in women with preeclampsia and was in agreement with the statement for presence of pronounced inflammation at preeclampsia compared to normal pregnancy and similar to the present series. Wolf et al. in a prospective case control study showed first trimester CRP levels were significantly higher among women in whom preeclampsia subsequently developed compared with controls (4.6 compared with 2.3 mg/L,  $p=0.04$ )<sup>14</sup>. Teran et al. found similar findings in high risk Andean population<sup>13</sup>. They observed that concentration of C-reactive protein was significantly higher in preeclamptic women (4.11±0.37 mg/dl;  $p<0.0001$ ) in comparison with normal pregnant women (2.49±0.26 mg/dl;  $p=0.001$ ) and non-pregnant controls (1.33±0.15 mg/dl;  $p<0.0001$ ). The difference between normal pregnancy and controls was also significant ( $p<0.005$ ). Wolf et al. reported that women in the highest quartile of CRP experienced a 3.5 fold increased risk of preeclampsia compared with women in the lowest quartile, although after adjusting for prepregnancy BMI in the multivariable model, the OR was greatly attenuated to 1.1<sup>14</sup>. Given that BMI and CRP concentrations were highly correlated and increased BMI and CRP are likely to be in the same causal pathway. Chunfang et al. repeated analyses designed to assess the independent and joint effects of maternal elevated CRP concentrations and prepregnancy overweight status, respectively<sup>16</sup>. They observed that elevated CRP concentrations among lean women were associated with a 2.5 fold increased risk of preeclampsia. Moreover maternal overweight status in the absence of elevated CRP concentration was associated with a 4.9-fold increased risk of preeclampsia. Women who were overweight and who also had elevated CRP concentrations

experienced a similar increased risk of preeclampsia (OR = 5.5). Ustun et al. in a case control study done in the third trimester of pregnancy showed plasma CRP levels in mild and severe preeclampsia were significantly higher than that of the normal third trimester pregnant women ( $r=0.515$ ,  $p=0.0001$ )<sup>18</sup>. This results is consistent with the current study. In this study, preeclamptic mother delivered low birth weight baby than normotensive mother. Mean birth weight in case group was 2.10±0.38 kg and which in control group was 2.86±0.21kg. The difference was statistically significant ( $p<0.001$ ). Birth weight was further analyzed among the case group. Mean birth weight in mild PE cases was 2.18±0.37 kg and in severe PE cases it was 1.95±0.38 kg. Severe PE mother delivered very low birth weight baby than mild PE mother but the difference was not significant statistically ( $p>0.10$ ), small sample size might be the cause. The fact may come out in further studies involving large population. Mean birth weight in the study of Paternoster et al. was 3157.66±7.35.43 and 1342.4±783.3 (g) in normotensive and preeclamptic mother respectively. The difference was highly significant ( $p<0.005$ )<sup>15</sup>. The fact came out in similar direction as in this series. Wolf et al. reported a significant difference in their study regarding birth weight ( $p<0.01$ ). The mean birth weight was 3356±573 and 2986±623 (g) in normal pregnant and preeclamptic mother respectively<sup>14</sup>. Findings of this study is also consistent with the current study. Multiple regression analysis in total population showed that there was strong negative correlation of Systolic and diastolic blood pressure values with birth weight of the newborns (SBP:  $r=-0.744$ ,  $p<0.001$ ; DBP:  $r=-0.795$ ,  $p<0.001$ ). CRP values were inversely correlated with birth weight ( $p<0.001$ ) Higher the CRP levels lower the birth weight during delivery. In the present study CRP level showed significant positive correlation with systolic blood pressure and diastolic blood pressure ( $p<0.001$ ), this is consistent with study done by Paternoster et al<sup>15</sup>. They found similar strong positive correlation of CRP level with systolic and diastolic blood pressure. They also showed in the whole population CRP levels were inversely correlated with birth weight during delivery (Birth weight  $p<0.001$ ) which is similar with the current study. Kumru et al (2005) observed serum hsCRP levels were elevated in women with preeclampsia and showed a strong positive correlation ( $r=0.9$ ,  $p=0.05$ ) with diastolic blood pressure and they also found a negative correlation ( $r=0.5$ ,  $p=0.05$ ) with weight of the newborns<sup>19</sup>. They concluded that hsCRP might be used as a marker for the severity of preeclampsia. Findings of their study corroborate with the data of this study.

**Conflict of Interests:** None.

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#### References:

1. Al-Jameil N, Aziz Khan F, Fareed Khan M, Tabassum H. A brief overview of preeclampsia. *J Clin Med Res*. 2014 Feb;6(1):1-7.
2. Corrigan L, O'Farrell A, Moran P, Daly D. Hypertension in pregnancy: prevalence, risk factors and outcomes for women birthing in Ireland. *Pregnancy Hypertension*. 2021 Jun 1;24:1-6.
3. Robson, S. C. 'Hypertension and Renal disease in pregnancy', in Dewhurst's Textbook of Obstetrics and Gynaecology for postgraduates, ed.D. K. Edmonds, 6th edn., Oxford, Blackwell Science, 2000;pp. 166-185.
4. Sultana S, Dabee SR, Akter S, Khatun MR, Akhter P. Serum C reactive Protein in Preeclamptic Women. *Journal of Bangladesh College of Physicians and Surgeons*. 2013;31(4):194-8.
5. Redman CW, Sacks GP, Sargent IL. Preeclampsia: an excessive maternal inflammatory response to pregnancy. *American journal of obstetrics and gynecology*. 1999 Feb 1;180(2):499-506.
6. Haeger MA, Unander MA, Norder-Hansson BI, Tylman MA, Bengtsson AN. Complement, neutrophil, and macrophage activation in women with severe preeclampsia and the syndrome of hemolysis, elevated liver enzymes, and low platelet count. *Obstetrics and gynecology*. 1992 Jan 1;79(1):19-26.  
[https://doi.org/10.1016/S0889-8545\(21\)00498-8](https://doi.org/10.1016/S0889-8545(21)00498-8)  
PMid:1350082
7. Von Dadelszen P, Wilkins T, Redman CW. Maternal peripheral blood leukocytes in normal and pre-eclamptic pregnancies. *BJOG: An International Journal of Obstetrics and Gynaecology*. 1999 Jun;106(6):576-81.
8. Walsh SW. Maternal-placental interactions of oxidative stress and antioxidants in preeclampsia. In *Seminars in reproductive endocrinology* 1998 Mar (Vol. 16, No. 01, pp. 93-104). Copyright© 1998 by Thieme Medical Publishers, Inc.
9. Williams MA, Farrand A, Mittendorf R, Sorensen TK, Zingheim RW, O'Reilly GC, et al. Maternal second trimester serum tumor necrosis factor- $\alpha$ -soluble receptor p55 (sTNFp55) and subsequent risk of preeclampsia. *American journal of epidemiology*. 1999 Feb 15;149(4):323-9.  
[https://doi.org/10.1016/S0921-4534\(99\)00516-X](https://doi.org/10.1016/S0921-4534(99)00516-X)
10. Sacks GP, Studena K, Sargent IL, Redman CW. Normal pregnancy and preeclampsia both produce inflammatory changes in peripheral blood leukocytes akin to those of sepsis. *American journal of obstetrics and gynecology*. 1998 Jul 1;179(1):80-6.  
[https://doi.org/10.1016/S0002-9378\(98\)70254-6](https://doi.org/10.1016/S0002-9378(98)70254-6)  
PMid:9704769
11. Perry Jr KG, Martin Jr JN. Abnormal hemostasis and coagulopathy in preeclampsia and eclampsia. *Clinical obstetrics and gynecology*. 1992 Jun 1;35(2):338-50.  
<https://doi.org/10.1097/00003081-199235020-00015>
12. Sproston NR, Ashworth JJ. Role of C-Reactive Protein at Sites of Inflammation and Infection. *Front Immunol*. 2018 Apr 13;9:754.
13. Teran E, Escudero C, Moya W, Flores M, Vallance P, Lopez-Jaramillo P. Elevated C-reactive protein and pro-inflammatory cytokines in Andean women with pre-eclampsia. *International Journal of Gynecology and Obstetrics*. 2001 Dec 1;75(3):243-9.  
[https://doi.org/10.1016/S0020-7292\(01\)00499-4](https://doi.org/10.1016/S0020-7292(01)00499-4)  
PMid:11728484
14. Wolf M, Kettyle E, Sandler L, Ecker JL, Roberts J, Thadhani R. Obesity and preeclampsia: the potential role of inflammation. *Obstetrics and Gynecology*. 2001 Nov 1;98(5):757-62.
15. Paternoster DM, Fantinato S, Stella A, Nanhorngue KN, Milani M, Plebani M, et al. C-reactive protein in hypertensive disorders in pregnancy. *Clinical and applied thrombosis/hemostasis*. 2006 Jul;12(3):330-7.  
<https://doi.org/10.1177/1076029606291382>  
PMid:16959687
16. Qiu C, Luthy DA, Zhang C, Walsh SW, Leisenring WM, Williams MA. A prospective study of maternal serum C-reactive protein concentrations and risk of preeclampsia. *American journal of hypertension*. 2004 Feb 1;17(2):154-60.  
<https://doi.org/10.1016/j.amjhyper.2003.09.011>  
PMid:14751658
17. Batashki I, Milchev N, Topalovska D, Uchikova E, Mateva N. C-reactive protein in women with pre-eclampsia. *Akusherstvo i Ginekologiya*. 2006 Jan 1;45:47-50.
18. Üstün Y, Engin-Üstün Y, Kamacı M. Association of fibrinogen and C-reactive protein with severity of preeclampsia. *European Journal of Obstetrics and Gynecology and Reproductive Biology*. 2005 Aug 1;121(2):154-8.  
<https://doi.org/10.1016/j.ejogrb.2004.12.009>  
PMid:16054955
19. Kumru S, Godekmerdan A, Kutlu S, Ozcan Z. Correlation of maternal serum high sensitive C-reactive protein levels with biochemical and clinical parameters in preeclampsia. *European Journal of Obstetrics and Gynecology and Reproductive Biology*. 2006 Feb 1;124(2):164-7.  
<https://doi.org/10.1016/j.ejogrb.2005.05.007>  
PMid:16054746

# Clinical Characteristics and Pattern of Imaging Change of Pediatric COVID-19

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## Abstract

**Introduction:** COVID-19 infection in children is relatively milder and vary from that in adults. Higher fatality rate of children in Bangladesh from COVID-19 infection does not matched with other country may be due to malnutrition, air pollution, poverty, poor parental education about health hygiene, inadequate access to high-quality acute healthcare. Chest X-ray is initial imaging technique which is done in children with mild respiratory infections with or without dyspnea. Few studies have reported the radiological findings of COVID-19 in children. **Objective:** In this study, our main goal was to investigate the clinical and imaging features of pediatric COVID-19 patients in child corona unit of Dhaka Medical College Hospital, Bangladesh. **Materials and Methods:** This single center observational study was conducted in Child Corona Unit of Dhaka Medical College Hospital between January 2022 to September 2022. A total of 123 COVID-19 positive pediatric patients detected by RT-PCR were purposively included in the study. Patients with comorbidities were excluded from the study. **Results:** Among 123 children with COVID-19, 43 had no symptoms, 71 had low grade fever and 9 presented with cough, nasal congestion, diarrhea, headache, or fatigue. Normal X-ray findings present in 50(40.6%), unilateral patchy shadowing in 28 (22.8%), bilateral patchy shadowing in 22(17.9%), ground glass opacity in 11(8.9%), consolidation in 7(5.8%) and Interstitial abnormalities in 5(4.0%). **Conclusion:** This study throw light on the cases of COVID-19 in the pediatric population. Children usually have mild or moderate clinical and imaging presentations. Understanding of the clinical and imaging findings helps in reducing misdiagnosis rate for those with concealed and atypical symptoms.

**Keywords:** COVID-19 infection, Paediatric patients, Clinical characteristics, Radiological features.

**Number of Tables:** 06; **Number of Figure:** 01; **Number of References:** 28; **Number of Correspondences:** 03.

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## Introduction:

Covid-19 infection broke out in December, 2019 has become a pandemic worldwide now<sup>1,2</sup>. The disease has been managed as one of class A infectious diseases. Class A infectious diseases indicate that, the diseases are the most infectious and which will be treated using the most severe measures: detecting and managing the source of infection, cutting off the transmission pathway, and protecting the susceptible population. The epidemic has entered its peak stage and better pathogen detection techniques have been developed, more children have been confirmed to be infected. In children patients infected with this virus with or without symptoms were the primary source of spread through close contact and respiratory droplets as the major person-to-person transmission channels, and a family cluster is the main epidemic spread of COVID-19 in paediatric patients<sup>3</sup>. The incubation period of infection of this virus is 1–14 days with most patients presenting with symptoms between 3–7 days<sup>4,5</sup>. Illness varies in severity from no clinical symptoms or with fever, fatigue, and dry cough, including accompanied upper respiratory symptoms like nasal congestion, runny nose, and sore throat; severe illness occurs in a large proportion of patients with clinically apparent infection<sup>6,7,8</sup>. Anorexia, nausea, vomiting, abdominal pain, and diarrhea may present initially.COVID-19 infection in children is relatively milder and vary from that in adults and a better prognosis with rare mortality in case of children with this disease have been reported<sup>9,10</sup>. Although a large proportion of infected children seems to be asymptomatic,severe pediatric cases of COVID-19 also have been reported<sup>10</sup>. If the COVID-19 infection occur in child who had some diseases, like severe acute malnutrition,

cancer, chronic kidney disease etc. the infection might progress quickly to severe or critically severe type of disease requiring admission to ICU and ventilation<sup>11</sup>. In pediatric patients fatal outcomes of COVID-19 pneumonia are rare, and only a few deaths have been reported<sup>12,13</sup>. Higher fatality rate of children in Bangladesh from COVID-19 infection does not matched with other country may be due to malnutrition, air pollution, poverty, poor parental education about health hygiene, inadequate access to high-quality acute healthcare<sup>14</sup>. Chest X-ray is initial imaging technique which is done in children with mild respiratory infections with or without dyspnea<sup>15</sup>. Few studies have reported the radiological findings of COVID-19 in children<sup>16</sup>.

#### Materials and Methods:

This cross-sectional observational study was conducted in the Paediatric COVID-19 unit, DMCH, Dhaka, Bangladesh. The only Government Paediatric Covid Unit in Bangladesh situated in Old Plastic and Burn Surgery Building of Dhaka Medical College. A total of 123 children diagnosed with COVID-19 infection detected by real-time reverse transcription-polymerase chain reaction (RT-PCR) and those underwent a chest X-ray due to symptoms of respiratory infection with at least one of the following symptoms: fever, nasal discharge, cough or respiratory distress were included in the study. Patients were excluded who had any comorbidities like Bronchial asthma, cystic fibrosis, tuberculosis, congenital heart disease, lymphoproliferative disorder, chronic kidney disease, chronic liver disease, hemoglobinopathies, rheumatological condition, chronic neurological disorder, immunosuppressive condition such as malignancy, immunosuppressive drug. Informed written consent was taken from patient's attendant. Patient's socio-demographic data were collected which include age, sex, contact history. The clinical features, laboratory parameters and radiological features were collected. Collected data were entered into SPSS and was checked. Data were analyzed and presented in tabulated form. The data collected from the patients were analyzed. The statistical analysis was conducted using SPSS (statistical package for the social science) version 26 statistical software. The findings of the study were presented by frequency, percentage in tables. Means and standard deviations for continuous variables and frequency distributions for categorical variables were used to describe the characteristics of the total sample. Association between qualitative data were assessed by Chi-Square and Fisher Exact tests. P value of <0.05 was considered as significant.

#### Results:

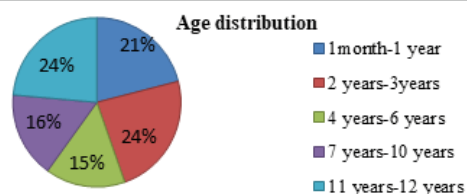


Figure-1: Characteristics of patients

Table- I: Characteristics of patients (N=123)

| Total number of patients                         | 123        |
|--------------------------------------------------|------------|
| Female                                           | 48 (39.02) |
| Male                                             | 75 (61)    |
| Positive epidemiological environment             |            |
| Positive                                         | 37 (30)    |
| Negative                                         | 86 (70)    |
| Comorbidity                                      | 36 (29)    |
| Infection with other organism                    | 16 (13)    |
| Hospitalisation                                  | 25 (20.3)  |
| Duration of hospitalisation, days (median [IQR]) | 3 [2.4]    |

Table- II: Clinical features and investigations

| Type of symptom  |           |
|------------------|-----------|
| Fever            | 71(57.7)  |
| Nasal congestion | 9 (7.3)   |
| Exanthema        | 3 (2.4)   |
| Myalgia          | 9 (7.3)   |
| Headache         | 9 (7.3)   |
| Cough            | 99(80.4)  |
| Chest pain       | 3 (2.4)   |
| Dyspnoea         | 24 (19.5) |
| Bronchospasm     | 1(0.8)    |
| Abdominal pain   | 8 (6.5)   |
| Vomiting         | 4 (3.2)   |
| Diarrhoea        | 9 (7.3)   |

Table - III: Distribution of patients by laboratory findings (N=123)

| Laboratory findings                                                                     | Frequency                         | Percentage |
|-----------------------------------------------------------------------------------------|-----------------------------------|------------|
| <b>Leucocyte count (<math>\times 1000</math> cell/ <math>\text{mm}^3</math>) (n=87)</b> |                                   |            |
| Normal                                                                                  | 21                                | 24.1       |
| Lower                                                                                   | 66                                | 75.9       |
| Median [IQR]                                                                            | 3,970.0 [3,800.0, 5,940.0]        |            |
| <b>Lymphocyte count (in %) (n=87)</b>                                                   |                                   |            |
| Normal                                                                                  | 20                                | 22.9       |
| Lower                                                                                   | 67                                | 77.1       |
| Median [IQR]                                                                            | 24.0 [22.0, 28.0]                 |            |
| <b>Platelet count (in <math>\text{mm}^3</math>)(n=87)</b>                               |                                   |            |
| Below                                                                                   | 12                                | 13.8       |
| Normal                                                                                  | 41                                | 47.0       |
| Higher                                                                                  | 34                                | 39.0       |
| Median [IQR]                                                                            | 3,59,000.0 [247,000.0, 49,0000.0] |            |
| <b>C-Reactive Protein (CRP)mg/L (n=71)</b>                                              |                                   |            |
| Normal                                                                                  | 28                                | 39.4       |
| Higher                                                                                  | 43                                | 60.6       |
| <b>D-dimer, mg/L (n=46)</b>                                                             |                                   |            |
| Normal                                                                                  | 8                                 | 17.4       |
| Higher                                                                                  | 38                                | 82.6       |
| Median [IQR]                                                                            | 2.5 [0.7, 4.4]                    |            |
| <b>Serum ferritin (in ng/mL)(n=48)</b>                                                  |                                   |            |
| Below                                                                                   | 2                                 | 4.2        |
| Normal                                                                                  | 12                                | 25.0       |
| Higher                                                                                  | 34                                | 70.8       |
| Median [IQR]                                                                            | 204.5 [91.0, 445.5]               |            |
| <b>Lactate dehydrogenase (in U/L) (n=47)</b>                                            |                                   |            |
| Below                                                                                   | 2                                 | 4.3        |
| Normal                                                                                  | 20                                | 42.6       |
| Higher                                                                                  | 25                                | 53.2       |
| Median [IQR]                                                                            | 500.0 [266.0, 740.0]              |            |

| Laboratory findings                          | Frequency            | Percentage |
|----------------------------------------------|----------------------|------------|
| <b>Lactate dehydrogenase (in U/L) (n=47)</b> |                      |            |
| Below                                        | 2                    | 4.3        |
| Normal                                       | 20                   | 42.6       |
| Higher                                       | 25                   | 53.2       |
| Median [IQR]                                 | 500.0 [266.0, 740.0] |            |

Table-IV Shows that 50 (40.6%) had no Chest X-ray abnormality. However, 28 (22.8%) had unilateral patchy opacity, 22 (17.9%) had bilateral patchy opacity. Ground-glass opacity (GGO) was present in 11 (8.9%) patients, consolidation was present in 7 (5.8%) patients and interstitial abnormalities was observed in 5 (4.0%) patients.

**Table IV: Distribution of patients by Chest X-ray findings (N=89)**

| Radiographic findings        | Frequency  | Percentage   |
|------------------------------|------------|--------------|
| No abnormality detected      | 50         | 40.6         |
| Unilateral patchy opacity    | 28         | 22.8         |
| Bilateral patchy opacity     | 22         | 17.9         |
| Ground - glass opacity (GGO) | 11         | 8.9          |
| Consolidation                | 7          | 5.8          |
| Interstitial abnormalities   | 5          | 4.0          |
| <b>Total</b>                 | <b>123</b> | <b>100.0</b> |

Table-V shows that most of the patients (86.8%) in severe group had lower leucocyte count while majority of the patients (67.3%) in mild to moderate group had lower leucocyte count ( $p=0.035$ ). Lymphocyte count was significantly lower in severe patients compared to mild to moderate patients ( $P=0.009$ ). Out of 71 patients, 6 (21.4%) patients with CRP  $<6$  had severe illness while 27 (62.8%) patients with CRP  $\geq 6$  CRP had severe illness ( $P=0.001$ ). No significant statistical difference was observed between the groups regarding Platelet count ( $P=0.166$ ), Hemoglobin ( $P=0.352$ ), D-dimer ( $P=0.440$ ), Ferritin ( $P=0.118$ ).

**Table V: Association between laboratory findings and severity of disease**

| Laboratory findings            | Severity of disease |            | P value      |
|--------------------------------|---------------------|------------|--------------|
|                                | Mild to moderate    | Severe     |              |
| <b>Leucocyte count (N=87)</b>  |                     |            |              |
| Normal                         | 16 (32.7%)          | 5 (13.2%)  | 0.035        |
| Lower                          | 33 (67.3%)          | 33 (86.8%) |              |
| <b>Lymphocyte count (N=87)</b> |                     |            |              |
| Normal                         | 16 (32.7%)          | 4 (10.5%)  | 0.009        |
| Lower                          | 33 (67.3%)          | 34 (89.5%) |              |
| <b>Platelet count (N=87)</b>   |                     |            |              |
| Below                          | 7 (58.3%)           | 5 (41.7%)  | 0.166        |
| Normal                         | 27 (65.9%)          | 14 (34.1%) |              |
| Higher                         | 15 (41.1%)          | 9 (59.9%)  |              |
| <b>Hemoglobin (N=87)</b>       |                     |            |              |
| Below                          | 43 (51.1%)          | 31 (41.9%) | 0.352*       |
| Normal                         | 5 (41.7%)           | 7 (58.3%)  |              |
| Higher                         | 1 (100.0%)          | 0 (0.0%)   |              |
| <b>D-dimer (n=46)</b>          |                     |            |              |
| Normal                         | 6 (75.0%)           | 2 (25.0%)  | 0.440*       |
| Higher                         | 21 (55.3%)          | 17 (44.7%) |              |
| <b>CRP (n=71)</b>              |                     |            |              |
| <6                             | 22 (78.6%)          | 6 (21.4%)  | <b>0.001</b> |
| ≥6                             | 16 (37.2%)          | 27 (62.8%) |              |
| <b>Ferritin (n=48)</b>         |                     |            |              |
| Below                          | 0 (0.0%)            | 2 (100.0%) | 0.118*       |
| Normal                         | 9 (75.0%)           | 3 (25.0%)  |              |
| Higher                         | 21 (61.8%)          | 13 (38.2%) |              |

\*Fisher Exact test

Table-VI Show that all patients with no abnormality in radiographic finding had mild illness while 22(80.0%) patients with unilateral patchy opacity had severe illness and 5(71.5%) with consolidation had severe illness. Fisher Exact test showed that there were significant statistical difference between radiographic findings and severity of disease as  $P<0.001$ .

**Table VI: Association between Chest X-ray findings and severity of disease (N=123)**

| Chest-X ray findings       | Severity of disease |            | P value |
|----------------------------|---------------------|------------|---------|
|                            | Mild to moderate    | Severe     |         |
| No abnormality detected    | 50 (100.0%)         | 0 (0.0%)   | <0.001  |
| Unilateral patchy opacity  | 6 (20.0%)           | 22 (80.0%) |         |
| Bilateral patchy opacity   | 5 (23.0%)           | 17 (77.0%) |         |
| Ground-glass opacity (GGO) | 3 (27.3%)           | 8 (72.7%)  |         |
| Consolidation              | 2 (28.5%)           | 5 (71.50%) |         |
| Interstitial abnormalities | 5 (100.0%)          | 0 (0.0%)   |         |

### Discussion:

Coronavirus disease-19 (COVID-19) is a global health crisis. Clinical symptoms are similar to any acute respiratory viral infection with less pronounced nasal symptoms. Disease seems to be milder in children but situation appear to be changing. While children experienced less severe illness than adults, young children specially infants are more vulnerable to disease and experienced more severe illness than older children<sup>17</sup>. The present cross sectional study had been conducted to find out the clinical characteristics and radiological features in children with COVID-19 infection. A total of 123 patients diagnosed with COVID-19 infection confirmed by real-time reverse transcription-polymerase chain reaction (RT-PCR) were purposively included in the study. Majority children had mild to moderate symptoms and majority children infected with COVID-19 were exposed through family clusters. Fever and cough were the most common symptoms where diarrhea and vomiting were also found in many patients. Leucocyte and lymphocyte counts are often below the normal range in children with COVID-19. Abnormalities in radio-imaging were found in majority of the patients, the most common being unilateral or bilateral patchy opacity. Infants and patients with lung abnormalities, lower leukocyte and lower lymphocyte count and elevated CRP had significantly more in severe form of disease than others. Among the 123 patients, 21.0% were from 1month-1 year age group, 24% patients were from 2-3 years age group, 15% patients were from 4-6 years age group, 16% patients were from 7-10 years age group, while 21% patients were from  $>10$  years age group. The study of Ghosh, et al. (2020) found that one fifth were infant, more than one third patients were from 1-5 years age group, another one fifth were from 5-10 years age group while 12.7% patients were from  $>10$  years age group. However, the single center observational study of Anwar, et al. (2021) showed that maximum patients were in the group of 11-15 years. A meta-analysis reported that 60.1% of the children were older than 5 years<sup>19</sup>. This difference might be due to the fact that the present study dealt with RT-PCR confirmed case and patients with up to 12 while those study included patients up to 18 years of age. Majority patients of this study were

male. The study conducted in Child Corona Unit of Dhaka Medical College Hospital (DMCH) also found that the proportion of male patients were higher compared to female patients<sup>14</sup>. Other studies also supported this results<sup>22</sup>. Pediatric patients are more likely to show upper respiratory symptoms, such as sore throat, pharyngeal congestion, and rhinorrhea. (Ding et al., 2020) Cough and fever and were most common symptom (80.4% and 57.7%) among the patients of the present study followed dyspnoea (19.5%). Others had diarrhea (7.3%), myalgia (7.3%), vomiting (3.2%), headache (7.3%), runny nose (7.3%) and abdominal pain (6.5%)<sup>28</sup>. The clinical profile of all patients of a study showed that fever, nasal congestion, cough, myalgia were very common symptoms.(Anwar et al., 2021) Again, the clinical profile of patients of a study showed that fever, cough, sore throat, runny nose, anorexia, convulsion, respiratory distress & acute diarrhea were the common symptoms<sup>22,23,24</sup>. Some atypical findings were presented in few patients of the current study which was later diagnosed as MIS-C. Multisystem Inflammatory Syndrome in Children (MIS-C) is a new phenomenon reported worldwide with temporal association with COVID-19<sup>18,20</sup>. Majority of the patients 50(40.6%) had no radiological abnormality where 28 (22.8%) had unilateral patchy opacity, another 22 (17.9%) had bilateral patchy opacity. Interstitial abnormalities was observed in 5 (4.0%) patients, consolidation was present in 7 (5.8%) patients and Ground-glass opacity (GGO) was present in 11 (8.9%) patients. Relatively similar results were reported by one study which found 38% were undergone local patchy shadowing, 31.8% patients were undergone bilateral patchy shadowing and 27.9% patients had interstitial abnormalities and only 2.1% patients were undergone Ground-glass opacity.(Anwar et al., 2021) A study reported that unilateral pneumonia is common in children with COVID-19 and the main change in imaging is ground-glass opacity<sup>27</sup>. Leukocyte and Lymphocyte count were lower in majority (>75.0%) patients. According to the Diagnosis and Treatment Program of Novel Coronavirus Infected Pneumonia, the leucocyte count usually remains normal or decreases, and the lymphocyte count decreases.(Lu et al., 2020) Majority patients had higher Lactate dehydrogenase (53.2%), serum ferritin (70.0%), C-Reactive Protein level (70.5%) and D-dimer (82.6%). Higher inflammatory markers (Lactate dehydrogenase and C-Reactive Protein) were also observed in other studies<sup>10,19</sup>. Leucocyte and Lymphocyte count were significantly lower in severe patients compared to mild to moderate patients (P=0.035, P=0.009 respectively). This finding was supported by the meta-analysis of Ding et al. (2020). Huang, et al. (2020) reported that leucocyte and Lymphocyte count were significantly lower in ICU patients compared to non-ICU patients. Lymphopenia is considered a remarkable feature of SARS and MERS because of apoptosis and viral particle-induced cytoplasmic damage<sup>20,25,26</sup>. All patients with no abnormality in radiographic finding had mild illness while 22(80.0%) patients with unilateral patchy opacity had severe illness and 5(71.5%) with consolidation had severe illness.

#### Conclusion:

Children with COVID-19 had mild to moderate symptoms. Fever and cough were the main symptoms of COVID-19 while vomiting and diarrhea occurring less frequently in

children. Few patients presented with MIS-C. Patchy opacity was the most common radiographic findings of children. Leucocyte and lymphocyte counts were often in below the normal range in children with COVID-19. Infants, patients with lung abnormalities, lower leucocyte, lymphocyte count and elevated CRP had significantly more severe form of disease than others. Clinical practitioners should pay attention on the specific characteristics of children to improve the accuracy of diagnosis and treatment of COVID-19.

**Conflict of Interest:** None.

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#### References:

1. Coronaviridae Study Group of the International Committee on Taxonomy of V. The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol.* 2020;5:536-44.  
<https://doi.org/10.1038/s41564-020-0695-z>  
PMid:32123347 PMCID:PMC7095448
2. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China *Lancet.* 2020.  
[https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5)  
PMid:31986264
3. Chan JF, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet.* 2020;395:514-23.  
[https://doi.org/10.1016/S0140-6736\(20\)30154-9](https://doi.org/10.1016/S0140-6736(20)30154-9)  
PMid:31986261
4. Backer JA, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20-28 January 2020. *Euro Surveill.* 2020;25  
<https://doi.org/10.2807/1560-7917.ES.2020.25.5.2000062>  
PMid:32046819 PMCID:PMC7014672
5. Xu YH, Dong JH, An WM, et al. Clinical and computed tomographic imaging features of novel coronavirus pneumonia caused by SARS-CoV-2. *J Inf Secur.* 2020;80:394-400.  
<https://doi.org/10.1016/j.jinf.2020.02.017>  
PMid:32109443 PMCID:PMC7102535
6. Du W, Yu J, Wang H, et al. Clinical characteristics of COVID-19 in children compared with adults in Shandong Province. *China Infection.* 2020.  
<https://doi.org/10.1007/s15010-020-01427-2>  
PMid:32301099 PMCID:PMC7161094
7. Tan YP, Tan BY, Pan J, Wu J, Zeng SZ, Wei HY. Epidemiologic and clinical characteristics of 10 children with coronavirus disease 2019 in Changsha, China. *J Clin Virol.* 2020;127:104353.  
<https://doi.org/10.1016/j.jcv.2020.104353>

PMid:32302953 PMCID:PMC7195108

8. Yang P, Wang X, Liu P, et al. Clinical characteristics and risk assessment of newborns born to mothers with COVID-19. *J Clin Virol.* 2020;127:104356.

<https://doi.org/10.1016/j.jcv.2020.104356>

PMid:32302955 PMCID:PMC7194834

9. Balasubramanian SRN, Goenka A, Roderick M, Ramanan AV. Coronavirus disease (COVID-19) in children - what we know so far and what we Do not? *Indian Pediatr.* 2020; [Epub ahead of print].

<https://doi.org/10.1007/s13312-020-1819-5>

PMid:32273490 PMCID:PMC7240240

10. Sun DLH, Lu XX, Xiao H, Ren J, Zhang FR, Liu ZS. Clinical features of severe pediatric patients with coronavirus disease 2019 in Wuhan: a single center's observational study. *World J Pediatr.* 2020; [Epub ahead of print]

<https://doi.org/10.1007/s12519-020-00354-4>

PMid:32193831 PMCID:PMC7091225

11. Chen F, Liu ZS, Zhang FR, et al. First case of severe childhood novel coronavirus pneumonia in China. *Zhonghua er ke za zhi.* 2020;58:179-82.

12. Gotzinger F, Santiago-Garcia B, Noguera-Julian A, et al. COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. *Lancet Child Adolesc Health.* 2020.

[https://doi.org/10.1016/S2352-4642\(20\)30177-2](https://doi.org/10.1016/S2352-4642(20)30177-2)

PMid:32593339

13. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatr.* 2020;109:1088-95.

<https://doi.org/10.1111/apa.15270>

PMid:32202343 PMCID:PMC7228328

14. Anwar S, Shamsad AI, Morshed AKM, Farzana F. Clinical Profile of Child COVID-19 Patients of Bangladesh. *American Journal of Pediatrics.* 2021;7(1): 5-8 .

<https://doi.org/10.11648/j.ajp.20210701.12>

15. Tezer H, Bedir Demirdag T, disease Ncoronavirus. COVID-19) in children. *Turk J Med Sci* 2020; 50(SI-1): 592-603.

<https://doi.org/10.3906/sag-2004-174>

PMid:32304191 PMCID:PMC7195991

16. Lu Y, Wen H, Rong D, Zhou Z, Liu H. Clinical characteristics and radiological features of children infected with the 2019 novel coronavirus. *Clin Radiol* 2020; 75. <https://doi.org/10.1016/j.crad.2020.04.010>

PMid:32389373 PMCID:PMC7252054

17. Management guideline for paediatric COVID-19.(2020). Bangladesh Pediatric Association.

18. Radia T, Williams N, Agrawal P, Harman K, Weale J, Cook J and Gupta A. Multi-system inflammatory syndrome in children & adolescents (MIS-C): A systematic review of clinical features and presentation. *Paediatric Respiratory Reviews.* 2021;38:51-57. <https://doi.org/10.1016/j.prrv.2020.08.001> PMid:32891582 PMCID:PMC7417920

19. Ding Y, Yan H & Guo W. Clinical characteristics of children with COVID-19: a meta-analysis. *Frontiers in*

*pediatrics.* 2020; 8:431.

<https://doi.org/10.3389/fped.2020.00431>

PMid:32719759 PMCID:PMC7350605

20. Chu H, Zhou J, Wong B.H.Y, Li, C, Chan J.F.W, et al. Middle East respiratory syndrome coronavirus efficiently infects human primary T lymphocytes and activates the extrinsic and intrinsic apoptosis pathways. *The Journal of infectious diseases.* 2016; 213(6): 904-914. <https://doi.org/10.1093/infdis/jiv380>

PMid:26203058 PMCID:PMC7107330

21. Feldstein L.R, Rose E.B, Horwitz S.M, Collins J.P, Newhams M.M, Son M.B.F, et al. Multisystem inflammatory syndrome in US children and adolescents. *New England Journal of Medicine.* 2020;383(4): 334-346.

<https://doi.org/10.1056/NEJMoa2021680> PMid:32598831 PMCID:PMC7346765

22. Ghosh U.K, Sultana A. Ghosh N.K, Akram A, Ahmed E, Rana I.H, et al. Clinico-demographic Profile of Coronavirus Infection among Bangladeshi Children: A Tertiary Care Hospital Study. *Bangladesh Journal of Infectious Diseases.* 2020:S16-S21.

<https://doi.org/10.3329/bjid.v7i00.50157>

23. Heimdal I, Moe N, Krokstad S, Christensen A, Skanke L.H, Nordbø S.A, et al. Human Coronavirus in Hospitalized Children with Respiratory Tract Infections: A 9-Year Population-Based Study From Norway. *The Journal of infectious diseases.* 2019; 219(8):1198-1206. <https://doi.org/10.1093/infdis/jiy646>

PMid:30418633 PMCID:PMC7107437

24. Ksiazek T.G, Erdman D, Goldsmith C.S, Zaki S.R, Peret T, Emery S, et al. A novel coronavirus associated with severe acute respiratory syndrome. *New England journal of medicine.* 2003; 348(20):1953-1966. <https://doi.org/10.1056/NEJMoa030781> PMid:12690092

25. Liu WJ, Zhao M, Liu K, Xu K, Wong, TanW, et al. T-cell immunity of SARS-CoV: Implications for vaccine development against MERS-CoV. *Antiviral research.* 2017;137:82-92. <https://doi.org/10.1016/j.antiviral.2016.11.006> PMid:27840203 PMCID:PMC7113894

26. Lifan Y, Dai Zhenyuan D.M, Yang Z, Wanqiu D, Li P, Yating L, et al . Suggestions for medical staff from department of pediatrics during the treatment of 2019-nCoV infection/pneumonia. *Journal of New Medicine.* 2020;51(2):77.

27. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *Journal of American Medical Association.* 2020; 323(11): 1061-1069. <https://doi.org/10.1001/jama.2020.1585> PMid:32031570 PMCID:PMC7042881

28. Xiao F, Tang M, Zheng X, Liu Y, Li X and Shan H. Evidence for gastrointestinal infection of SARS-CoV-2. *Gastroenterology.* 2020;158(6):1831-1833.

<https://doi.org/10.1053/j.gastro.2020.02.055>

PMid:32142773 PMCID:PMC7130181

# Medical Waste Management Practices in Sylhet City among Healthcare Providers

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## Abstract

**Introduction:** In the present world, large amount of wastes are clinical wastes, generated during diagnosis, treatment and research purpose. Most of the clinical wastes are hazardous like infectious, toxic of radioactive compounds. It is challenging to ensure proper waste management for developing countries like Bangladesh. **Materials and Methods:** This cross sectional study was conducted among doctors, nurse, nursing assistants, OT technicians, janitors, helper, sanitary worker and security guards at different private hospitals, clinics and diagnostic centers in Sylhet city. 300 healthcare staffs were purposively interviewed to evaluate the extend practices of biological or hospital waste management from January 2021 to December 2021. The study was conducted after taking informed written consent. **Results:** The outcomes of the present study indicated that maximum of the study participants were knowledgeable. But majority (71%) still do not use PPE (Personal protective equipment), 53% were not immunized against hepatitis B. They also had less practice to keep the hospital wastes in correct color coded container and less practice of washing the waste container properly. **Conclusion:** Most participants valued the significance of waste management practice to prevent health hazards but average practice was observed among them. For proper waste handling and disposal, frequent awareness program should be conducted among the health personnel.

**Keywords:** Hospital waste, management, biological hazard, medical waste, practice.

**Number of Tables:** : 02. **Number of Figures:** 04; **Number of References:** 20; **Number of Correspondences:** 02.

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## Introduction:

The waste material that are generated in the hospitals, clinics, laboratories or research centers are known as medical waste (MW) or biomedical waste (BMW)<sup>1</sup>. These types of waste materials not only threaten environment, but also harmful for the patients and health care professionals<sup>2</sup>. Biological wastes are of different categories like, human anatomical waste, animal waste, micro-biological or bacteriological waste, sharp waste, discarded medicine or cytotoxic drugs, incineration and chemical waste<sup>3</sup>. Cholera, diarrhoea, wound infection, respiratory tract infection, hepatitis, tuberculosis may be associated with improper hospital waste management<sup>2</sup>. Doctors, nurse, laboratory technicians, cleaning stuffs are more vulnerable to the harmful effects of such wastes. Biomedical waste should be separated at the source of generation, keep them in a specific color coded container or bag before their final disposal<sup>4</sup>. Studies found that, better academic knowledge is possessed by doctors, but practical knowledge is more among nurses, janitors and sanitary workers<sup>5</sup>. Proper attention is necessary for collection, transport, storage and proper disposal of biochemical waste is crucial. Several problems are associated with inappropriate waste management. These includes insufficient training, lack of knowledge, careless of maintaining waste management protocol, inadequate funding, lack of man power, unavailable disposal system and many others. Most importantly monitoring system is not available in many health institutes<sup>3</sup>. Many countries in the world cannot regulate the waste management system properly or they are not very much concerned about the situation. Infect training facilities for health care providers are not available in many medical institutes<sup>4</sup>. To prevent hospital acquired infections and personal protection, clinicians and hospital stuffs need acquaintance of proper awareness and practice on the topic of medical waste<sup>2</sup>. Several studies were conducted to evaluate the knowledge, attitude, practice (KAP) of biological waste management in our country. But no studies found so far to evaluate the practice of hospital waste management among health care workers in the hospitals of Sylhet city. Consequently, this study was

supervised to assess the practice of waste management among health professionals in hospitals of Sylhet city for the better management of the hospital wastes.

#### Materials and Methods:

The study is a questionnaire-based observational study conducted on the health care workers. Health care professionals, agreeable to took part in the research study including doctors, nurse, nursing assistants, OT technicians, janitors, helper, sanitary worker, even security guards were involved. Total 300 participants of different private hospitals, clinics and diagnostic centers from Sylhet city took part into the study from January 2021 to December 2021. For collection of data, purposive sampling methods were implied. A structured questionnaire was used for the collection of data. Total 23 questions were included into the questionnaire regarding practice and attitude of waste management. Before data collection, the nature, purpose of the study was explained to the participants and asked for their spontaneous collaboration. Participants were allowed to withdraw him or herself anytime from the study. Data collection, processing and analysis was done by Department of Community Medicine, Park view Medical College Hospital, Sylhet. All the data were processed and analyzed in SPSS (Statistical Package for the Social Sciences) version 22. Tables and graphs are used for data presentation.

#### Results:

Socio-demographic characteristics of the study population was shown on table I. Subjects from 20 to 60 years were involved, where 55% were female. Only 6% doctors participated in the study and 35% were maid. Experience in the medical section was <5 years were found among 56% subjects. Knowledge regarding hospital or biological waste management on study subjects were shown on table II.

**Table I: Frequency distribution of socio-demographic characteristics of the participants (N=300)**

| Characteristics    | Sub group         | Frequency | Percentage |
|--------------------|-------------------|-----------|------------|
| Age                | 20- 30 years      | 51        | 17         |
|                    | 31- 40 years      | 126       | 42         |
|                    | 41- 50 years      | 87        | 29         |
|                    | 51- 60 years      | 36        | 12         |
| Sex                | Male              | 135       | 45         |
|                    | Female            | 165       | 55         |
| Occupation         | Doctor            | 18        | 6          |
|                    | Nurse             | 48        | 16         |
|                    | Nursing assistant | 18        | 6          |
|                    | Maid              | 105       | 35         |
|                    | Sanitary worker   | 15        | 5          |
|                    | Security guard    | 21        | 7          |
|                    | Word boy          | 15        | 5          |
|                    | Word master       | 3         | 1          |
|                    | Ambulance driver  | 6         | 2          |
|                    | Helper            | 24        | 8          |
|                    | OT technician     | 27        | 9          |
| Education          | Post graduate     | 3         | 1          |
|                    | MBBS              | 15        | 5          |
|                    | Graduate          | 39        | 13         |
|                    | HSC               | 42        | 14         |
|                    | SSC               | 63        | 21         |
|                    | Primary           | 90        | 30         |
| Working experience | Uneducated        | 48        | 16         |
|                    | < 5 years         | 168       | 56         |
|                    | 5- 10 years       | 105       | 35         |
|                    | 11- 20 years      | 257       | 9          |

**Table II: Knowledge on medical waste management (N=300)**

|                                                                | Sub group | Frequency (n) | Percentage (%) |
|----------------------------------------------------------------|-----------|---------------|----------------|
| Knowledge about waste management                               | Poor      | 198           | 66             |
|                                                                | Average   | 84            | 28             |
|                                                                | Good      | 18            | 6              |
| Attitude about collection of waste                             | Positive  | 288           | 96             |
|                                                                | Negative  | 12            | 4              |
| Disposal should be a priority                                  | Yes       | 279           | 93             |
|                                                                | No        | 21            | 7              |
| Waste disposal responsibility                                  | Everyone  | 285           | 95             |
|                                                                | Admin     | 15            | 5              |
| Attitude about safe disposal of waste                          | Positive  | 252           | 84             |
|                                                                | Negative  | 48            | 16             |
| Practices of separate collection                               | Yes       | 168           | 56             |
|                                                                | No        | 132           | 44             |
| Practices of labeling infectious and non-infectious waste bins | Yes       | 225           | 75             |
|                                                                | No        | 75            | 25             |
| Provision of personal protective items by the hospital         | Yes       | 261           | 87             |
|                                                                | No        | 39            | 13             |
| Hand washing practice                                          | Yes       | 294           | 98             |
|                                                                | No        | 6             | 2              |
| Receiving training on waste management                         | Yes       | 285           | 95             |
|                                                                | No        | 15            | 5              |
| Do you maintain a record for BMW                               | Yes       | 240           | 80             |
|                                                                | No        | 60            | 20             |
| Have you been immunized against hepatitis B                    | Yes       | 141           | 47             |
|                                                                | No        | 159           | 53             |

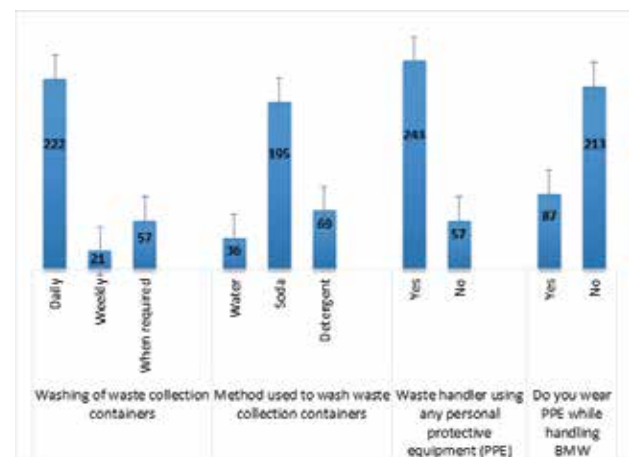


**Figure-1: Waste management practice by hospitals**

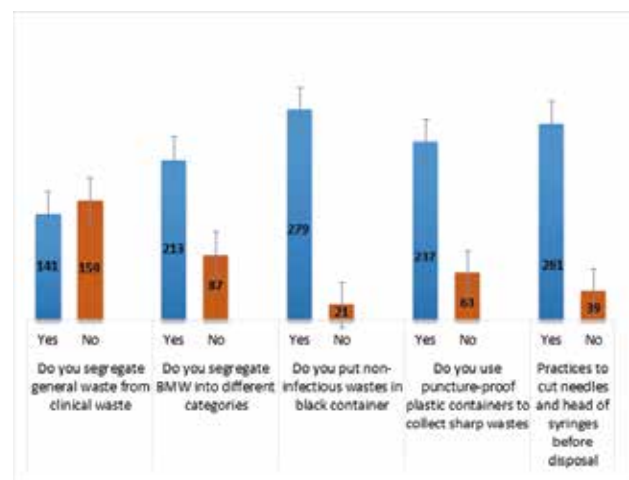


**Figure-2: Practice of waste disposal**

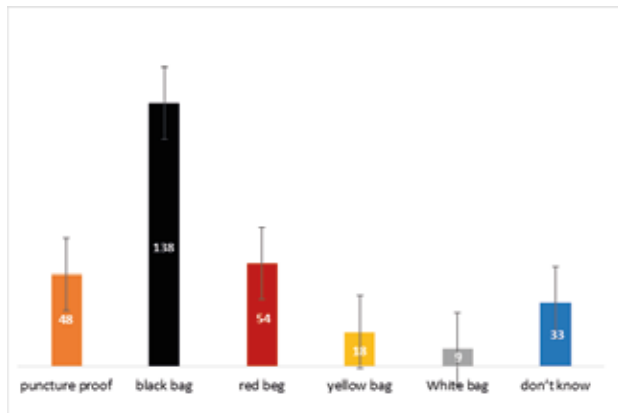


**Figure-3: Practices of disposed of items contaminated by blood**

#### Discussion:

There is a tremendous growth of hospitals and clinics in Sylhet city due to increased demand of healthcare facilities. Hospitals and clinics of Sylhet generates 0.934 kg/bed/day of waste every day and the amount is higher than outdoor clinics and diagnostic centers<sup>6</sup>.

Poor practice of waste disposal (66%) was observed in this study. Only 6% revealed that they possessed good knowledge about hospital waste management. Although the knowledge is poor, 96% and 93% of them had positive attitude about proper waste collection and disposal. Majority (93%) of them think that waste disposal is the responsibility of everyone. Abdo 2019 also found positive attitude of waste management among the health personals. They also mentioned some other studies similar with this findings<sup>7</sup>. Doctors had less waste management practice than other medical stuffs in this study. This findings are contrary with Mattoo, Hameed and Butt 2019 (Asif et al)<sup>5</sup>. Another study in Bangalore, India found better waste management among doctors and nurses.<sup>8</sup> A study in Nigeria 45% doctors and 33% nurses received training on proper waste management (Imam)<sup>2</sup>. Study in Rawalpindi, Pakistan reveled that majority subjects (77%) did not get any training (Asif et al)<sup>5</sup>. In the present study, 95% medical person received training on waste management from their institute. 87% participants confirmed that personal protective items are provided by their working place and 81% uses PPE (Personal protective equipment) during waste handling. A study revealed, workers other than doctors and nurses did not use PPE regularly while handling wastes. It may be due to their poor knowledge regarding hazards of biomedical wastes<sup>8</sup>. As hand washing is the primary concern of everyone, 98% had hand washing practice. In the question of immunization, 53% were not immunized against hepatitis B virus. Basavaraj, Shashibhushan and Sreedevi 2021 found all the doctors and nurses received hepatitis B vaccine in their study, but 29.5% stuffs were not immunized<sup>8</sup>. There are several recommendations and guidelines for proper waste management. Specific color coded baskets or bags should use for waste disposal and the containers must be covered<sup>3</sup>. Form this survey we

came to know that 47% medical personal do not separate general waste from the clinical waste and 29% do not separate waste into different categories. Karenzi et al. conducted a study in Rwanda and found majority nurse did not segregate waste material into categories<sup>9</sup>. The current study demonstrated that 75% label the infectious and noninfectious waste separately. Human or animal tissue waste should keep in yellow container. Only 6% subjects in this study knew the fact that blood contaminated items should be placed on yellow container. Rest had wrong idea about disposal of the blood stained items. Microbiology or soiled waste should keep in red container, blue or transparent container should use for sharp waste. Discarder medicine, cytotoxic drugs, chemical and incineration waste should be place on black containers<sup>3</sup>. 93% participants in our study put noninfectious waste in black containers. 87% disposed needle, head of the syringe before disposal and aware of needle stick injury. 74% agreed to wash these waste containing container daily. Waste disposal in color coded container is still properly not known by health personals in our study. A study in India found that their participants were well awarded about the color coded disposal system<sup>8</sup>. 65% from this study think that soda should be used for the washing of the waste container. But the washing or cleaning method is different for different containers. Red, white and blue container should be treated with autoclaving, microwaving or dry heat. Yellow container should be incinerated or deeply buried<sup>10</sup>. Fully covered vehicles should use for transports of the wastes. International infectious substance symbol must be present in the bags and containers containing infectious wastes. Incineration of human tissue, autoclave the instruments, waste containing containers or vehicles washing facilitates should be available in all health care institutes. Maintenance of waste record is mandatory. In this study, 80% maintained the record of biological waste management. Doctors had less tendency to maintain record of biomedical waste than nurses and other hospital stuffs were found in another study<sup>8</sup>. Above all, a proper monitoring committee must be present to ensure proper waste management in the concerned institute<sup>3</sup>. We conducted our survey on the private hospitals and clinics. But could not reach into government hospitals. The result of this survey may be different in government hospitals. Future study is recommended to be conducted at government hospitals.



**Figure: International infectious substance symbol**



**Figure-4: Color coded container for waste disposal**

#### Conclusion:

Average waste management practice was observed in the participants of this study. Periodic training and education program regarding collection, storage, transport and safe disposal of hospital or biological waste is necessary for health care providers and hospital staffs to improve the waste disposal practice. Strict enactment of waste management guideline is also recommended.

**Conflict of Interest:** None.

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#### References:

1. Ilić-Živojinović JB, Ilić B, Backović D, Tomanić M, Gavrilović A, Bogdanović L. Knowledge and attitudes on medical waste management among Belgrade medical and dental students. *Srpski arhiv za celokupno lekarstvo*. 2019;147(5-6):281-5. <https://doi.org/10.2298/SARH180405065I>
2. Windfeld ES, Brooks MS. Medical waste management-A review. *Journal of environmental management*. 2015;163:98-108. <https://doi.org/10.1016/j.jenvman.2015.08.013> PMID:26301686
3. Shareefdeen ZM. Medical waste management and control. *Journal of Environmental Protection*. 2012;3(12):1625. <https://doi.org/10.4236/jep.2012.312179>
4. Imam TS, Sani M, Sani A. Assessment of Attitude, Knowledge and Practice of Biomedical Waste Management in Surgical Theaters of Some Selected Hospitals in Urban Kano, Northern Nigeria. *Dutse Journal of Pure and Applied Sciences*. 2019;5(1):43-56.
5. Padmanabhan KK, Barik D. Health hazards of medical waste and its disposal. In *Energy from toxic organic waste for heat and power generation 2019*. Woodhead Publishing. <https://doi.org/10.1016/B978-0-08-102528-4.00008-0> PMID:PMC7152398
6. Mandal SK, Dutta J. Integrated bio-medical waste management plan for Patna city. Institute of Town Planners. 2009.
7. Hirani DP, Villaitramani KR, Kumbhar SJ. Biomedical waste: an introduction to its management. *International Journal of Innovative Research in Advanced Engineering*. 2014;1(8):82-7.
8. Datta P, Mohi G, Chander J. Biomedical waste management in India: Critical appraisal. *Journal of laboratory physicians*. 2018;10(01):006-14. [https://doi.org/10.4103/JLP.JLP\\_89\\_17](https://doi.org/10.4103/JLP.JLP_89_17) PMID:29403196 PMID:PMC5784295

2018;10(01):006-14.

[https://doi.org/10.4103/JLP.JLP\\_89\\_17](https://doi.org/10.4103/JLP.JLP_89_17)

PMid:29403196 PMID:PMC5784295

9. Njiru MW, Mutai C, Gikunju J. Awareness and practice on biomedical waste management among health care personnel in kenyatta national hospital. *East African medical journal*. 2013;90(2):52-8.

10. Mattoo AM, Hameed S, Butt AM. Healthcare Waste Management: Current Knowledge, Attitude and Practices "A Study at Secondary and Tertiary Care Hospitals". *Pakistan Journal of Medical Research*. 2019;58(4):187-92. 11. Shahjahan M, Sarkar KA, Haque MA, Khan TA. Hospital waste management in Sylhet city.

12. Abdo NM, Hamza WS, Al-Fadhli MA. Effectiveness of education program on hospital waste management. *International Journal of Workplace Health Management*. 2019.

<https://doi.org/10.1108/IJWHM-10-2018-0137>

13. Basavaraj TJ, Shashibhushan BL, Sreedevi A. To assess the knowledge, attitude and practices in biomedical waste management among health care workers in dedicated COVID hospital in Bangalore. *The Egyptian Journal of Internal Medicine*. 2021;33(1):1-5.

<https://doi.org/10.1186/s43162-021-00066-9>

PMid:34803371 PMID:PMC8592803

14. Bencko V, Kapek J, Vinš O. Hospital waste treatment and disposal in the general university hospital-current situation and future challenges. *Indoor and Built Environment*. 2003;12(1-2):99-104

<https://doi.org/10.1177/1420326X03012001016>

15. Tobin EA, Edigbonya TF, Asogun DA, Oteri AJ. Assessment of healthcare waste management practices in primary health care facilities in a Lassa Fever Endemic Local Government Area of Edo state, Nigeria. *Afrimed Journal*. 2013;4(2):16-23.

16. Jotham K. Occupational health risks associated with medical waste management practices among health professionals 252 working in three district hospitals in Rwanda 2019. *Rwanda J. Med. Health Sci*. 2019;2(3):252-7.

<https://doi.org/10.4314/rjmh.v2i3.7>

17. Singhal L, Tuli AK, Gautam V. Biomedical waste management guidelines 2016: what's done and what needs to be done. *Indian Journal of Medical Microbiology*. 2017;35(2):194-8. [https://doi.org/10.4103/ijmm.IJMM\\_17\\_105](https://doi.org/10.4103/ijmm.IJMM_17_105)

PMid:28681805

18. Abah SO, Ohimain EI. Healthcare waste management in Nigeria: A case study. *Journal of Public health and Epidemiology*. 2011;3(3):99-110.

19. Sefouhi L, Kalla M, Bahmed L, Aouragh L. The risk assessment for the healthcare waste in the hospital of Batna city, Algeria. *International journal of environmental science and development*. 2013;4(4):442.

<https://doi.org/10.7763/IJESD.2013.V4.390>

20. Abor PA. Managing healthcare waste in Ghana: a comparative study of public and private hospitals. *International journal of health care quality assurance*. 2013;26(4):375-86.

<https://doi.org/10.1108/09526861311319591> PMID:23795428

# Study of the Frequency and Outcome of Acute Respiratory Tract Infection in Exclusively Breastfed Infants

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## Abstract

**Introduction:** Exclusive breast feeding is the fundamental component of child nutrition and survival. Exclusive breast feeding provides nutritional and immunological support for infant normal growth and development. Bangladesh is traditionally a breastfed community. The risks of acute respiratory infection (ARI) is higher in partially breastfed and formula-fed infants during the first 4 months of life. **Objective:** To see frequency and outcome of ARI in exclusively breastfed (EBF) infants. **Materials and Methods:** This cross sectional study was done at Department of Pediatrics, Rajshahi Medical College Hospital, from January 2013 to June 2013, a period of six months to find out the frequency and outcome of acute respiratory tract (ARI) infection in exclusively breastfed infants. 100 cases of infants suffering from ARI were selected who were exclusively breastfed. Data were analyzed through SPSS software. **Results:** Most of the EBF babies (M48+F28=) 76% came to hospital with a history of one or two attacks of ARI. Among 100 EBF babies, 96 babies were cured without complications and 02 babies develop complications and cured. There was 02 unfortunate death. Only 42% of EBF babies presented with moderate or less severe attack, 58% had mild attack. Hospital stays in EBF babies are shorter, only 64% of EBF patients had to stay more than 03 days. **Conclusion:** Frequency and severity of ARI attack is less and mild and hospital staying is short found in EBF babies, as well as better outcome with treatment.

**Keywords:** Respiratory distress, severe, morbidity, mortality, exclusive breast feeding.

Number of Tables: 06; Number of References: 17; Number of Correspondences: 04.

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## Introduction:

Exclusive breastfeeding plays the chief role of child nutrition and survival. Exclusive breast feeding provides nutritional and immunological support for infant normal growth and development<sup>1,2,3</sup>. Bangladesh is traditionally a breastfed community<sup>4</sup>. In a survey in Bangladesh in 2007, almost equal rural and urban mothers were continuing breastfeeding at one year (98.9% versus 98.7%). Average 88.8% of mothers were continuing breastfeeding at 2 years<sup>5</sup>. In Dhaka urban affluent, bottle feeding was observed 3.6% at birth, 57.7% at one month and 70% at four month of age<sup>6</sup>. A cross-sectional study was carried out in 10 unions of 5 divisions in Bangladesh during 1995. Here 5313 mothers were interviewed (57% from urban areas and 43% from rural areas). There 26.2% initiated breastfeeding immediately after birth and 22.4% within 1-5 hours and 38.6% after 5 hours or more. Among 4921 mothers having babies aged 1- 24 month, 4.7 % of rural mothers as compared to 13% of urban mothers used bottle-feeding for their babies. The prevalence of bottle feeding was 2-3 times higher among the urban mothers (Fifty third World Health Assembly, 2000)<sup>7</sup>. Every year some 22 million children in developing countries die before they reach their fifth birthday many during the first year of life and ARI is one of the principle causes of these deaths<sup>8</sup>. In most of the studies, it has been shown that lack of breast feeding is associated with increased incidence, severity, mortality and morbidity of ARI in infants. In studies in Bangladesh, infants exclusively breastfed for 4 or more months had significantly fewer respiratory infections than infants exclusively breastfed for 3 or fewer months. Infants who never

breastfed had the highest risk of hospital admission for an ARI<sup>9</sup>. In studies in Brazil, the Philippines, Tanzania mortality from acute lower respiratory infection (ALRI) and the relationship of lack of breastfeed was shown. The weighted average of the relative risk of pneumonia deaths due to lack of breastfeeding was 2.0<sup>10</sup>. Data showed from a population-based study from Brazil that children <12 months who were not breastfed had a relative risk of dying from ALRI of 3.6; infants who were partially breastfed had a relative risk of 1.6<sup>11</sup>. The probability of having an episode of ARI was higher for formula-fed than for EBF infants during the first 4 months of life. The prevalence of respiratory tract infection was also higher for formula-fed than for breastfed infants<sup>12</sup>. In a study in Indonesia there was significant decrease in the number of days ill from acute respiratory infection as time spent breastfeeding was increased. Breastfeeding also prevents weight loss because of ARI<sup>13</sup>. According to the millennium development goal, our fourth goal was “Reducing under five mortality by two-thirds” by the year 2015. ARI in infants was one of the contributors of infant mortality and morbidity. In many studies it has been shown that exclusive breast feeding is associated with reduced incidence of respiratory infection in infants. The picture of breast feeding and its association with acute respiratory infection in infants in this North-west part of Bangladesh is still undiscovered. So it is necessary to study on this ground which may help to take steps reducing the incidence of respiratory infection in infants.

#### Material and Methods:

This cross-sectional study was done in the department of pediatrics Rajshahi medical college and hospital, Rajshahi, during six month period from January, 2013 to June, 2013. In this study 100 cases of infants suffering from ARI who were exclusively breast fed were selected. Those infants having clinical features of acute respiratory infection aged 2 months to 1 year, and both male and female infants were included. Age <2 months and >1 year with other concomitant illnesses were excluded. Information had been collected with informed consent of the infant's parents. Detailed information was obtained in each case according to protocol. Complete history was taken either from accompanying attendants. Thorough physical examinations and follow up were done. All the information was recorded in the fixed protocol. Collected data was classified, edited, coded and entered into the computer for statistical analysis. Data were analyzed through standard statistical methods by using SPSS software, version 12.0 (statistical package for social science SPSS Inc. Chicago, USA). Standard Error and their “p” values were obtained to see the statistical significance. P value < 0.05 was considered as significant.

#### Results:

**Table-I: Demographic Profile of delivery (n=60).**

| Demographic Profile | EBF<br>(N=100) |
|---------------------|----------------|
|---------------------|----------------|

|                                |            |    |
|--------------------------------|------------|----|
| Sex                            | Male       | 48 |
|                                | Female     | 52 |
| Economic status                | Higher     | 28 |
|                                | Middle     | 44 |
|                                | Lower      | 26 |
| Educational status<br>(Mother) | Illiterate | 12 |
|                                | Primary    | 24 |
|                                | SSC        | 36 |
|                                | HSC        | 28 |
| Educational status<br>(Father) | Illiterate | 20 |
|                                | Primary    | 12 |
|                                | SSC        | 20 |
|                                | HSC        | 48 |

Among 100 EBF babies 47 are male and 53 are female; most of the babies are coming from middle class families; educational status of their parents is mostly SSC to HSC.

In the PBF group among 100 patients 44 are male and 56 are female; most of the babies come from middle class families. Educational status of their parents is mostly primary.

**Table-II: Frequency of ARI attacks in EBF**

|     | Number of attacks |     |     |     |
|-----|-------------------|-----|-----|-----|
|     | 01                | 02  | 03  | 04  |
| EBF | 48%               | 28% | 24% | 00% |

In this table it is observed that most of the EBF babies (48+28=) 76% were coming to hospital with a history of one or two attacks of ARI.

**Table-III: Severity of attack in EBF**

|     | Mild   |            | Severe |            |
|-----|--------|------------|--------|------------|
|     | Number | Percentage | Number | Percentage |
| EBF | 58     | 58%        | 42     | 42%        |

Severe attack is less frequent; out of 100 patients only 42% EBF baby presented with severe attack, Nonetheless, maximum 58% EBF baby present with mild attack.

**Table-IV: Comparison of duration of hospital staying in EBF**

|     | Hospital staying<br>up to 3 days | Hospital staying<br>>3 days |
|-----|----------------------------------|-----------------------------|
| EBF | 36%                              | 64%                         |

Out of 100 patients 36% patients stayed up to 3 days in hospital and 64% EBF patients had to stay more than 03 days. Hospital stays of EBF babies suffering from ARI are shorter.

**Table-V: Hospital-stay in severe attack patients of EBF.**

|            | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | D <sub>5</sub> | D <sub>6</sub> | D <sub>7</sub> |
|------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| EBF (N=42) | 00             | 00             | 18             | 15             | 5              | 2              | 2              |

Out of 100 patients only 42 patients had suffered from severe attack and hospital staying is less. Up to day 3 only 18 patients but 33 patients up to day 4 stayed in hospital.

**Table-VI: Outcome of EBF baby suffering from ARI**

| EBF              | Complication | Death     | Cure      |
|------------------|--------------|-----------|-----------|
| Mild=58          | 00           | 00        | 58        |
| Severe=42        | 02           | 02        | 38        |
| <b>Total=100</b> | <b>02</b>    | <b>02</b> | <b>96</b> |

Among the 100 EBF patients 58 were in mild attack and all were cured without complication. From the rest of the 42 severe attack patients, 38 were cured, 02 died and 02 become complicated. In total 96% patients were cured, 02% died and 02% became complicated.

#### Discussion:

Acute respiratory infection in infants is one of the major contributors of infant mortality and morbidity. In many studies, it has been shown that exclusive breast feeding is associated with reduced incidence of acute respiratory infection in infants. The present study aims to identify the effects of exclusive breastfeeding on frequency and outcome of acute respiratory infection in infants in the pediatric units of Rajshahi Medical College Hospital (RMCH). This study was carried out in the department of Pediatrics, Rajshahi Medical College Hospital, during the period of January 2013 to June 2013. In this study we observed that most of the EBF babies (48+28=)76% were coming to hospital with a history of one or two attacks of ARI (Table-II). In a study in Sri Lanka, in 1999 had showed that infants exclusively breastfed for 4 or more months had significantly fewer respiratory infections than infants EBF for 3 or fewer months. Infants who were never breastfed had the highest risk of hospital admission for an ARI<sup>14</sup>. Similar study done in Mexico in 1997 has shown that the probability of having an episode of ARI was higher for formula-fed than for EBF infants during the first 4 months of life. The risks for partially breastfed infants fell between those of formula-fed and EBF infants, suggesting a dose-response effect of breastfeeding on risk of respiratory infection. The prevalence of respiratory infection was also found higher for formula-fed than for breastfed infants<sup>15</sup>. Table-III shows that only 42% EBF babies presented with severe attack, Nonetheless, a maximum 58% EBF baby present with mild attack. Any infection were less severe in EBF babies than who were partially breastfed or not breastfed at all. w.w.w.dailymail.co.uk showed that EBF babies

had suffered from less severe form of ARI than partial breastfed or not breastfed at all. Table-IV, V shows that 64% EBF patients had to stay more than 03 days. Hospital stays in EBF babies suffering from ARI are shorter even in severe attacks. Infants who never received breast milk were more likely to have longer episodes of ARI than those of breastfed. A study shows evidence of a protective effect of breast feeding against ARI. EBF has reduced the percentage of days of illness and duration of individual episodes in breast fed infants<sup>15</sup>. Another similar study was done in Bangladesh in 1997 and showed that infants exclusively breastfed for 4 or more months had significantly fewer respiratory infections than infants EBF for 3 or fewer months. Infants who were never breastfed had the highest risk of hospital admission for an ARI<sup>19</sup>. In this study, cure, complication and death rate is studied. It is observed that among 100 EBF babies, 96 babies were cured without complication. Only 02 babies develop complications and 02 unfortunate deaths were found (Table-VI). EBF groups are associated with more cure rate and less complication rate. In another study in Dhaka, Bangladesh in 2001 shown that infants who were partially breastfed or not breastfed had a risk of ARI death 2.40 times greater than exclusively breastfed infants<sup>16</sup>. In Rwanda reported that no breastfed children were twice more likely to die from pneumonia than were breastfed children<sup>17</sup>.

#### Conclusion:

Although the outcome of ARI is multi factorial (Breast feeding, malnutrition, LBW, chronic disease), it is certain that breastfeeding has an important role in incidence, severity, morbidity, mortality and outcome of ARI in infants. So, it is imperative to practice EBF widely with an aim to prevent ARI.

**Conflict of Interest:** None.

#### References:

- Ahn CH, William C, Mac Lean Jr. Growth of the exclusively breast-fed infants. American J Clinical Nutr. 1980; 33: 183-192.  
<https://doi.org/10.1093/ajcn/33.2.183>  
PMid:7355791
- Cohen RJ, Brown KB, Canahuati J, Dewey KJ. Effects of age of Introduction of Complementary foods on infant breast milk Intake. Total Energy Intake and Growth: A Randomized Intervention Study Honduras. The Lancet. 1994; 344: 288-93.  
[https://doi.org/10.1016/S0140-6736\(94\)91337-4](https://doi.org/10.1016/S0140-6736(94)91337-4)  
PMid:7914260
- Talukder MQK, Kawsar CA, Growth Pattern of Exclusively Breast fed Infants. Bangladesh J Child Health. 1986; 10: 59-65.
- Fewey KG, Cohen RJ, Brown KH, Rivera LL. Effects of exclusive breastfeeding for four versus six months on maternal nutritional status and infant motor development: results of two randomized trials in Honduras. J Nutr. 2001; 13: 262-267.

<https://doi.org/10.1093/jn/131.2.262>

PMid:11160544

5. Bangladesh Nutritional Survey. Child and Mother Nutrition Survey of Bangladesh, UNICEF/Bangladesh Bureau of Statistics. Dhaka, 2007.

6. Dewey K. Guideline principles for complementary feeding of the breastfed child. American Health Organization/ World Health Organization, 2001; 8-9.

7. Fifty third World Health Assembly. Infant and Young Child Nutrition. World Health Assembly A53/7, Agenda item 12.4 March 2000.

8. WHO. Global Health Observatory

([https://www.who.int/gho/child\\_health/index.html](https://www.who.int/gho/child_health/index.html))

9. Zaman K, Baqui AH, Yunus MD, Bateman OM, Chowdhury HR, Black RE. Acute respiratory infections in children: A community-based longitudinal study in rural Bangladesh. *J Trop Pediatr* 1997; 43: 133-7.

<https://doi.org/10.1093/tropej/43.3.133>

PMid:9231631

10. Victora CG, Smith PG, Barros FC, Vaughan JP, Fuchs SC. Risk factors for deaths due to respiratory infections among Brazilian infants. *Int J Epidemiol*. 1989; 9:18-25.

<https://doi.org/10.1093/ije/18.4.918>

PMid:2621029

11. Victora CG, Kirkwood BR, Ashworth A, et al. Potential interventions for the prevention of childhood pneumonia in developing countries: Improving nutrition. *Am J Clin Nutr*. 1999; 70: 309-320.

<https://doi.org/10.1093/ajcn/70.3.309>

PMid:10479192

12. Lopez-Alarcon M, Villalpando S, Fajardo A. Breast-feeding lowers the frequency and duration of acute

respiratory infection and diarrhea in infants under six months of age. *J Nutr*. 1997; 127: 436-43.

<https://doi.org/10.1093/jn/127.3.436>

PMid:9082027

13. Launer LJ, Habicht J-P, Kardjati S. Breastfeeding protects against illness and weight loss due to illness. *Am J Epidemiol*. 1990; 131(2): 322-31.

<https://doi.org/10.1093/oxfordjournals.aje.a115501>

PMid:2296984

14. Perera BJC, Ganesan S, Jayarasa J, Ranaweera S. The impact of breastfeeding practices on respiratory and diarrhoeal disease in infancy: A study from Sri Lanka, *J Trop Pediatr*. 1999; 45: 115-8.

<https://doi.org/10.1093/tropej/45.2.115>

PMid:10341510

15. Mardya Lopez-Alarcon, Salvador Villalpando and Arturo Fajardo. Breastfeeding lowers the frequency and duration of Acute Respiratory Infection and diarrhea in infants under Six Months of Age. *J. Nutr*. March 1, 1997; 127(3): 436-443.

<https://doi.org/10.1093/jn/127.3.436>

PMid:9082027

16. Arifeen S, Black RE, Atbeknab G, Baqui A, Caulfield L, Becker S. Exclusive breastfeeding reduces acute respiratory infection and diarrhea deaths among infants in Dhaka slums. *Pediatrics*. 2001;108(4):67.

<https://doi.org/10.1542/peds.108.4.e67>

PMid:11581475

17. Cunningham AS. Morbidity in breast-fed and artificially fed infants. *J Pediatr*. 1977; 90(5): 726-9.

[https://doi.org/10.1016/S0022-3476\(77\)81236-5](https://doi.org/10.1016/S0022-3476(77)81236-5)

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## Causes of Infertility among the Couples Who are Attending the Infertility OPD of BSMMU

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### Abstract

**Introduction:** Infertility may be defined as inability to conceive within one year of unprotected regular coitus. Approximately 85 – 90% of healthy young couples conceive within 1 year, most within 6 months<sup>1</sup>. Infertility therefore affects approximately 10 – 15% of couples and represents an important part of clinical practice<sup>2</sup>. A general classification of causes of infertility are male 35 – 40%, female 40 – 50% (tubal 25%, ovulatory 20% and cervical 1 – 2%), sexual 10% and unknown 10%<sup>3</sup>. More than one factor per couple accounts for the total percentage appearing to exceed 100%. **Objective:** To assess the determinants of infertility among the infertile couples both male and female attending the outpatient department of infertility unit of the department of obstetrics and gynaecology of Bangabandhu Sheikh Mujib Medical University, Shahbagh, Dhaka. **Materials & Methods:** This prospective observational study was conducted in the Infertility unit, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, during the period from 01.07.2018 to 30.12.2021. Five hundred infertile couples were recruited from the out-patient department of infertility unit who came to take treatment for their infertility problem. Data were collected from the couples by data collection sheet and the data were plotted in the tables. The data were analyzed by SPSS program, version 28. **Results:** The socio-demographic characteristics of the study subjects (n = 500). Husbands age group was 22 – 55 in years, Mean  $\pm$  SD (34.0  $\pm$  5.9). Age of the female partners was 18 – 44 years, mean  $\pm$  SD (27.1  $\pm$  5.2). Majority of the female study subjects had secondary level of education (49.4%), where as in male study subjects secondary level of education was 30.4%, followed by graduates (29.6%). Occupation of female partners was mostly housewife = 395 (79.0%), occupation of male partners was mostly service = 356 (71.2%). Regarding religion, Muslims were 476 (95.2%), others were 24 (4.8%). Majority of them hailed from rural area (62%). According to BMI, majority of female were overweight (56%). Among the respondents, majority of them had primary infertility (59.8%) and the rest (40.2%) had secondary infertility. Regarding hormonal status of infertile women, most of them (94%) had serum FSH below normal (< 3U/L), serum LH below normal (< 2U/L) in 96% patients, Serum TSH above normal (>4.5 mU/L) in 49.0% patients, serum FT4 above normal (>21 pml/L) in (60.8%) patients, serum Prolactin level above normal (>630 mU/L) in 27.8% patients. Diabetes: In male = 28 (5.6%). Mumps: In male = 7 (1.4%). Chicken pox: In male = 18 (3.6%). Hypertension: In male = 10 (2.0%). Orchitis: In male = 6 (1.2%). Personal history of husband: Smoking = 129 (25.8%). In male patients, Testosterone level normal (10 – 30 nmol/L) in 133 (26.6%) patients and above normal (>30 nmol/L) in 367 (73.4%) patients. The semen analyses of the husbands of the infertile female patients shows, quality of semen poor (<4%) in 305 (61%) patients. Regarding semen quality, oligospermia (<15 million/ml) was in 480 (96%) patients and azospermia (0% count) in 20 (4%) patients. In case of motility of sperms, rapid linear below normal (<50%) was in 90 (18%). In case of slow linear (SL), below normal (<15%) in 324 (64.8%) patients. In case of morphology of sperms, below normal (<14million/ml) in 25 (5%) patients. Regarding structural abnormalities of female organs bicornuate uterus was found in 15.2% patients, abnormal uterine cavity in 11.4% patients. In 13.0% patients' abnormal right ostium were found and in 12.6% patients' abnormal left ostium were found. Intrauterine adhesion was found in 35.2% patients and submucous fibroid in 17.6% patients. Abnormal right fallopian tube was found in 33.2% patients and abnormal left fallopian tube was found in 34.2% patients. Dye test in 42.4% patients were negative that means the tubes were blocked. **Conclusion:** This study shows that a significant percentage of both male and female are suffering from infertility. The major causes of male infertility are partly hormonal, structural abnormalities of male genitalia, infection of genital tract, and partly psychological. Causes of female infertility are mostly hormonal, structural abnormalities of the uterus, fallopian tubes, infection of the genital tract and partly psychological.

**Keywords:** Female Infertility, Male Infertility, Hormonal, Structural abnormality, Semen abnormality.

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**Introduction:**

Infertility may be defined as inability to conceive within one year of unprotected regular coitus. Approximately 85 – 90% of healthy young couples conceive within 1 year, most within 6 months<sup>1</sup>. Infertility therefore affects approximately 10 – 15% of couples and represents an important part of clinical practice<sup>2</sup>. A general classification of causes of infertility are male 35 – 40%, female 40 – 50% (tubal 25%, ovulatory 20% and cervical 1 – 2%), sexual 10% and unknown 10%<sup>3</sup>. More than one factor per couple accounts for the total percentage appearing to exceed 100%. Increased public awareness of the natural age – related decline in fertility and the increasing risk of chromosomally abnormal offspring with advancing maternal age, at a time when large numbers of women have deferred childbearing to pursue to carriers, has led to a new sense of urgency among the many couples who now seek to initiate and complete their families over a relatively short period of time before age 40<sup>3</sup>. Infertility affects approximately 15% of couples. Roughly 40% of cases involve a male contribution or factor, 40% involve a female factor, and the remainder involves both sexes<sup>4</sup>. According to the American Society for Reproductive Medicine, infertility affects about 6.1 million people in the United States, equivalent to 10% of the reproductive age population. Female infertility accounts for one-third of infertility cases, male infertility another third, combined male and female infertility for another 15% and the remainder of cases is ‘unexplained’<sup>5</sup>. A Robertsonian translocation in either partner may cause recurrent abortions or complete infertility. “Secondary infertility” is difficulty conceiving after already having conceived and carried a normal pregnancy. Apart from various medical conditions (e.g. hormonal), this may come as a result of age and stress felt to provide a sibling their first child. There are various treatment options of the infertile couples. Among them, counseling of the infertile couples is one of the main and most effective methods of treatment. In this research it will prove that counseling is one of the most effective methods of treatment of infertile couples.

**Materials and Methods:**

This prospective observational study was conducted in the Infertility unit, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, during the period from 01.07.2018 to 31.12.2021. Ethical clearance was got from Bangladesh Medical Research Council (BMRC) Dhaka, Bangladesh. Bangabandhu Sheikh Mujib Medical University (BSMMU) is a tertiary hospital, where patients of infertility come from different parts of the country. Here, diagnosis of infertility is done by most modern investigation techniques and most modern treatment and management is given for the infertile couples. 500 infertile couples who are sexually active were recruited from the out-patient department of infertility unit who came for diagnosis and take treatment for their infertility problem either primary or secondary. Inclusion criteria of male partners were from 22 years to 55 years sexually active one. Inclusion criteria of female partners were 18

years to 44 years who were menstruating. Exclusion criteria for male were sexually inactive, that means impotent. Exclusion criteria for female were post menopausal whether naturally or surgically. All the study subjects were informed about the study and they were confirmed about the privacy and they gave their consent about the study. After collecting the data, it was analyzed by appropriate statistical methods using Statistical package for Social Sciences (SPSS) software programme.

### Results:

Table I shows the socio-demographic characteristics of the study subjects (n = 500). Age of the female patients was 18 – 44 years, Mean  $\pm$  SD (27.1  $\pm$  5.2). Husbands age group was 22 – 55 in years, Mean  $\pm$  SD (34.0  $\pm$  5.9). Educational level of female partners was, no education = 8 (1.6%), primary = 49 (9.8%), secondary = 247 (49.4%), graduate = 87 (17.4%), postgraduate = 54 (10.8%), Others = 55 (11.0%). Educational level of male partners was, no education = 5 (1.0%), primary = 27 (5.4%), secondary = 152 (30.4%), graduate = 148 (29.6%), postgraduate = 74 (14.8%), Others = 94 (18.8%). Occupation of female partners was, housewife = 395 (79.0%), service = 103 (20.6%), business = 2 (0.4%). Occupation of male partners was, unemployed = 6 (1.2%), service = 356 (71.2%), business = 138 (27.6%). Regarding religion, Muslims were 476 (95.2%), others were 24 (4.8%). Monthly income of the infertile couple were in taka, < 10000 = 52 (10.4%), 10000 – 20000 = 188 (37.6%), 20000 – 40000 = 212 (42.4%), > 40000 = 48 (9.6%). Area of residence: urban 176 (35.2%), rural = 310 (62.0%), slum = 14 (2.8%). BMI (kg/m<sup>2</sup>) of the female partners were, underweight (< 18.0) = 4 (0.8%), normal weight (18-24.99) = 127 (25.4%), overweight (25 – 29.99) = 281 (56.2%), obese (>30.0) = 88 (17.6%).

**Table I: Socio-demographic characteristics of the study subjects (n=500)**

| Socio-demographic characteristics          | No of patients                 | Percentage (%) |
|--------------------------------------------|--------------------------------|----------------|
| 18-20                                      | 32                             | 6.4            |
| 21-25                                      | 198                            | 39.6           |
| 26-30                                      | 152                            | 30.4           |
| 31-35                                      | 83                             | 16.6           |
| 36-40                                      | 31                             | 6.2            |
| 41-45                                      | 4                              | .8             |
| Mean $\pm$ SD (range: min-max)             | 27.1 $\pm$ 5.2 (18 – 44 years) |                |
| Range                                      |                                |                |
| <b>Husband's age group (in years)</b>      |                                |                |
| 21-25                                      | 14                             | 2.8            |
| 26-30                                      | 166                            | 33.2           |
| 31-35                                      | 160                            | 32.0           |
| 36-40                                      | 103                            | 20.6           |
| 41-45                                      | 42                             | 8.4            |
| 46-50                                      | 10                             | 2.0            |
| 51-55                                      | 5                              | 1.0            |
| Mean $\pm$ SD (range: min-max)             | 34.0 $\pm$ 5.9 (22 – 55) years |                |
| Range                                      |                                |                |
| <b>Educational level of female partner</b> |                                |                |
| Not education                              | 8                              | 1.6            |
| primary                                    | 49                             | 9.8            |
| Secondary                                  | 247                            | 49.4           |
| Graduate                                   | 87                             | 17.4           |
| Postgraduate                               | 54                             | 10.8           |
| Other                                      | 55                             | 11.0           |

|                                                  |     |      |
|--------------------------------------------------|-----|------|
| <b>Educational level of male partner</b>         |     |      |
| Not education                                    | 5   | 1.0  |
| primary                                          | 27  | 5.4  |
| Secondary                                        | 152 | 30.4 |
| Graduate                                         | 148 | 29.6 |
| Postgraduate                                     | 74  | 14.8 |
| Other                                            | 94  | 18.8 |
| <b>Occupation of female partner</b>              |     |      |
| Housewife                                        | 395 | 79.0 |
| Service                                          | 103 | 20.6 |
| Business                                         | 2   | .4   |
| <b>Occupation of male partner</b>                |     |      |
| Unemployed                                       | 6   | 1.2  |
| Service                                          | 356 | 71.2 |
| Business                                         | 138 | 27.6 |
| <b>Religion</b>                                  |     |      |
| Islam                                            | 476 | 95.2 |
| Other                                            | 24  | 4.8  |
| <b>Monthly family income of infertile couple</b> |     |      |
| <10000                                           | 52  | 10.4 |
| 10000-20000                                      | 188 | 37.6 |
| 20000-40000                                      | 212 | 42.4 |
| >40000                                           | 48  | 9.6  |
| <b>Area of residence</b>                         |     |      |
| Urban                                            | 176 | 35.2 |
| Rural                                            | 310 | 62.0 |
| Slum                                             | 14  | 2.8  |
| <b>BMI(kg/m<sup>2</sup>)</b>                     |     |      |
| Underweight (<18.0)                              | 4   | .8   |
| Normal weight (18-24.99)                         | 127 | 25.4 |
| Overweight (25-29.99)                            | 281 | 56.2 |
| Obese (>30.0)                                    | 88  | 17.6 |

**Table II shows the type of infertility of the study subjects (n = 500):**

Primary infertility = 299 (59.8%), secondary infertility = 201 (40.2%).

**Table-II: Type of infertility of the study subjects (n=500)**

| Type of infertility | No of patients | Percentage (%) |
|---------------------|----------------|----------------|
| Primary             | 299            | 59.8           |
| Secondary           | 201            | 40.2           |
| <b>Total</b>        | <b>500</b>     | <b>100.0</b>   |

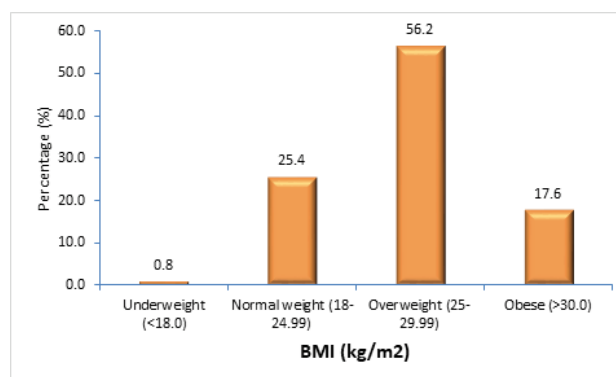


**Figure-1: Bar diagram showing the BMI of the study female patients (n=500)**

Figure 1 shows the BMI of the female patients. Underweight (<18) is 0.8%, normal weight (18-24.99) is 25.4%, overweight (25-29.99) is 56.2% and obese (>30.0) is 17.6%.

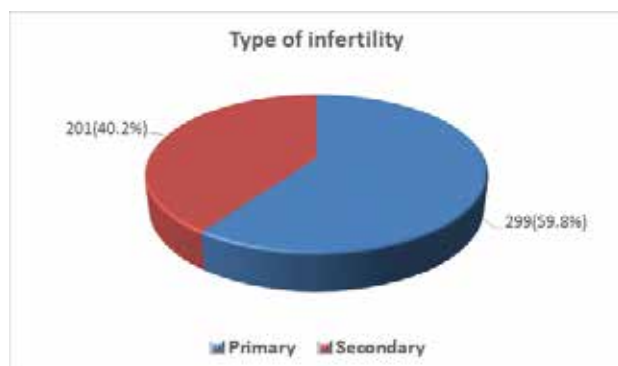


**Figure-2: Pie diagram showing the type of infertility (n=500)**

Figure 2 shows the type of infertility. Primary infertility is 299 and Secondary is 201.

Table III shows the medical history of the couple (n = 500). Diabetes: In female = 18 (3.6%), in male = 28 (5.6%). Mumps: In female = 1 (0.2%), in male = 7 (1.4%). Chicken pox: In female = 35 (7.0%), in male = 18 (3.6%). Hypertension: In female = 12 (2.4%), in male = 10 (2.0%). Chemotherapy: In female = 0 (0.0%), in male = 1 (0.2%). Tuberculosis: In female = 2 (0.4%), in male = 3 (0.6%). Hypothyroidism: In female = 38 (7.6%), in male = 3 (0.6%). Allergy: In female = 5 (1.0%), in male = 1 (0.2%). Radiation: In female = 0 (0.0%), in male = 1 (0.2%). Orchitis: In female = 0 (0.0%), in male = 6 (1.2%).

**Table-III: Medical history of the couple (n=500)**

| Medical history of couple | Female partner<br>No. (%) | Male partner<br>No. (%) |
|---------------------------|---------------------------|-------------------------|
| Diabetes                  | 18 (3.6%)                 | 28 (5.6%)               |
| Mumps                     | 1 (0.2%)                  | 7 (1.4%)                |
| Chicken pox               | 35 (7.0%)                 | 18 (3.6%)               |
| Hypertension              | 12 (2.4%)                 | 10 (2.0%)               |
| Chemotherapy              | 0 (0.0%)                  | 1 (0.2%)                |
| Tuberculosis              | 2 (0.4%)                  | 3 (0.6%)                |
| Hypothyroidism            | 38 (7.6%)                 | 3 (0.6%)                |
| Allergy                   | 5 (1.0%)                  | 1 (0.2%)                |
| Radiation                 | 0 (0.0%)                  | 1 (0.2%)                |
| Orchitis                  | 0 (0.0%)                  | 6 (1.2%)                |

Table IV shows personal history and family history of the couple (n = 500). Personal history of husband: Smoking = 129 (25.8%), alcohol = 3 (0.6%), others (nil) = 368 (73.6%). Disease of family: Hypothyroidism = 9 (1.8%), diabetes = 38 (7.6%), tuberculosis = 4 (0.8%), history of subfertility = 14 (2.8%), hypertension = 5 (1.0%), hypothyroidism with diabetes = 3 (0.6%), hypertension with diabetes = 4 (0.8%).

**Table-IV: Personal history and family history of the couple (n=500)**

| Personal history of husband | No of patients | Percentage (%) |
|-----------------------------|----------------|----------------|
| Smoking                     | 129            | 25.8           |
| Alcohol                     | 3              | 0.6            |
| Others                      | 368            | 73.6           |

| Family history          | No. | Percentage (%) |
|-------------------------|-----|----------------|
| Hypothyroidism          | 9   | 1.8            |
| Diabetes                | 38  | 7.6            |
| Tuberculosis            | 4   | 0.8            |
| History of subfertility | 14  | 2.8            |
| HTN                     | 5   | 1.0            |
| Hypothyroidism+DM       | 3   | 0.6            |
| DM+HTN                  | 4   | 0.8            |

Table V shows the drug history of the couple (n 500). Anti-hypertensive: In female partner = 12 (2.4%), in male partner = 16 (3.2%). Antidiabetic: In female partner = 20 (4.0%), in male partner = 21 (4.2%). Anti TB: In female partner = 5 (1.0%), in male partner = 5 (1.0%). Thyroid drug: In female partner = 34 (6.8%), in male partner = 2 (0.4%).

**Table-V: Drug history of the couple (n=500)**

| Drug history of couple | Female partner<br>No. (%) | Male partner<br>No. (%) |
|------------------------|---------------------------|-------------------------|
| Anti-hypertensive      | 12 (2.4%)                 | 16 (3.2%)               |
| Anti diabetic          | 20 (4.0%)                 | 21 (4.2%)               |
| Anti TB                | 5 (1.0%)                  | 5 (1.0%)                |
| Thyroid drug           | 34 (6.8%)                 | 2 (0.4%)                |

Table VI shows hormonal status of infertile women (N=500). Serum FSH below normal (< 3 U/L) in 470 (94%) patients, normal (3 – 10 U/L) in 17 (5.4%) patients and above normal (>10 U/L) in 3 (0.6%) patients. Serum LH below normal (< 2 U/L) in 480 (96%) patients, normal (2 – 9 U/L) in 17 (3.4%) patients and above normal (>9.0 U/L) in 3 (0.6%) patients. Serum TSH normal (0.2 – 4.5 mU/L) in 255 (51.0%) patients and above normal (>4.5 mU/L) in 245 (49.0%) patients. Serum FT4 normal (9 – 21 pmol/L) in 196 (39.2%) patients and above normal (>21 pmol/L) in 304 (60.8%) patients. Serum Prolactin level normal (25 – 630 mU/L) in 361 (72.2%) patients and above normal (>630 mU/L) in 139 (27.8%) patients. In male patients, Testosterone level normal (10 – 30 nmol/L) in 133 (26.6%) patients and above normal (>30 nmol/L) in 367 (73.4%) patients.

**Table-VI: Hormonal status of infertile women (n=500)**

| Hormonal status |                           | No of patients | Percentage (%) |
|-----------------|---------------------------|----------------|----------------|
| FSH             | Below normal (<3 U/L)     | 470            | 94.0           |
|                 | Normal (3.0-10.0 U/L)     | 27             | 5.4            |
|                 | Above normal (>10 U/L)    | 3              | .6             |
| LH              | Below normal (<2 U/L)     | 480            | 96.0           |
|                 | Normal (2.0-9.0 U/L)      | 17             | 3.4            |
|                 | Above normal (>9.0 U/L)   | 3              | .6             |
| TSH             | Normal (0.2-4.5 mU/L)     | 255            | 51.0           |
|                 | Above normal (>4.5 mU/L)  | 245            | 49.0           |
| FT4             | Normal (9-21 pmol/L)      | 196            | 39.2           |
|                 | Above normal (>21 pmol/L) | 304            | 60.8           |
| Prolactin       | Normal (25-630 mU/L)      | 361            | 72.2           |
|                 | Above normal (>630 mU/L)  | 139            | 27.8           |
| Testosterone    | Normal (10-30 nmol/L)     | 133            | 26.6           |
|                 | Above normal (>30 nmol/L) | 367            | 73.4           |

In table VII shows the structural abnormalities of female organs (n=500). In Hysterosalpingography (HSG), there were seen patients with abnormal uterine cavity in 2 (0.40%) patients, septed uterus in 21 (4.2%) patients, bicornuate uterus in 76 (15.2%) patients, unicornuate uterus in 5 (1.0%) patients and endometrial polyp in 8 (1.6%) patients. In Hysteroscopy, abnormal uterus was found in 6 (1.2%) patients, abnormal uterine cavity in 57 (11.4%) patients and abnormal endometrial flakes were found in 62 (12.4%) patients. In 65 (13.0%) patients abnormal right ostium were found and in 63 (12.6%) patients abnormal left ostium were found. During Hysteroscopy, there were found intrauterine adhesion in 176 (35.2%) patients, polyp in 14 (2.8%) patients and submucous fibroid in 88 (17.6%) patients. During Laparoscopy, abnormal uterus were found in 15 (3%) patients, abnormal right fallopian tube were found in 166 (33.2%) patients and abnormal left fallopian tube were found in 171 (34.2%) patients. During Laparoscopy, there also was found abnormal right fallopian tube in 185 (37.0%) patients and abnormal left fallopian tube was found in 188 (37.6%) patients. During laparoscopy, there also was found pouch of Douglas free in 315 (63%) patients. During dye test in laparoscopy, 288 (57.6%) patients were found positive and rest of the patients was negative that means the tubes were blocked.

**Table-VII: Structural abnormalities of female organs (n=500)**

|                             | No of patients | Percentage (%) |
|-----------------------------|----------------|----------------|
| <b>HSG findings</b>         |                |                |
| Abnormal uterine cavity     | 2              | 0.40           |
| Septed                      | 21             | 4.2            |
| Bicornuate                  | 76             | 15.2           |
| Unicornuate                 | 5              | 1.0            |
| Endometrial polyp           | 8              | 1.6            |
| <b>Hysteroscopy</b>         |                |                |
| Abnormal uterus             | 6              | 1.2            |
| Abnormal cavity             | 57             | 11.4           |
| Abnormal Endometrium flakes | 62             | 12.4           |
| <b>Ostium</b>               |                |                |
| Abnormal (Right)            | 65             | 13.0           |
| Abnormal (Left)             | 63             | 12.6           |
| <b>Any pathology</b>        |                |                |
| Intrauterine adhesion       | 176            | 35.2           |
| Polyp                       | 14             | 2.8            |
| Submucous fibroid           | 88             | 17.6           |
| <b>Laparoscopy</b>          |                |                |
| Abnormal Uterus             | 15             | 3.0            |
| Abnormal (Right)            | 166            | 33.2           |
| Abnormal (Left)             | 171            | 34.2           |
| <b>Fallopian tubes</b>      |                |                |
| Abnormal (Right)            | 185            | 37.0           |
| Abnormal (Left)             | 188            | 37.6           |
| <b>Ovary</b>                |                |                |
| Pouch of Douglas (free)     | 315            | 63.0           |
| Dye test (positive)         | 288            | 57.6           |

Table VIII shows the semen analysis of the husbands of the infertile female patients. In quality, semen type was intermediate (4-14%) in 195 (39%) patients and poor (<4%) in 305 (61%) patients. Regarding semen count, normal (15-20 million/ml) was in 96 (19.2%) patients and above normal (>20 million/ml) was in 404 (80.8%) patients. Regarding semen quality, oligospermia (<15 million/ml) was in 480 (96%) patients and azospermia (0% count) in 20 (4%) patients. In case of motility of sperms, rapid linear (RL), normal (50-60%) in 408 (81.6%) patients, above normal (>60%) was in 2 (0.4%) patients and below normal (<50%) was in 90 (18%). In case of slow linear (SL), normal (15-20%) in 125 (25%) patients, above normal (>20%) was in 51 (10.2%) patients and below normal (<15%) in 324 (64.8%) patients. Regarding non propagative (NP), normal (0-10%) in 439 (87.8%) patients and above normal (>10%) was in 61 (12.2%) patients. In case of morphology of sperms, normal (14-50 million/ml) in 72 (14.4%) patients, above normal (>50 million/ml) in 403 (80.6%) patients and below normal (<14million/ml) in 25 (5%) patients.

**Table-VIII: Semen analysis of husbands (n=500)**

| Semen analysis (husbands)     | No of patients | Percentage (%) |
|-------------------------------|----------------|----------------|
| <b>Semen type</b>             |                |                |
| Intermediate (4-14%)          | 195            | 39.0           |
| Poor (<4%)                    | 305            | 61.0           |
| <b>Semen count</b>            |                |                |
| Normal (15-20)                | 96             | 19.2           |
| Above normal (>20)            | 404            | 80.8           |
| <b>Semen analysis</b>         |                |                |
| Oligospermia (<15 million/ml) | 480            | 96.0           |
| Azoospermia (0%)              | 20             | 4.0            |
| <b>Rapid linear (RL)</b>      |                |                |
| Normal (50-60)                | 408            | 81.6           |
| Above normal (>60)            | 2              | .4             |
| Below normal (<50)            | 90             | 18.0           |
| <b>Slow liner (SL)</b>        |                |                |
| Normal (15-20)                | 125            | 25.0           |
| Above normal (>20)            | 51             | 10.2           |
| Below normal (<15)            | 324            | 64.8           |
| <b>Non propagative (Np)</b>   |                |                |
| Normal (0-10)                 | 439            | 87.8           |
| Above normal (>10)            | 61             | 12.2           |
| <b>Morphology</b>             |                |                |
| Normal (14-50)                | 72             | 14.4           |
| Above normal (>50)            | 403            | 80.6           |
| Below normal (<14)            | 25             | 5.0            |

## Discussion:

The present study attempted to assess the determinants of infertility among the married couples who were attending the infertility outpatient department of Bangabandhu Sheikh Mujib Medical University, shahbagh, Dhaka. Socio-demographic characteristics of the married couples attending the infertility outpatient department are one of the determinants affecting fertility. Rural residents 310 (62%)

are more sufferer of infertility than urban 176 (35.2%) ones. Mallikarjuna M. et.al also shows in their study that rural couples are more sufferers in infertility than urban<sup>6</sup>. BMI more than 25 are 281 (56.2%) more affect fertility in female. Giwercman A et al. has shown the results like ours<sup>7</sup>. Primary infertility was significantly higher 299 (59.8%) than secondary infertility 201 (40.2%). Similarly, one study by Singh K et al. in Bihar, India also shows the results like those of ours<sup>8</sup>. In our study, nearly 77% of infertile couples reported to hospital for treatment between 2- 10 years of marriage. Singh K et al. in Bihar, India also shows the same presentation like ours<sup>8</sup>. Determinants of infertility among the female partners of the couple were hormonal status like FSH below normal (<3 U/L) was in 470 (94%), LH below normal (<2 U/L) was in 480 (96%), TSH above normal (>4.5 mU/L) was in 245 (49%), serum prolactin above normal (>630 mU/L) was in 139 (27.8%) which corresponds with the results of infertile married women of India<sup>8</sup> and Ethiopia<sup>9</sup>. Structural abnormalities of female organs which are the determinants of female infertility like HSG findings, Hysteroscopic findings, any pathology of uterus, laparoscopic findings of uterus, fallopian tubes, ovary all corresponds to the findings of Bihar, India<sup>8</sup>. Among the determinants of male infertility are: age, smoking, obesity, alcohol and caffeinated beverages consumption, stress, electronic devices, scrotal temperature, some drugs. Our findings of male infertility corresponds with the findings of Mahat et al.<sup>10</sup>. Besides, some structural factors of male genital tract, like varicocele, endocrine disorders, male reproductive tract infection, ejaculatory disorders, immunological factors, genetic and chromosomal defects also cause male infertility. One of the main causes of male infertility is semen quality. In our study, semen analysis shows normozoospermia and oligospermia together 96% and azoospermia 4%, motility 81.6%, which corresponds to the study of Nigeria<sup>11</sup>. Bhattacharya et al. also shows the male factors of infertility which also corresponds to our study results<sup>12</sup>. One study conducted by Farhi and Ben-Haroush et al., also shows the similar results of male infertility like ours one<sup>13</sup>. Seminal fluid abnormalities among male partners of infertile couples in this study correspond to the study of male partners of Owolabi et al., Ile-Ife, Nigeria<sup>14</sup>. Results of our study in socio-demographic characteristics also corresponds to the study of Nepal (Tamarkar et al 2019)<sup>15</sup>. One study in India from the demographic health survey showed the Prevalence and Potential Determinants of Primary Infertility in India also corresponds to our study (Purakayastha et al. 2021)<sup>16</sup>.

#### Conclusion:

The present study found a good number of infertile couples both primary and secondary who attended in the infertility outpatient department of infertility unit of Gynaecology and Obstetrics department. Among the male partners, the determinants of infertility are hormonal, structural abnormalities of male genitalia, abnormal sperm count in semen and partly psychological. Among the female partners, major determinants of infertility are partly hormonal, structural

abnormalities of uterus, fallopian tubes, infection of genital tract and partly psychological which can be overcome by counseling.

**Conflict of Interest:** None.

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#### References:

1. Wang X, Chen C, Wang L, Chen D, Guang W, French J. Conception, early pregnancy loss, and time to clinical pregnancy: a population-based prospective study. *Fertil Steril*. 2003;79:577.  
[https://doi.org/10.1016/S0015-0282\(02\)04694-0](https://doi.org/10.1016/S0015-0282(02)04694-0)  
PMid:12620443
2. Thoma ME, McLain AC, Louis JF, King RB, Trumble AC, Sundaram R, et al. Prevalence of infertility in the United States as estimated by the current duration approach and a traditional constructed approach. *Fertil Steril*. 2013; 99(5): 1324.e1.  
<https://doi.org/10.1016/j.fertnstert.2012.11.037>  
PMid:23290741 PMCID:PMC3615032
3. Reid RL. Infertility, August 2006, Retrieved from; <http://en.wikipedia.org/wiki/infertility>.
4. Wikipedia. Infertility. August, 2006. Retrieved from; <http://en.wikipedia.org/wiki/infertility>.
5. American Society for Reproductive Medicine. Retrieved from: <http://www.asrm.org/Patients/faqs.html> (2019).
6. Mallikarajuna M, Rajeshwari B. V. Selected risk factors of infertility in women: case control study. *Int J Reprod Contracept Obstet Gynecol*. 2015 Dec; 4(6): 1714 - 1719.  
<https://doi.org/10.18203/2320-1770.ijrcog20151129>
7. Giwercman A, Kretser D, Skakkebaek N. Risk factors of infertility. *Lancet*. 1994; 343: 1473 - 1479.  
[https://doi.org/10.1016/S0140-6736\(94\)92586-0](https://doi.org/10.1016/S0140-6736(94)92586-0)  
PMid:7911182
8. Singh K, Kumari R, Ranjan A, Bharti G. Analysis of causes and clinical pattern of infertility in couples coming to a tertiary care centre in Bihar, India. *Int J Reprod Contracept Obstet Gynecol*. 2017 Jun; 6 (6): 2279 - 2283.  
<https://doi.org/10.18203/2320-1770.ijrcog20172118>
9. Bayu D, Egata G, Kefale B, Jemere T. Determinants of Infertility among Married Women Attending Dessie Referral Hospital and Dr. Misganaw Gynecology and Obstetrics Clinic, Dessie, Ethiopia. *Int J Reprod Med*. Mar 2020, page 1 - 6.  
<https://doi.org/10.1155/2020/1540318>  
PMid:32280671 PMCID:PMC7139857
10. Mahat et al. Risk Factors and Causes of Male Infertility - A Review; Mahat et al., *Biochem Anal Biochem*. 2016; 5(2):1 - 5.  
<https://doi.org/10.4172/2161-1009.1000271>

11. Lukman et al. Determinants of infertility in male partners of infertile couples at a public health facility in Ilorin, Nigeria. *J Med Soc.* 2016; 30; 153 - 157.  
<https://doi.org/10.4103/0972-4958.191180>
12. Bhattacharya et al., The epidemiology of infertility in the North East of Scotland, *Hum. Reprod.* 2009; 24: 3096 - 3107.  
<https://doi.org/10.1093/humrep/dep287>  
PMid:19684046
13. Farhi, J., Ben-Harosh, A. Distribution of causes of Infertility in Patients attending Primary Fertility Clinics in Israel. *Isr.Med. Asso. J.* 2011; issu:13: 51-54.
14. Owolabi et al. Semen quality if male partners of infertile

- couples in Ili-Ifi, Nigeria. *Niger J Clin Pract.* 2013; 16: 37 - 40.  
<https://doi.org/10.4103/1119-3077.106729>  
PMid:23377467
15. Determinants of Infertility in Couples. Tamarkar et al. *J Nepal Health Res Counc.* 2019; 17 (42): 85 - 89.  
<https://doi.org/10.33314/jnhrc.v17i01.1827>  
PMid:31110383
16. Purakayastha. Prevalence and Potential Determinants of Primary Infertility in India: Evidence from Indian Demographic Health Survey: *Clinical Epidemiology and Global Health.* 2021; 9: 162 - 170.  
<https://doi.org/10.1016/j.cegh.2020.08.008>

# A Comparative Study between Metal Clip Application and Suture Ligation of Cystic Duct in Laparoscopic Cholecystectomy

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## Abstract

**Introduction:** Laparoscopic cholecystectomy has been performed for decades and is a fairly standardized procedure throughout the world. Occlusion of the cystic duct is popularly done with the help of metal clips. There are many other techniques described in the literature to deal with occlusion of the Cystic Duct. Suture ligation of the duct is one such way. To evaluate the effectiveness in term of cost, safety, and complication in occlusion of cystic duct with suture ligation compared to clip application. **Materials and Methods:** A prospective cross sectional comparative study was carried out From June 2020 to November 2020. Data were collected from 80 patients undergone laparoscopic cholecystectomy for Gall stone diseases. 40 patients were enrolled in each group by consecutive purposive sampling. Complete history was taken. Thorough clinical examination was done. Relevant investigations report was collected. **Results:** Female patients were predominant in both groups and most of the patients were underweight. Mean time for ligation was more in occlusion of cystic duct with clip application. Bile leakage was found and duration of drain in situ was more in occlusion with clip application. Cost was high in occlusion with clip application. **Conclusion:** : Time for ligation, Bile leakage, mean duration of drain in situ (days), and cost of Cystic Duct occlusion and port closure were significantly higher in Laparoscopic Cholecystectomy with conventional Clip application of Cystic Duct group in comparison to Laparoscopic Cholecystectomy with ligation of the Cystic duct with no-Ivicryl by extra corporeal knotting group.

**Keywords:** Laparoscopic cholecystectomy, metal clips application, suture ligation of cystic duct.

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## Introduction:

Laparoscopic cholecystectomy is accepted as the “gold standard” surgical treatment of gall stone diseases due to its optimal postoperative results and enhanced quality of life<sup>1,2</sup>. Cholecystectomy is the second most commonly performed intra-abdominal operation worldwide after appendectomy<sup>3</sup>. It is the commonest performed laparoscopy worldwide<sup>4</sup>. Compared with open cholecystectomy, laparoscopic cholecystectomy has improved surgical outcome in terms of reduce pain, shorter hospital stay, quicker return of normal activity and improved cosmetic outcome<sup>5</sup>. During laparoscopic cholecystectomy it is important to identify the structures of callot’s triangle at the time of cystic duct isolation. Cystic duct occlusion can be done with clips, intra or extra corporeal ligation, harmonic scalpel or ligasure<sup>6</sup>. The main pitfall of metal clips are clip failure (dislodge, slippage or migration), bile leakage and common bile duct injury<sup>7-11</sup>. One reason of bile leakage is laceration of cystic duct by metal clips<sup>12</sup>. This is because of ability of the metal clip to conduct electricity causing a cut in the cystic duct or cause necrosis of clamped tissue<sup>13</sup>. Rarely the metal clips can erode into the cystic duct and migrate in to common bile duct. Such migration of clips can act as a nidus for stone in common bile duct<sup>14</sup>. These disadvantages limited the worldwide use of metal clips in surgical procedures<sup>5</sup>. Alternative techniques have included the use of absorbable clips and harmonic scalpel. These are, however, more expensive, not readily available and used infrequently<sup>15</sup>. In contrast, these complications are not encountered with open cholecystectomy using thread to ligate the duct<sup>5</sup>. It is now possible, with increasing experience in advanced laparoscopic technique, to safely occlude cystic duct with ligature as an alternative to clips<sup>6,16</sup>. Therefore, the

purpose of the present study is to evaluate the effectiveness in terms of intra operative complications, operative time, post-operative complications and cost effectiveness in both groups.

#### Materials and Methods:

This prospective cross sectional comparative study was conducted between June 2020 to November 2020 at Department of Surgery, Cumilla Medical College, Cumilla. Sample were collected by Consecutive purposive sampling method. Patient who undergone laparoscopic cholecystectomy for Gall stone diseases with short and wide cystic duct were selected for study. Exclusion criteria were – choledocholithiasis, previous Upper abdominal surgeries, comorbidities like CLD, ascites & coagulopathy, anaesthetic fitness with ASA grading of 3 and above. All patients received preoperative medication. General anesthesia was applied for all patients. In group A, clip was applied over the cystic duct and artery. In group B, after creating a window extra corporeal meltzer knot was applied for both cystic duct and artery. informed written consent were taken from each patient or from his/her legal guardian. Data collection was done by face-to-face interview using a standard questionnaire by the researchers. Then the patients were examined by the researcher for certain signs and those were recorded in the check-list. Investigations were done for supporting the diagnoses. According to the participants' understanding level, sometimes the questions were described in the native language so that the patients can understand the questions perfectly and answer accurately. Data was process and analyses using SPSS (Statistical Package for Social Sciences) software version 23. The chi-square test and student "t" test was used to analyze the significance level of  $p < 0.05$ . Continuous scale data was presented as mean standard deviation and Categorical data was presented as number percentage. Unpaired t-test was used for continuous variables and Chi square test was used for categorical variables. The summarize data was present in the table and chart. The study was approved by the Institutional Review Board (IRB) of National Institute of Neuroscience (NINS).

#### Results:

In group A majority 10(25.0%) patients belonged to age group 31-40 years and 17(42.5%) in group B. The mean age was  $39.97 \pm 13.50$  years in group A and  $40.12 \pm 9.67$  years in group B (Table-I). Female patients were predominant in both groups. Based on calculated BMI, most of the patients were underweight in both groups that was 15(37.5%) in group A and 16(40.0%) in group B Healthy was 14(35.0%) and 13(32.5%) in group A and group B respectively. The difference was not statistically significant ( $p > 0.05$ ) between two group (Table-II).

Post operative complications shows statistically significant difference in group A and group B. Slippage of clip or ligature was 5(12.5%) in group A and none in group B (Table-III). Spillage of bile was 3(5.0%) in group A and 2(5.0%) in group B. The difference was not statistically significant. Mean time for ligation was significantly more in

group A ( $2.48 \pm 0.30$  minutes) than in group B ( $1.55 \pm 0.25$  minutes) (Table-IV). Bile leakage was found in 4(10.0%) in group A but not found in group B. Duration of drain in situ was  $5.4 \pm 1.2$  days and  $4.1 \pm 1.1$  days in group B. Bile leakage and duration of drain in situ was statistically significant ( $p < 0.05$ ) between two groups (Table-V). Readmission after discharge was found in 3(7.5%) in group A and 2(5.0%) in group B which was not statistically significant (Table-VI). Table 3.9 shows that cost of Cystic Duct occlusion and port closure was  $947.3 \pm 26.2$  taka in group A and 400 taka in group B. The difference was statistically significant ( $p < 0.05$ ) (Table-VII).

**Table I: Distribution of the study patients by age (n=80)**

| Age (years) | Group A<br>(n=40) |      | Group B<br>(n=40) |      | P value             |
|-------------|-------------------|------|-------------------|------|---------------------|
|             | n                 | %    | n                 | %    |                     |
| ≤20         | 3                 | 7.5  | 2                 | 5.0  |                     |
| 21-30       | 8                 | 20.0 | 7                 | 17.5 |                     |
| 31-40       | 10                | 25.0 | 17                | 42.5 |                     |
| 41-50       | 6                 | 15.0 | 7                 | 17.5 |                     |
| 51-60       | 9                 | 22.5 | 5                 | 12.5 |                     |
| >60         | 4                 | 10.0 | 2                 | 5.0  |                     |
| Mean±SD     | 39.97±13.50       |      | 40.12±9.67        |      | 0.954 <sup>ns</sup> |

**Table II: Distribution of the study patients by BMI (n=80)**

| Body mass index (kg/m <sup>2</sup> )    | Group A<br>(n=40) |      | Group B<br>(n=40) |      | P value             |
|-----------------------------------------|-------------------|------|-------------------|------|---------------------|
|                                         | n                 | %    | n                 | %    |                     |
| Underweight (≤18.4 kg/m <sup>2</sup> )  | 15                | 37.5 | 16                | 40.0 |                     |
| Healthy (18.5- 22.9 kg/m <sup>2</sup> ) | 14                | 35.0 | 13                | 32.5 |                     |
| Overweight (23-24.9 kg/m <sup>2</sup> ) | 9                 | 22.5 | 10                | 25.0 |                     |
| Obese (≥25 kg/m <sup>2</sup> )          | 2                 | 5.0  | 1                 | 2.5  | 0.928 <sup>ns</sup> |

ns=not significant

P value reached from Chi square test

**Table III: Distribution of the study patients by operative complications (n=80)**

| Operative complications      | Group A<br>(n=40) |       | Group B<br>(n=40) |       | P value             |
|------------------------------|-------------------|-------|-------------------|-------|---------------------|
|                              | n                 | %     | n                 | %     |                     |
| Conversion                   | 0                 | 0.0   | 0                 | 0.0   | -                   |
| Spillage of bile             | 3                 | 7.5   | 2                 | 5.0   | 0.644 <sup>ns</sup> |
| Bleeding from cystic artery  | 2                 | 5.0   | 1                 | 2.5   | 0.556 <sup>ns</sup> |
| Cystic duct injury           | 1                 | 2.5   | 0                 | 0.0   | 3.15 <sup>ns</sup>  |
| Bile duct injury             | 1                 | 2.5   | 0                 | 0.0   | 0.152 <sup>ns</sup> |
| Slippage of clip or ligature | 5                 | 12.5  | 0                 | 0.0   | 0.020 <sup>s</sup>  |
| Drain placement              | 40                | 100.0 | 40                | 100.0 | -                   |

s=significant; ns=not significant; P value reached from Chi square test

**Table IV: Time for ligation of the study patients (n=80)**

|                             | Group A<br>(n=40) | Group B<br>(n=40) | P value            |
|-----------------------------|-------------------|-------------------|--------------------|
|                             | mean±SD           | mean±SD           |                    |
| Time for ligation (minutes) | 2.48±0.30         | 1.55±0.25         | 0.001 <sup>s</sup> |

s=significant; P value reached from unpaired t-test

**Table V: Distribution of the study patients post operative variables (n=80)**

| Post operative variables                 | Group A<br>(n=40) | Group B<br>(n=40) | P value             |
|------------------------------------------|-------------------|-------------------|---------------------|
| Bile leakage (n, %)                      | 4 (10.0)          | 0 (0.0)           | 0.040 <sup>s</sup>  |
| Hospital stay (days) mean±SD             | 2.5 ±0.4          | 2.4±0.5           | 0.326 <sup>ns</sup> |
| Duration of drain in situ (days) mean±SD | 5.4±1.2           | 4.1±1.1           | 0.001 <sup>s</sup>  |

s=significant; ns=not significant; P value reached from

Chi square test and unpaired t-test

**Table VI: Distribution of the study patient's readmission after discharge**

| Readmission after discharge | Group A<br>(n=40) |      | Group B<br>(n=40) |      | P value             |
|-----------------------------|-------------------|------|-------------------|------|---------------------|
|                             | n                 | %    | n                 | %    |                     |
| Yes                         | 3                 | 7.5  | 2                 | 5.0  | 0.644 <sup>ns</sup> |
| No                          | 37                | 92.5 | 38                | 95.0 |                     |

ns=not significant; P value reached from Chi square test

**Table VII: Cost of CD occlusion and port closure**

| Cost of CD occlusion and port closure | Clip application (5-8 clips) and suture (used for port closure) | Extra- corporeal ligation + port closure (1 suture is used) | P value            |
|---------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------|--------------------|
| Mean±SD                               | 947.3±26.2                                                      | 400±0.0                                                     | 0.001 <sup>s</sup> |

s=significant; P value reached from unpaired t-test

**Discussion:**

The present study revealed that the majority 10 (25.0%) patients belonged to age group 31-40 years in group A and 17 (42.5%) in group B. The mean age was 39.97±13.50 years in group A and 40.12±9.67 years in group B. The difference was not statistically significant. Riaz et al.<sup>17</sup> observed that the mean age of the patient was 40.3±11.9 years and 38.3±10.8 years in laparoscopic cholecystectomy with metal clips group and intracorporeal ligation group respectively. Sharma et al.<sup>5</sup> reported the mean age in their study was 44.26 years in clip group and 47.32 years in ligature group. In this study showed that female patients were predominant in both groups, that was 32(80.0%) in group A and 31(77.5%) in group B. The difference was not statistically significant. Prabu et al.<sup>3</sup> reported total of 70 patients were included in the study. 67% of the patients were female and 33% were male. Sharma et al.<sup>5</sup>

reported female predominance in both clip (70%) and ligature groups (74%). Saha et al.<sup>6</sup> observed most of the patients were female (80.0%). This study observed that mean time for ligation was 2.48±0.30 minutes in group A and 1.55±0.25 minutes in group B. The difference was statistically significant (p<0.05) between two group. Riaz et al.<sup>17</sup> reported that the mean operating time in metal clip group was 2.53 ± 0.5 minutes compared to intracorporeal ligation group which was 4.79±1.5 minutes.

However, the study also showed that slippage of clip or ligature was 5(12.5%) in group A and none in group B. The difference was statistically significant (p>0.05) between two groups.

In this study showed that bile leakage was found in 4(10.0%) in group A but not found in group B. Duration of drain in situ was 5.4±1.2 days in group A and 4.1±1.1 days in group B. Bile leakage and duration of drain in situ was statistically significant (p<0.05) between two groups. The result of our study regarding bile leakage was comparable with the study done by Talebpour and Panahi.<sup>18</sup> That study concluded that ligation by suturing is effective in decreasing the risk of bile duct trauma and bile leakage. The result of our study was further supported by Rajra et al.<sup>12</sup> in MMU Hospital India. Bile leakage was 6% in clip group vs 3% in knot group. In a study conducted in Fort Prajaksi lapakoun hospital, Thailand by Jongsiri<sup>7</sup> showed that intracorporeal ligation in laparoscopic cholecystectomy was feasible, economical and safe. Leo et al.<sup>19</sup> reported In the MC group, three patients had post-operative bile leak from the CD stump and two had injury to the common bile duct. Compared to MC, it is observed that the use of absorbable locking clips shows a lesser incidence in bile leak post-operatively. Sharma et al.<sup>5</sup> observed majority of patients in group 1, 46(92%) were discharge on 5th and 7th day while in group 2nd 31(62%) were discharge on beyond 7th day. This difference between two groups was highly significant. In present study showed that cost of CD occlusion and port closure was 947.3±26.2 taka in group A and 400 taka in group B. The difference was statistically significant (p<0.05). In Prabu et al.<sup>3</sup> study, the cost of polyglactin suture was much cheaper than that of titanium clips used for the cystic duct and artery. For the suture material used during the study, the price was only 250-300 rupees (3.51-4.21 \$), whereas for the titanium clips used for clipping it was far higher, reaching 790-1000 rupees (12.28-15.55 \$). This suggests that the use of suture for ligation is a very cost-effective and economic option for ligation. Singal et al.<sup>20</sup> reported that the cost of material for silk suture (40-60 Rupees or 0.62-0.92 \$) is definitely much lower than that for Liga clips (790-1000 Rupees or 12.28-15.55 \$).

**Conclusion:**

Female patients were predominant in both groups and most of the patients were underweight. All patients had drain placement in both groups and slippage of clip or ligature were significantly higher in Laparoscopic Cholecystectomy with conventional Clip application of Cystic Duct. Time for ligation, Bile leakage, mean duration of drain in

situ (days), and cost of CD occlusion and port closure were significantly higher in Laparoscopic Cholecystectomy with conventional Clip application of Cystic Duct group in comparison to Laparoscopic Cholecystectomy with ligation of the Cystic duct with no-1vicryl by extra corporeal knotting group.

**Conflict of Interest:** None.

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**References:**

1. Keus F, Broeders IA, Van Laarhoven CJ. Surgical aspects of symptomatic cholecystolithiasis and acute cholecystitis. *Best Practice & Research Clinical Gastroenterology*. 2006; 20(6):1031-51. <https://doi.org/10.1016/j.bpg.2006.05.008> PMID:17127186
2. Mufti TS, Ahmad S, Naveed D, Akbar M, Zafar A. Laparoscopic cholecystectomy: an early experience at Ayub Teaching Hospital Abbottabad. *Journal of Ayub Medical College Abbottabad*. 2007;19(4):42-4.
3. Prabu KRM, Balaji D, Pai VM. Is suture ligation of cystic duct in laparoscopic cholecystectomy a safe alternative to clipping? Our experience in a rural centre. *Int Surg J*. 2019;6(10):3715-18. <https://doi.org/10.18203/2349-2902.isj20194430>
4. Ji W, Li LT, Li JS. Role of laparoscopic subtotal cholecystectomy in the treatment of complicated cholecystitis. *Hepatobiliary & pancreatic diseases international: HBPD INT*. 2006;5(4):584-9.
5. Sharma D, Sharma B, Solanki M. Laproscopic Cholecystectomy: Cystic Duct Occlusion with Titanium Clip or Ligation. *International Journal of Science and Research (IJSR)*. 2016;5(11):1909-12.
6. Saha PK, Roy RR, Rahman M, Khan EH, Reza SM, Rabbani G, Alom KS. Clipless Laparoscopic Cholecystectomy: An initial experience of 50 cases in Bangladesh. *Journal of Science Foundation*. January 2015; 13(1): 11-14. <https://doi.org/10.3329/jsf.v13i1.27828>
7. Jongsiri, Narongsak. How to secure cystic duct ligation for laparoscopic cholecystectomy- back to simple technique. *Thai Journal of Surgery*. 2009;30(1/2):29.
8. Adamsen S, Hansen OH, Funch-Jensen P, Schulze S, Stage JG, Wara P. Bile duct injury during laparoscopic cholecystectomy: a prospective nationwide series. *Journal of the American College of Surgeons*. 1997;184(6):571-78.
9. Huang X, Feng Y and Huang Z. Complications of Laparoscopic Cholecystectomy in China: An Analysis of 39,238 Cases. *Chinese Medical Journal*. 1997; 110: 704-06.

10. Shea JA, Healey MJ, Berlin JA, Clarke JR, Malet PF, Staroscik RN, et al. Mortality and complications associated with laparoscopic cholecystectomy. A meta-analysis. *Annals of surgery*. 1996;224(5):609. <https://doi.org/10.1097/00000658-199611000-00005> PMID:8916876 PMCID:PMC1235438
11. Unger SW, Glick GL, Landeros M. Cystic Duct Leak Study Group. Cystic duct leak after laparoscopic cholecystectomy. *Surgical endoscopy*. 1996; 10(12):1189-93. <https://doi.org/10.1007/s004649900276> PMID:8939840
12. Rajra A, Gupta M, Agnihotri L. 2016 Comparing outcome of patients in laparoscopic cholecystectomy by using clips vs ligation for cystic duct occlusion. *Sch J App Med Sci*. 2016;4(4D):1418-23.
13. Miroshnik M, Saafan A, Koh S, Farlow J, Neophyton J, Lizzio J, et al. Biliary tract injury in laparoscopic cholecystectomy: results of a single unit. *ANZ journal of surgery*. 2002;72(12):867-70. <https://doi.org/10.1046/j.1445-2197.2002.02587.x> PMID:12485222
14. Chong VH, Chong CF. Biliary complications secondary to post-cholecystectomy clip migration: A review of 69 cases. *J Gastroenterol Surg*. 2010;14(4):688-96. <https://doi.org/10.1007/s11605-009-1131-0> PMID:20049550
15. Ahmed AE. New technique of clipless laparoscopic cholecystectomy. *Surg Sci*. 2012;3.
16. Zaidi AH, Halim A, Azami R, Rana SH, Naqvi S, Shan A. Complications in Laparoscopic Cholecystectomy. *APMC*. 2015;9(2):57-65.
17. Riaz O, Riaz MF, Rehan A. Metal Clips Versus Intracorporeal Ligation for Cystic Duct Occlusion in Laparoscopic Cholecystectomy. *APMC*. 2017;11(2):165-68.
18. Talebpour M, Panahi M. New Aspects in Laparoscopic Cholecystectomy. *J Lap Surg Tech*. 2007;17(3):290-95. <https://doi.org/10.1089/lap.2006.0090> PMID:17570772
19. Leo XLJ, Saravanan S, Muthukumar RP, Aishwarya CVL, Pai VM. Comparing the Efficacy of Clipping versus Suture Ligation of the Cystic Duct in Laparoscopic Cholecystectomy: A Prospective Study. *Int J Sci Stud*. 2016;4(6):130-32.
20. Singal R, Sharma A, Zaman M. The Safety and Efficacy of Clipless versus Conventional Laparoscopic Cholecystectomy - our Experience in an Indian Rural Center. *MAEDICA - a Journal of Clinical Medicine*. 2018; 13(1): 44-50. <https://doi.org/10.26574/maedica.2018.13.1.44>

## Management Pattern of Chronic venous Disease in Bangladesh

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### Abstract

**Introduction:** Chronic venous disease (CVD) is mostly underdiagnosed disease which may progress to chronic venous insufficiency and venous ulcer thus extensive treatment. CVD may affect negatively into patient's good well-being which can create burdens on their life and also healthcare resources. Bangladesh has very minimum awareness on CVD. **Materials and Methods:** This was a cross-sectional study was carried out in department of vascular surgery of National Institute of Cardiovascular disease. we randomly choose 60 patients with chronic venous disease (CVD) and evaluate their characteristics and prevalence of several types along with the management pattern. Data collection started from May 2021 for next 6 months. **Results:** The patients of this survey were aged between 24 to 70 years and the Mean±SD age was 43.6±12.2. 78.3% of total study population were male, 33.3% were businessman and 10% were housewife. 66.6% patients were having low socio-economic condition. C2 varicose veins were highly prevalent among the study population (35%) & lowest prevalence of C4b lipodermatosclerosis or atrophie blanche (11.7%). Male were predominantly more prevalent to having CVD, 78.33% (n47), (p <0.001). Among all the patient 68.3% patient were exposed to smoking. All the patient were managed predominantly by compression therapy mainly are of moderate pressure (66.7%), 80% of total patients got treated by oral MPFF therapy. **Conclusion:** : Patients having CVD, invariably presented with the complains of heaviness of leg and unexplained leg swelling and Varicose vein were highly prevalent irrespective of sex. Compression therapy has been remained the mainstay of treatment in tertiary level hospital NICVD along with oral MPFF therapy. **Keywords:** Chronic venous disease (CVD).

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### Introduction:

Chronic venous disease (CVD) patients pursue management with several symptoms and signs that may affect their quality of life (QoL). Common symptoms are leg pain, discomfort, and heaviness, whereas the clinical signs of CVD are varicose veins (VVs), oedema, skin discolouration, lipodermatosclerosis, and, in severe cases, venous ulceration. Based on the presence of specific clinical signs, which may or may not be symptomatic but are associated with increasing clinical severity, CVD can be classified from C0 (no signs) to C6

(venous ulceration) <sup>1</sup>. This form of venous dysfunction may be the result of recanalization of thrombosed venous segments, pathological dilation of the vein or due to congenital absence of competent valves <sup>2</sup>. CVD is a very common problem with varicose veins affecting more than 25 million adults in the United States and more than 6 million with more advanced venous disease<sup>3</sup>. Estimates from the west show that prevalence of varicose veins varies widely from 2–56% in men and from 1–60% in women and venous ulceration affect approximately 0.3% of the adult population<sup>4</sup>. In Bangladesh, there is no published data regarding the prevalence of CVD. However, unpublished data from the National Institute of cardiovascular diseases (NICVD) suggest that about 50% of all patients undergoing Duplex study for vascular diseases are venous patients and more than 80% of venous consultations are for C4-C6 disease<sup>5</sup>. Prevalence estimates for varicose veins are higher, <1% to 73% in females and 2% to 56% in males<sup>6</sup>. A lower prevalence has been observed in men but some recent surveys have suggested that the occurrence in men may be comparable to that in women<sup>7</sup>. Treatment of CVD is mainly driven by compression therapy along with MPFF and painkillers. Keeping that in mind we have designed this study to see prevalence of chronic venous disease and common treatment pattern in NICVD.

### Materials and Methods:

This cross-sectional study was carried out in department of vascular surgery of National Institute of Cardiovascular disease. we randomly choose 60 patients with chronic venous disease (CVD) and evaluate their characteristics and prevalence of several types and treatment pattern. Data collection started from May 2021 for next 6 months in patients who was

admitted with CVD like symptoms. who were aged 18 years and above and willing fortreatment and given informed written consent were includedthis study and patients below 18 years of age were excluded inthis study. Data collected with a pre-tested structuredquestionnaire containing history, clinical, laboratoryinvestigations, pre-operative, post operative complications andpost operative follow up findings. Data collected, compiledand tabulated according to key variables. The analysis ofdifferent variable done according to standard statistical analysis- by using SPSS-19.

#### Results:

The patients of this survey were aged between 24 to 70 years and the Mean $\pm$ SD age was 43.6 $\pm$ 12.2. 78.3% patient were male and male: female ratio was 1:5.6. around 80% patient were employed that includes service (23.3%), business (33.3%), farming(10%) and garments working(13.3%). 66.7% patients were from low socio-economic background (Table I). All types of CVD patients were seen in our study (Table II), among them C2 varicose vein was more prevalent (35%). Advanced stage C5 healed venous ulcer also seen highly prevalent ( 21.7%).

**Table-I: Demographic characteristics of the study patients (n=60).**

| Variables                     | Number of patients | Percentage (%) |
|-------------------------------|--------------------|----------------|
| <b>Age group (years)</b>      |                    |                |
| 20 -30                        | 9                  | 15.0           |
| 31 -40                        | 17                 | 28.3           |
| 41 -50                        | 14                 | 23.3           |
| 51 -60                        | 16                 | 26.7           |
| 61 -70                        | 4                  | 6.7            |
| <b>Mean<math>\pm</math>SD</b> | 43.6 $\pm$ 12.2    |                |
| <b>Range (min-max)</b>        | 24-70              |                |
| <b>Sex</b>                    |                    |                |
| Male                          | 47                 | 78.3           |
| Female                        | 13                 | 21.7           |
| <b>Male : Female ratio</b>    | 5.6:1              |                |
| <b>Occupation</b>             |                    |                |
| Service                       | 14                 | 23.3           |
| Business                      | 20                 | 33.3           |
| Garments worker               | 8                  | 13.3           |
| Retired                       | 4                  | 6.7            |
| Farmer                        | 6                  | 10.0           |
| Housewife                     | 8                  | 13.3           |
| <b>Socioeconomic status</b>   |                    |                |
| Low                           | 40                 | 66.7           |
| Middle                        | 16                 | 26.7           |
| High                          | 4                  | 6.7            |

**Table-II: Distribution of the study patients by clinical classification (n=60).**

| Clinical classification                      | Number of patients | Percentage |
|----------------------------------------------|--------------------|------------|
| C2 varicose veins                            | 21                 | 35.0       |
| C3 edema                                     | 8                  | 13.3       |
| C4b lipodermatosclerosis or atrophie blanche | 7                  | 11.7       |
| C5 healed venous ulcer                       | 13                 | 21.7       |
| C6 active venous ulcer                       | 11                 | 18.3       |
| <b>Total</b>                                 | 60                 | 100.0      |

31-40 years age group were most prevalent having CVD with 17 patients, then 41-50 years age group with 14 patients and 51-60 years age group with 16 patients showing diversified distribution of the disease in the several age groups (Table III). Male were more prevalent having CVD (Table IV) with 78.3% presence. 27.7% male showed C5 healed venous ulcer ( $p<0.001^*$ ) whereas C2 varicose veins were most prevalent among female (69.2%) ( $p<0.001^*$ ). C5 healed venous ulcer and C6 healed venous ulcer were mostly prevalent among service holder and businessman (Table V). Association of CVD with socio-economic status results were in (Table VI). All the patients have been treated with compression therapy. 66.7% patients got the moderate pressure and 26.7% patient got the mild pressure, very few (6.7%) patients got the light pressure. Stocking position was 73% in the thigh level means that is the most common site. Around 80% patients got treated additional MPFF( DAFILON) therapy. Only 8 patients got topical management. 13 patients required pain killer for pain.

**Table-III: Association of clinical classification of CVD with age group (n=60).**

| Age group (years) |    | Clinical classification |          |                                              |                        |                        | p-value |
|-------------------|----|-------------------------|----------|----------------------------------------------|------------------------|------------------------|---------|
|                   |    | C2 varicose veins       | C3 edema | C4b lipodermatosclerosis or atrophie blanche | C5 healed venous ulcer | C6 active venous ulcer |         |
| 20-30             | 9  | 8(88.9%)                | 1(11.1%) | 0(0.0%)                                      | 0(0.0%)                | 0(0.0%)                | <0.001* |
| 31-40             | 17 | 7(41.2%)                | 0(0.0%)  | 2(11.8%)                                     | 3(17.6%)               | 5(29.4%)               |         |
| 41-50             | 14 | 4(28.6%)                | 3(21.4%) | 1(7.1%)                                      | 1(7.1%)                | 5(35.7%)               |         |
| 51-60             | 16 | 2(12.5%)                | 4(25.0%) | 0(0.0%)                                      | 9(56.3%)               | 1(6.3%)                |         |
| 61-70             | 4  | 0(0.0%)                 | 0(0.0%)  | 4(100.0%)                                    | 0(0.0%)                | 0(0.0%)                |         |
| <b>Total</b>      | 60 | 21(35.0%)               | 8(13.3%) | 7(11.7%)                                     | 13(21.7%)              | 11(18.3%)              |         |

p-value obtained by Chi-square test, \*significant

**Table-IV: Distribution of the study patients by compression therapy (n=60).**

| Variables             | Number of patients | Percentage (%) |
|-----------------------|--------------------|----------------|
| Light (10 – 14 mmHg)  | 4                  | 6.7            |
| Mild (15 – 22mm Hg)   | 16                 | 26.7           |
| Moderate (23 -32mmHg) | 40                 | 66.7           |
| <b>Total</b>          | 60                 | 100.0          |

**Table-V: Distribution of the study patients by stockings (n=60).**

| Variables    | Number of patients | Percentage (%) |
|--------------|--------------------|----------------|
| Below-knee   | 16                 | 26.7           |
| Thigh level  | 44                 | 73.3           |
| <b>Total</b> | <b>60</b>          | <b>100.0</b>   |

**Table-VI: Distribution of the study patients by treatment (n=60).**

| Treatment                                           | Number of patients | Percentage (%) |
|-----------------------------------------------------|--------------------|----------------|
| Oral Venoactive treatment (Tab. Daflon)             | 48                 | 80.0           |
| Painkiller (Tab. Paracetamol)                       | 13                 | 21.7           |
| Topical                                             | 8                  | 13.3           |
| Others (surgical intervention, RFA, LASER ablation) | 14                 | 23.4           |

\*RFA = Radio Frequency Ablation

#### Discussion:

Hippocrates recommended puncture of varicose veins followed by compression<sup>7</sup>. Compression therapy, despite significant improvements in dressing materials and other methods, remains the cornerstone of conservative treatment. This is because of its ease of use, non-invasive nature, and efficacy in managing venous hypertension, the main pathophysiological mechanism of CVD. Elastic stockings were invented in 1930 as a result of the personal experience of Jobst, an engineer, who himself suffered from a venous ulceration. While bathing in his pool, he noticed that his symptoms were less pronounced, coming to the conclusion that the increasing depth of the water was the secret of the “healing” component. Thus, graduated compression stockings were invented<sup>8</sup>. The current standard treatment for symptoms and signs of chronic venous obstruction or deep venous reflux is compression therapy. However, its effectiveness may be suboptimal in selected cases, especially when compression therapy has limited effect on venous symptoms or the compliance is poor. One RCT, concerned with treatment of venous ulcers, showed that the group treated by CHIVA had a similar healing rate (100% vs. 96%) and a lower recurrence rate (9% vs. 38%) at 3 years follow up than the group treated by compression<sup>9</sup>. In a RCT, sustained compression of at least 40 mmHg with a four layer compression bandage over a week has been 69% C. Wittens et al. shown to be more effective than lower grades of compression<sup>10</sup>. Maximum research suggest that compression therapy has been very effective and time tested for managing CVD. In this study along with compression several other concomitant therapy like oral MPFF, Painkiller, Surgical interventions, RFA, laser ablation have also been used in selective patients. Our study result also reveals similarity with these data. All the patients got treated with compression therapy in tertiary level hospital like NICVD.

#### Conclusion:

Chronic venous disease is quite common in Bangladesh. But majority of the patient remains unaware the disease and

also the rarely seek treatment. Maximum of our patients are poor thereby they are reluctant to take adequate management. Compression therapy is a cheaper option for the management of CVD along with MPFF. Use of compression is quite popular also in tertiary level hospital which is substantiated with our study.

**Conflict of Interest:** None.

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#### References:

1. Adv Ther. <https://doi.org/10.1007/s12325-019-0881-7> PMid:30758738 PMCID:PMC6824448
2. Zwiebel WJ. Ultrasound diagnosis of venous insufficiency. In: Zwiebel WJ. Introduction to vascular ultrasonography. 5th ed. WB saunders company;2005:479. <https://doi.org/10.1016/B978-0-7216-0631-6.50032-4>
3. Beebe-Dimmer JL, Pfeifer JR, Engle JS, Schottenfeld D. The epidemiology of chronic venous insufficiency and varicose veins. Ann Epidemiol. 2005; 15: 175-184. <https://doi.org/10.1016/j.annepidem.2004.05.015> PMid:15723761
4. Robertson L, Evans C, Fowkes FG. Epidemiology of chronic venous disease. Phlebology. 2008;23(3):103-111. <https://doi.org/10.1258/phleb.2007.007061> PMid:18467617
5. Chronic Venous Disorders: A Contemporary Review Abul Hasan Muhammad Bashar Department of Vascular Surgery, NICVD, Dhaka.
6. Das S. Ulcers of the leg. Surgical Short cases. 3rd edition. 2007; 15:183.
7. K.A.L. Darvall, G.R. Bate, D.J. Adam, S.H. Silverman, A.W. Bradbury. Duplex Ultrasound Outcomes following Ultrasound-guided Foam Sclerotherapy of Symptomatic Recurrent Great Saphenous Varicose Veins. European Journal of Vascular and Endovascular Surgery. 2011;42(1):107-114. <https://doi.org/10.1016/j.ejvs.2011.03.010> PMid:21474347
8. JR Vincent, GT Jones, GB Hill, AM van Rij . Journal of vascular surgery; 2011.
9. Zamboni P, Cisno C, Marchetti F, Mazza P, Fogato L, Carandina S, et al. Minimally invasive surgical management of primary venous ulcers vs. compression treatment: a randomized clinical trial. Eur J VascEndovase Surg. 2003;25:313e8. <https://doi.org/10.1053/ejvs.2002.1871> PMid:12651168
10. Blair SD, Wright DD, Backhouse CM, Riddle E, McCollum CN. Sustained compression and healing of chronic venous ulcers. Br Med J. 1988;297:1159e61 <https://doi.org/10.1136/bmj.297.6657.1159> PMid:3144330 PMCID:PMC1834977

# Intraventricular Hemorrhage Extension is a Strong Predictor of Mortality in Hemorrhagic Stroke

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## Abstract

**Introduction:** Spontaneous intracerebral hemorrhage (sICH) accounts for 10–15% of all strokes and is characterized by a 30–50% 3-month mortality rate. Intraventricular hemorrhage (IVH) extension can be seen in up to 54% of spontaneous intracerebral hemorrhage and is an independent predictor of worse outcome and neurological deterioration. **Objective:** To predict outcome and prognosis in spontaneous intracerebral hemorrhage patient in relation with intraventricular hemorrhage extension. **Materials and Methods:** Hospital based prospective study carried out in two hundred hemorrhagic stroke patients. The severity of intraventricular hemorrhage extension was calculated using the Graeb scale and volume of hemorrhage was measured by ABC/2 formula using CT scan. **Results:** Mean age of patients of hemorrhagic stroke was  $61.64 \pm 12.76$  years. 66% of patients were male. Mortality rate of hemorrhagic stroke after the age of 60 years was 47.92% in 1st month. 79.80% of patients were died with GCS score less than 8. In our study 96.08% of patient died with >50 ml Hemorrhage group, on the other hand mortality rate was 48% in 30-50ml hemorrhage group and 11.12% in <30ml hemorrhage group. Mortality rate was 61.17% in hemorrhagic stroke with ventricular extension group on the other hand mortality was 21.65% in hemorrhagic stroke without ventricular extension. Those patients with GRAEB score >5 their mortality rate was 75.00% on the other hand mortality was 49.10% in GRAEB score 1-4. **Conclusion:** Intraventricular hemorrhage extension increased mortality in spontaneous intracerebral hemorrhage. Increased IVH extension severity, defined by a GRAEB score  $\geq 5$ , is an independent predictor of poor outcome of Spontaneous intracerebral hemorrhage alone with age, GCS and hemorrhage volume.

**Keyword:** Intraventricular hemorrhage extension, Hemorrhagic stroke, Mortality.

**Number of Tables:** 07; **Number of References:** 40; **Number of Correspondences:** 04.

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## Introduction:

Spontaneous intracerebral hemorrhage (sICH) has an overall incidence of 24.6 per 100,000 patient-years and the incidence increases with age<sup>1</sup>. sICH accounts for 10–15% of all strokes and is characterized by a 30–50% 3-month mortality rate<sup>2-4</sup>. Intraventricular hemorrhage (IVH) extension can be seen in up to 54% of sICH and is an independent predictor of worse outcome and neurological deterioration<sup>4,13</sup>. Parameters such as age, ICH volume, Glasgow Coma Scale (GCS) or infratentorial origin of hemorrhage, the presence of intraventricular hemorrhage (IVH) represents an established parameter independently impacting clinical outcomes after ICH<sup>11,14</sup>. IVH occurs in up to 45% of ICH patients [5] and previous analyses have suggested an influence of the extent of IVH on functional outcome<sup>15,16</sup>.

In ICH patients, the most detrimental consequence of IVH is acute, obstructive hydrocephalus. The occurrence of hydrocephalus has been shown to be an independent predictor of mortality in ICH patients<sup>16</sup>.

Observations from retrospective clinical series and prospective clinical trials have confirmed the importance of IVH as a clinical factor associated with poor outcomes including coma, mortality, and long-term functional impairment. The presence of intraven-

tricular blood has been strongly associated with impaired consciousness at presentation<sup>17</sup>. Simple comparison between ICH subjects with and without IVH extension suggests that mortality is substantially increased if IVH is present. Tuhim was the first to consistently demonstrate a powerful relationship between the presence of IVH in a brain hemorrhage patient and the likelihood of death<sup>18</sup>. This relationship was prospectively demonstrated in several subsequent studies<sup>10,19</sup>. Multivariate regression analysis performed on other convenience samples almost always defines the presence of IVH as an independent risk factor for mortality and poor functional outcome<sup>20-22</sup>. Randomized controlled studies in the past decade have confirmed this point by demonstrating a similar relationship between poor outcomes and the extent of IVH.

#### Materials and Methods:

This Prospective study was conducted at Department of neurology, Shahid Sheikh Abu Naser Specialized Hospital, Khulna, between the period of 01/01/2019 to 31/01/2020. 200 cases of CT scan proved hemorrhagic stroke patient were included in this study. Hemorrhagic stroke with history of recent trauma to head, intracerebral hemorrhage due to anticoagulant or antiplatelet therapy, CT scan evidence of a subarachnoid hemorrhage, isolated intraventricular hemorrhage, patient with blood dyscrasia and hemorrhagic infarction were excluded from this study.

All stroke patients admitted in Neurology unit evaluated clinically and CT scan was done. Clinical assessment of outcome was done by assessing age, Glasgow Coma Scale (for assessing conscious level), neck rigidity (for assessing ventricular extension), posterior fossa lesion (assessed by seeing signs of brain stem lesion, signs of cerebellar lesion, respiratory pattern and cardiovascular status). We calculate hemorrhage volume in bedside by using ABC/2 formula<sup>23,24</sup>. Volume of hemorrhage was measured by ABC/2 formula using CT scan. CT scan slice with the largest area of hemorrhage was identified. The largest diameter (A) of the hemorrhage on this slice was measured. The largest diameter 90° to A on the same slice was measured next (B). Finally, the approximate number of slices on which the intracerebral hemorrhage was seen was calculated (C). C was calculated by a comparison of each CT slice with hemorrhage to the CT slice with the largest hemorrhage on that scan. If the hemorrhage area for a particular slice was greater than 75% of the area seen on the slice where the hemorrhage was largest, the slice was considered 1 hemorrhage slice for determining C. If the area was approximately 25% to 75% of the area, the slice was considered half a hemorrhage slice; and if the area was less than 25% of the largest hemorrhage, the slice was not considered a hemorrhage slice. These CT hemorrhage slice values were added and multiplied by the slice thickness and determined the value for C. All measurements for A and B were made with the use of the centimeter scale on the CT scan to the nearest 0.5 cm. A, B, and C were then multiplied and the product divided by 2, which yielded the volume of hemorrhage in cubic centimeters. Site of haemorrhage and ventricular extension were recorded. The severity of IVH extension was calculated using the Graeb scale<sup>25</sup>. The Graeb scale is a semiquantitative tool for IVH extension scoring, ranging from 0 to 12 points, with higher scores denot-

ing increased IVH volumes; a maximum of four is given for each lateral ventricle if expanded and filled with blood and up to 2 for the third and fourth ventricle if filled with blood and expanded (16). From day of admission to day 7 all patients were followed up twice daily. In each follow up pulse, blood pressure, Cardiac status, respiratory status, Glasgow Coma Scale, pupil, new focal sign and bed sore were assessed and any change in status were recorded. As shortage of bed in hospital could not allowed long duration stay, so those patients were discharged they were requested to attend follow up on 15th and 30th day in Neurology unit, and those who could not attend the follow up their information (outcome i.e. static / improved / death) had been collected over telephone. Results were calculated using Chi-square test.

#### Results:

A total of 200 patients of hemorrhagic stroke were incorporated in this study. Majority of the patients incorporated in this study belongs to age group above 60 years (i.e. 48%), followed by 50 – 60 years group (which was 31.5%) and 20.0% in < 50 years group. 66% of patients were male and 34% of patients were female.

Table – I: Shows

- Mortality rate increased with increased age, 46 patients died out of 84 after the age of 60 (i.e. about 54.76%) of all death, followed by 27 patients died in the age between 50 – 60 (i.e. about 32.14% of all death).

The results are as follows –

**Table – I: Distribution of patients according to age and 1st month mortality (n=200).**

| Age of the patients | Group             |                  | Total              |
|---------------------|-------------------|------------------|--------------------|
|                     | Alive             | Death            |                    |
| < 50 yrs            | 30<br>73.17%      | 11<br>26.83%     | 41<br>20.5%        |
| 50 – 60 yrs         | 36<br>57.14%      | 27<br>42.86%     | 63<br>31.5%        |
| > 60 yrs            | 50<br>52.08%      | 46<br>47.92%     | 96<br>48%          |
| <b>Total</b>        | <b>116</b><br>58% | <b>84</b><br>42% | <b>200</b><br>100% |

**Table – II: Shows**

- 42% of death occurs with 1 month of onset of intracerebral hemorrhage (ICH). 41.5% of patients were static and 16.5% patients improved in 1st month.

**Table – II: Distribution of patients according to outcome in 1st month (n=200).**

| Outcome      | Total      | Percentage  |
|--------------|------------|-------------|
| Death        | 84         | 42%         |
| Static       | 83         | 41.5%       |
| Improved     | 33         | 16.5%       |
| <b>Total</b> | <b>200</b> | <b>100%</b> |

**Table – III: Shows**

• 99 patients presented with GCS  $\leq 8$  of which 79 patients (i.e. 79.80%) died on the other hand only 5 patients died (i.e. 4.95%) out of 101 with GCS  $\geq 9$ .

**Table – III: Distribution of patients according to initial Glasgow Coma Scale (GCS) and 1st month mortality (n=200).**

| GCS          | Group      |           | Total      | Chi-square test ( $\chi^2$ ) | Odds ratio | P-value         |
|--------------|------------|-----------|------------|------------------------------|------------|-----------------|
|              | Alive      | Death     |            |                              |            |                 |
| $\leq 8$     | 20         | 79        | 99         |                              |            |                 |
|              | 20.20%     | 79.80%    |            | 49.50%                       | 114.97     | 75.84 < 0.00001 |
| $\geq 9$     | 96         | 5         | 101        |                              |            |                 |
|              | 95.05%     | 4.95%     |            | 50.50%                       |            |                 |
| <b>Total</b> | <b>116</b> | <b>84</b> | <b>200</b> |                              |            |                 |

**Table – IV: Shows**

• Mortality rate of hemorrhagic stroke in 1st month was 42%. This study shows increased size of hemorrhage increased mortality. Mortality rate of hemorrhage volume  $> 50$  ml was about 96.08% in this study, where as mortality rate of hemorrhage volume  $< 30$  ml was only 11.12%.

**Table – IV: Distribution of according to volume of hemorrhage with 1st month mortality (n=200).**

| Volume of hemorrhage | Group      |            | Total       | Chi-square test ( $\chi^2$ ) | Pvalue             |
|----------------------|------------|------------|-------------|------------------------------|--------------------|
|                      | Alive      | Death      |             |                              |                    |
| $< 30$ ml            | 88         | 11         | 99          |                              |                    |
|                      | 88.88%     | 11.12%     |             | 49.50%                       |                    |
| 30–50 ml             | 26         | 24         | 50          |                              |                    |
|                      | 52%        | 48%        |             | 25%                          | 100.7416 < 0.00001 |
| $> 50$ ml            | 2          | 49         | 51          |                              |                    |
|                      | 3.92%      | 96.08%     |             | 25.50%                       |                    |
| <b>Total</b>         | <b>116</b> | <b>84</b>  | <b>200</b>  |                              |                    |
|                      | <b>58%</b> | <b>42%</b> | <b>100%</b> |                              |                    |

**Table – V: Shows**

• 61.17% of patients died in ventricular extension group on the other hand only 21.65% patient died who had no ventricular extension.

**Table – V: Distribution of patients according to ventricular extension and 1st month mortality (n=200).**

| Ventricular extension | Group      |           | Total      | Chi-square test ( $\chi^2$ ) | Odds ratio | P-value         |
|-----------------------|------------|-----------|------------|------------------------------|------------|-----------------|
|                       | Alive      | Death     |            |                              |            |                 |
| Present               | 40         | 63        | 103        |                              |            |                 |
|                       | 38.83%     | 61.17%    |            | 51.50%                       | 32.0212    | 5.700 < 0.00001 |
| Absent                | 76         | 21        | 97         |                              |            |                 |
|                       | 78.35%     | 21.65%    |            | 48.50%                       |            |                 |
| <b>Total</b>          | <b>116</b> | <b>84</b> | <b>100</b> |                              |            |                 |

**Table – VI: Shows**

• 75.00% of patient died in graeb score 5-12 group, on the other hand 49.10% patient died in graeb score 1-4 group.

**Table – VI: Distribution of patients of ventricular extension according to GRAEB score (n=103).**

| Graeb score  | Group     |           | Total      | Chi-square test | P-value |
|--------------|-----------|-----------|------------|-----------------|---------|
|              | Alive     | Death     |            |                 |         |
| 1-4          | 28        | 27        | 55         |                 |         |
|              | 50.90%    | 49.10%    |            | 53.40%          |         |
| 5-12         | 12        | 36        | 48         |                 |         |
|              | 25.00%    | 75.00%    |            | 46.60%          |         |
| <b>Total</b> | <b>40</b> | <b>63</b> | <b>103</b> |                 |         |

**Table – VII: Shows**

61.17% of patient died with ventricular hemorrhage group on the other hand 21.65% of patient died in non ventricular hemorrhage group

**Table – VII: Comparative death analysis of ventricular hemorrhage and non ventricular hemorrhage (n=200).**

| Distribution               | Number     | Group      |           | Odds ratio | P-value                     |
|----------------------------|------------|------------|-----------|------------|-----------------------------|
|                            |            | Alive      | Death     |            |                             |
| Ventricular hemorrhage     | 103        | 40         | 63        |            |                             |
|                            |            | 38.83%     | 61.17%    | 5.7000     | 0.0001 (CI: 3.0513-10.6479) |
| Non ventricular hemorrhage | 97         | 76         | 21        |            |                             |
|                            |            | 78.35%     | 21.65%    |            |                             |
| <b>Total</b>               | <b>200</b> | <b>116</b> | <b>84</b> |            |                             |

**Discussion:**

Two hundred patients with hemorrhagic stroke admitted in Department of neurology, Shahid Sheikh Abu Naser Specialized Hospital, Khulna were included in this study within the time period of 01/01/2019 to 31/12/2019. All patients were selected as per inclusion criteria. Their presentation, risk factors and outcome were assessed. In this study shows that mean age of patients of onset of hemorrhagic stroke was  $61.64 \pm 12.76$ . This co-relates with studies shows hemorrhagic stroke occurs particularly those older than 55 years of age<sup>26,27</sup>. This study shows that males were affected more than females, 66% of patients were male and 34% of patients were female. This co-relates with studies suggesting that intracerebral hemorrhage is more common in men than women<sup>26,27</sup>. 47.92% of patients died in age group  $> 60$  years followed by 42.86% in 50–60 years and 26.83% in  $< 50$  years group (Table - I), suggest mortality increased with increased age which correlates with study shown by Daverat P and Broderick JP et al<sup>28,29</sup>. This study shows that 42% of patients died 41.5% static and

16.5% were improved in 1<sup>st</sup> month of onset of stroke (Table - II), which co-relates with the study shown by Broderick et al they shown that 30 day mortality of ICH was 44%, with half of deaths occurring within the first 2 days of onset<sup>29</sup>. Level of consciousness, volume of parenchymal hemorrhage and to a lesser extent intraventricular hemorrhage has been most consistently linked with poor outcome<sup>30-35</sup>.

This study shows 79.80% of (79 out of 99 ) patients died with a GCS  $\leq$  8, where as 4.95% of patients (5 out of 101) died with GCS  $\geq$  9 (Table - III), with a p – value  $< 0.00001$  that is statistically significant which strongly co-relates with other foreign studie<sup>29</sup>.

Volume of intracerebral hemorrhage as calculated by ABC/2 formulas using on CT-Scan were studied into three different categories  $< 30$  ml,  $30 - 50$  ml and  $> 50$  ml, Shown 96% death rates of hemorrhage size  $> 50$  ml in 1<sup>st</sup> month. On the other hand death rates in  $30 - 50$  ml group were 48% and  $< 30$  ml group were only 11.12% (Table -IV); with a chi-square test result was 100.7416 and p-value  $< 0.00001$ , that was statistically significant and coincide with the study shown that increased volume of hemorrhage increased mortality, Broderick J et al shows that a model of 30 day mortality that used the Glasgow coma scale and hemorrhage volume in patients with intracerebral hemorrhage correctly predicted outcome with a sensitivity and specificity of 97%<sup>29</sup>.

51.50% of patients (n=103) presented with ventricular extension of which 61.17% (n=63) of patients died within 1 month (Table - V), with p-value  $< 0.00001$  that was statistically significant and co-relates with several studies<sup>36,37</sup>. Tuhim was the first to consistently demonstrate a powerful relationship between the presence of IVH in a brain hemorrhage patient and the likelihood of death<sup>18</sup>. This relationship was prospectively demonstrated in several subsequent studies<sup>10,19</sup>. Multivariate regression analysis performed on other convenience samples almost always defines the presence of IVH as an independent risk factor for mortality and poor functional outcome<sup>20-22</sup>. Randomized controlled studies in the past decade have confirmed this point by demonstrating a similar relationship between poor outcomes and the extent of IVH. 75% of patient died in Graeb score 5 - 12 group, on the other hand 49.10% of patient died in graeb score 1 - 4 group (Table - VI) with chi square test value 7.2434 and p-value  $< 0.05$  that is statistically significant. Trifan G in a study shown higher IVH severity as defined as Graeb score  $\geq 5$  is associated with worse outcome, while lower IVH severity Graeb scores 1-4 has similar outcomes to patient without IVH<sup>38</sup>. In one of these studies, Graeb score  $\geq 5$  was associated with increased functional impairment at hospital discharge<sup>39</sup>. In another study, increasing IVH severity decreased survival and functional independence<sup>40</sup>. Comparative death analysis of ventricular hemorrhage and non ventricular hemorrhage ( Table - VII) shows 61.17% of patient died in ventricular hemorrhage group on the other hand 21.65% of patient died in non ventricular hemorrhage group with odd ratio 5.7000

and p-value  $< 0.0001$  that is statistically significant which co relates with study shown by Trifan G<sup>38</sup>.

#### Conclusion:

Intraventricular hemorrhage extension is a strong predictor of mortality in spontaneous intracerebral hemorrhage. Increased IVH extension severity, defined by a GRAEB score  $\geq 5$ , is an independent predictor of poor outcome of Spontaneous intracerebral hemorrhage alone with age, GCS and hemorrhage volume. When using risk stratification tools for clinical severity grading after sICH, IVH extension should be given different weights based on the amount of IVH extension present, rather than being used as a dichotomized variable.

**Conflict of Interest:** None.

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#### References:

1. Van Asch CJ, Luitse MJ, Rinkel GJ, Van der Tweel I, Algra A, Klijn CJ. Incidence, case fatality, and functional outcome of intracerebral haemorrhage over time, according to age, sex, and ethnic origin: a systematic review and meta-analysis. *Lancet Neurol.* (2010) 9:167-76.  
[https://doi.org/10.1016/S1474-4422\(09\)70340-0](https://doi.org/10.1016/S1474-4422(09)70340-0)  
PMid:20056489
2. Andersen KK, Olsen TS, Dehlendorff C, Kammersgaard LP. Hemorrhagic and ischemic strokes compared: stroke severity, mortality, and risk factors. *Stroke.* 2009; 40:2068-72.  
<https://doi.org/10.1161/STROKEAHA.108.540112>  
PMid:19359645
3. Sacco S, Marini C, Toni D, Olivieri L, Carolei A. Incidence and 10-year survival of intracerebral hemorrhage in a population-based registry. *Stroke.* 2009; 40:394-9.  
<https://doi.org/10.1161/STROKEAHA.108.523209>  
PMid:19038914
4. Qureshi AI, Tuhim S, Broderick JP, Batjer HH, Hondo H, Hanley DF. Spontaneous intracerebral hemorrhage. *N Engl J Med.* 2001; 344:1450-60.  
<https://doi.org/10.1056/NEJM200105103441907>  
PMid:11346811
5. Sun W, Pan W, Kranz PG, Hailey CE, Williamson RA, Sun W, et al. Predictors of late neurological deterioration after spontaneous intracerebral hemorrhage. *Neurocrit Care.* 2013; 19:299-305.  
<https://doi.org/10.1007/s12028-013-9894-2>  
PMid:23979796 PMCID:PMC4100944
6. Hansen BM, Morgan TC, Betz JF, Sundgren PC, Norrving B, Hanley DF, et al. Intraventricular extension of supratentorial intracerebral hemorrhage: the modified graeb

scale improves outcome prediction in lund stroke register. *Neuroepidemiology*. 2016; 46:43-50.

<https://doi.org/10.1159/000442575>

PMid:26668048 PMCID:PMC6139030

7. Hallevi H, Albright KC, Aronowski J, Barreto AD, Martin Schild S, Khaja AM, et al. Intraventricular hemorrhage: anatomic relationships and clinical implications. *Neurology*. 2008; 70:848-52.

<https://doi.org/10.1212/01.wnl.0000304930.47751.75>

PMid:18332342 PMCID:PMC2745649

8. Witsch J, Bruce E, Meyers E, Velazquez A, Schmidt JM, Suwatcharakoon S, et al. Intraventricular hemorrhage expansion in patients with spontaneous intracerebral hemorrhage. *Neurology*. 2015; 84:989-94.

<https://doi.org/10.1212/WNL.0000000000001344>

PMid:25663233 PMCID:PMC4352099

9. Nishikawa T, Ueba T, Kajiwaru M, Miyamatsu N, Yamashita K. A priority treatment of the intraventricular hemorrhage (IVH) should be performed in the patients suffering intracerebral hemorrhage with large IVH. *Clin Neurol Neurosurg*. 2009; 111:450-3.

<https://doi.org/10.1016/j.clineuro.2009.01.005>

PMid:19231066

10. Tuhim S, Horowitz DR, Sacher M, Godbold JH. Volume of ventricular blood is an important determinant of outcome in supratentorial intracerebral hemorrhage. *Crit Care Med*. 1999;27:617-21.

<https://doi.org/10.1097/00003246-199903000-00045>

PMid:10199544

11. Hemphill JC III, Bonovich DC, Besmertis L, Manley GT, Johnston SC. The ICH score: a simple, reliable grading scale for intracerebral hemorrhage. *Stroke*. 2001; 32:891-7.

<https://doi.org/10.1161/01.STR.32.4.891>

PMid:11283388

12. Bhatia R, Singh H, Singh S, Padma MV, Prasad K, Tripathi M, et al. A prospective study of in-hospital mortality and discharge outcome in spontaneous intracerebral hemorrhage. *Neurol India*. 2013; 61:244-8.

<https://doi.org/10.4103/0028-3886.115062>

PMid:23860142

13. Mustanoja S, Satopaa J, Meretoja A, Putaala J, Strbian D, Curtze S, et al. Extent of secondary intraventricular hemorrhage is an independent predictor of outcomes in intracerebral hemorrhage: data from the Helsinki ICH Study. *Int J Stroke*. 2015; 10:576-81.

<https://doi.org/10.1111/ijss.12437>

PMid:25580771

14. Mansouri B, Heidari K, Asadollahi S, Nazari M, Assar-zadegan F, Amini A. Mortality and functional disability after spontaneous intracranial hemorrhage: the predictive impact of overall admission factors. *Neurol Sci*. 2013 Nov; 34(11): 1933-9.

<https://doi.org/10.1007/s10072-013-1410-0>

PMid:23543380

15. Rusalleda J, Peiró A. Prognostic factors in intraparenchymatous hematoma with ventricular hemorrhage. *Neuroradiology*. 1986; 28(1): 34-7.

<https://doi.org/10.1007/BF00341763>

PMid:3951686

16. Morgan TC, Dawson J, Spengler D, Lees KR, Aldrich C, Mishra NK, et al.; CLEAR and VISTA Investigators. The Modified Graeb Score: an enhanced tool for intraventricular hemorrhage measurement and prediction of functional outcome. *Stroke*. 2013 Mar; 44(3): 635-41.

<https://doi.org/10.1161/STROKEAHA.112.670653>

PMid:23370203 PMCID:PMC6800016

17. Qureshi AI, Safdar K, Weil J. Predictors of early deterioration and mortality in black Americans with spontaneous intracerebral hemorrhage. *Stroke*. 1995;26:1764-1767.

<https://doi.org/10.1161/01.STR.26.10.1764>

PMid:7570722

18. Tuhim S, Dambrosia JM, Price TR, Mohr JP, Wolf PA, Heyman A, et al. Prediction of intracerebral hemorrhage survival. *Ann Neurol*. 1988; 24:258-263.

<https://doi.org/10.1002/ana.410240213>

PMid:3178180

19. Tuhim S, Dambrosia JM, Price TR. Intracerebral hemorrhage: External validation and extension of a model for prediction of 30-day survival. *Ann Neurol*. 1991;29:658-663.

<https://doi.org/10.1002/ana.410290614>

PMid:1842899

20. Steiner T, Schneider D, Mayer S, Brun N, Begtrup K, Broderick J, et al. Dynamics of intraventricular hemorrhage in patients with spontaneous intracerebral hemorrhage: Risk factors, clinical impact, and effect of hemostatic therapy with recombinant activated factor vii. *Neurosurgery*. 2006;59:767-773.

<https://doi.org/10.1227/01.NEU.0000232837.34992.32>

PMid:17038942

21. Bhattathiri PS, Gregson B, Prasad KS, Mendelow AD. Intraventricular hemorrhage and hydrocephalus after spontaneous intracerebral hemorrhage: Results from the stich trial. *Acta Neurochir Suppl*. 2006;96:65-68.

[https://doi.org/10.1007/3-211-30714-1\\_16](https://doi.org/10.1007/3-211-30714-1_16)

PMid:16671427

22. Mayfrank L, Hutter BO, Kohorst Y, Kreitschmann-Andermahr I, Rohde V, Thron A, et al. Influence of intraventricular hemorrhage on outcome after rupture of intracranial aneurysm. *Neurosurg Rev*. 2001;24: 185-191.

<https://doi.org/10.1007/s101430100160>

PMid:11778824

23. Kothari RU, Brott T, Broderick JP, Barsan WG, Sauerbeck LR, Zuccarello M, et al. The abcs of measuring intracerebral hemorrhage volumes. *Stroke*. 1996;27:1304-1305.

<https://doi.org/10.1161/01.STR.27.8.1304>

PMid:8711791

24. Gebel JM, Sila CA, Sloan MA, Granger CB, Weisenberger JP, Green CL, et al. Comparison of the abc/2 estimation technique to computer-assisted volumetric analysis of intraparenchymal and subdural hematomas complicating the gusto-1 trial. *Stroke*. 1998;29: 1799-1801.  
<https://doi.org/10.1161/01.STR.29.9.1799>  
PMid:9731597
25. Graeb DA, Robertson WD, Lapointe JS, Nugent RA, Harrison PB. Computed tomographic diagnosis of intraventricular hemorrhage. Etiology and prognosis. *Radiology*. 1982; 143:91-6.  
<https://doi.org/10.1148/radiology.143.1.6977795>  
PMid:6977795
26. Giroud M, Gras P, Chadan N, et al. Cerebral hemorrhage in a French prospective population study. *J Neurol Neurosurg Psychiatry*. 1991;54:595-598.  
<https://doi.org/10.1136/jnnp.54.7.595>  
PMid:1895123 PMCid:PMC1014428
27. Sacco RL, Mayer SA. Epidemiology of intracerebral hemorrhage. In: Feldmann E, ed. *Intracerebral hemorrhage*. Armonk, N.Y.: Futura Publishing. 1994:3-23.
28. Daverat P, Castel JP, Dartigues JF, Orgogozo JM. Death and functional outcome after spontaneous intracerebral hemorrhage: a prospective study of 166 cases using multivariate analysis. *Stroke*. 1991;22:1-6.  
<https://doi.org/10.1161/01.STR.22.1.1>  
PMid:1987664
29. Broderick JP, Brott TG, Duldner JE, Tomsick T, Huster G. Volume of intracerebral hemorrhage: a powerful and easy-to-use predictor of 30-day mortality. *Stroke*. 1993;24:987-993.  
<https://doi.org/10.1161/01.STR.24.7.987>  
PMid:8322400
30. Fogelholm R, Nuutila M, Vuorela AL. Primary intracerebral haemorrhage in the Jyväskylä region, Central Finland, 1985-89: incidence, case fatality rate, and functional outcome. *J Neurol Neurosurg Psychiatry*. 1992;55:546-552.  
<https://doi.org/10.1136/jnnp.55.7.546>  
PMid:1640229 PMCid:PMC489163
31. Tuhim S, Dambrosia J, Price T, Mohr J, Wolf P, Hier D, et al. Intracerebral hemorrhage: external validation and extension of a model for prediction of 30-day survival. *Ann Neurol*. 1991; 29:658-663.  
<https://doi.org/10.1002/ana.410290614>  
PMid:1842899
32. Massaro AR, Sacco RL, Mohr JP, Foulkes MA, Tatemichi TK, Price TR, et al. Clinical discriminators of lobar and deep hemorrhages: the Stroke Data Bank. *Neurology*. 1991; 41: 1881-1885.  
<https://doi.org/10.1212/WNL.41.12.1881>  
PMid:1745342
33. Portenoy R, Lipton R, Berger A, Lesser M, Lantos G. Intracerebral haemorrhage: a model for the prediction of outcome. *J Neurol Neurosurg Psychiatry*. 1987;50:976-979.  
<https://doi.org/10.1136/jnnp.50.8.976>  
PMid:3655832 PMCid:PMC1032224
34. Daverat P, Castel JP, Dartigues JF, Orgogozo JM. Death and functional outcome after spontaneous intracerebral hemorrhage: a prospective study of 166 cases using multivariate analysis. *Stroke*. 1991;22:1-6.  
<https://doi.org/10.1161/01.STR.22.1.1>  
PMid:1987664
35. Young WB, Lee KP, Pessin MS, Kwan ES, Rand WM, Caplan LR. Prognostic significance of ventricular blood in supratentorial hemorrhage: a volumetric study. *Neurology*. 1990; 40:616-619.  
<https://doi.org/10.1212/WNL.40.4.616>  
PMid:2320234
36. Rusalleda J, Peiró A. Prognostic factors in intraparenchymatous hematoma with ventricular hemorrhage. *Neuroradiology*. 1986; 28(1): 34-7.  
<https://doi.org/10.1007/BF00341763>  
PMid:3951686
37. Nelson S, Mould W, Gandhi D, Thompson R, Salter S, Dlugash R, et al. Primary intraventricular hemorrhage outcomes in the CLEAR III trial. *International Journal of Stroke*. 2020; Vol. 15(8) 872-880  
<https://doi.org/10.1177/1747493020908146>  
PMid:32075571 PMCid:PMC7837409
38. Trifan G, Arshi B and Testai FD. Intraventricular Hemorrhage Severity as a Predictor of Outcome in Intracerebral Hemorrhage. *Front. Neurol*. March 2019; 10:217.  
<https://doi.org/10.3389/fneur.2019.00217>  
PMid:30915027 PMCid:PMC6422963
39. Nishikawa T, Ueba T, Kajiwarra M, Miyamatsu N, Yamashita K. A priority treatment of the intraventricular hemorrhage (IVH) should be performed in the patients suffering intracerebral hemorrhage with large IVH. *Clin Neurol Neurosurg*. 2009; 111:450-3.  
<https://doi.org/10.1016/j.clineuro.2009.01.005>  
PMid:19231066
40. Hansen BM, Morgan TC, Betz JF, Sundgren PC, Norrving B, Hanley DF, et al. Intraventricular extension of supratentorial intracerebral hemorrhage: the modified graeb scale improves outcome prediction in lund stroke register. *Neuroepidemiology*. 2016; 46:43-50.  
<https://doi.org/10.1159/000442575>  
PMid:26668048 PMCid:PMC6139030

## Outcome and Evaluation of the Patient Thyroidectomy with Hyperthyroidism: A Case-Control Study

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### Abstract

**Introduction:** According to reports, pediatric patients with hypothyroidism have a higher risk of complications following surgery than adults. Specifically, this Study's aimed to evaluate how complete thyroidectomy is in youth (18 years) and adults. **Materials and Methods:** A retrospective case-control study of all (n=100) complete thyroidectomies was performed on 32 pediatric and 68 adult patients who were consecutive from were compared at the Department of ENT, Head & Neck Surgery, Islami Bank Medical College and multicentral base hospital, Rajshahi, Bangladesh, from July 2018 to June 2021. **Results:** The average patient age in children was 9.7 years (range 3.4-17.9 years) against 44.9 years (range 18.4-84.2 years) in adults. Compared to adults, surgical procedures on children took an average of (2.18  $\pm$  0.08 hrs.) longer to complete in adults (1.66  $\pm$  0.03 hrs) (p = 0.003). The average weight of a thyroid specimen was 48.0  $\pm$  6.4 grams in adults and 38.6.0  $\pm$  8.9 grams in children (range, 6.6-203 grams; p = 0.34). Children had a higher ratio of thyroid weight to body weight (0.94  $\pm$  0.11 gm/kg) than adults (0.67  $\pm$  0.8 gm/kg; p = 0.05). After surgery, the hyperthyroid condition improved in every patient. There were no operational deaths, recurrences, or long-term hypoparathyroidism. **Conclusion:** It is clear that the technical difficulties associated with treating Graves' disease surgically in children and adults result in longer operational periods. There was no difference in the chances of long-term consequences, including recurrent laryngeal nerve damage or neck hematoma.

**Keywords:** Hyperthyroidism, Thyroidectomy, Thyroid, Pediatric, Child, Adult.

Number of Table: 01; Number of Figure: 01; Number of References: 15; Number of Correspondences: 03.

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### Introduction:

Overall, the risk of complications was found to be greater in pediatric patients than in adult patients<sup>1</sup>. By definition, a high-volume specialist in the field of thyroid surgical treatment is one who performs more than 30 cases per year on children and their rates of complications are lower<sup>2</sup>. When an endocrine surgeon who performs over 30 operations each year operates on a child, the likelihood of complications is reduced<sup>3</sup>. We hypothesized that a surgical team consisting of a high-volume specialist in the field of thyroid surgical treatment, a pediatric endocrinologist, and an experienced specialist in the field of thyroid surgical team an experienced nurse may be able to lessen the difference in surgical outcomes experienced by young patients compared to their older counterparts. To assess the efficacy of this strategy, we evaluated the long-term results of 100 consecutive patients of all ages who underwent thyroidectomy for Graves' disease (GD) at a single institution under the care of a high-volume adult and pediatric expert in the area of the thyroid surgical team.

### Materials and Methods:

A retrospective case-control analysis was done at the Department of ENT, Head & Neck Surgery, Islami Bank Medical College and Rajshahi Medical College Hospital, Rajshahi, Bangladesh, from July 2018 to June 2021. Both attending surgeons performed all pediatric procedures. All but one patient was treated preoperatively with Supersaturated potassium iodide (SSKI) treatment. The primary purpose of 5 days for this Study was to assess what is recommended. After receiving only half of the recommended amount of SSKI, one child suffered an allergic reaction, and the medication was discontinued. Before operating on 20 children, the hospital prescribed them 0.5 mcg of Calcitriol twice a day for 3

days. It took 15 days to quit the calcitriol completely after surgery. A whole or almost complete removal of both thyroids was done in each patient. An extracapsular dissection was used to remove the whole thyroid gland, referred to as a total thyroidectomy<sup>4</sup>. If it was established intraoperatively that the recurrent laryngeal nerve (RLN) or parathyroid gland(s) would be severely damaged by performing a complete extracapsular dissection, a near-total thyroidectomy was performed in which just a little quantity of thyroid tissue was removed<sup>5</sup>. As a result of the surgical procedure, all patients required admission. In the pediatric patients, serum calcium levels were monitored every 4-8 hours following surgery, and in all patients, calcium levels were checked first thing on a postoperative day one. If the blood calcium level (after correcting for total protein) was below 7.5 mg/dL, treatment with intravenous calcium gluconate was started, and if it was below 8.0 mg/dL, treatment with oral calcium supplementation was started. (e.g., hand paresthesia, perioral numbness, muscle cramps, the presence of a Chvostek's sign). Preoperative demographics, comorbidities and medications were recorded. Operative details, including detailed contemporaneous operative illustrations, postoperative course, and both serum calcium levels and postoperative pathology, were observed. Major problems included damage to the RLN (recurrent laryngeal nerve) for the rest of the patient's life, hematoma, and lifelong hypoparathyroidism. Minor problems included acute RLN neuropraxia and transient hypocalcemia necessitating intravenous calcium infusion. To do statistical analysis, t-test as appropriate. Statistical significance was determined when  $p < 0.05$ . Values shown are mean  $\pm$  standard deviation.

### Results:

The number of people who have had a whole or near-total thyroidectomy increases to 32 for children and 68 for adults. Table I details the Patient's clinical features. The average ages for both children and adults at the time of surgery were 9.7 (range, 3.4-17.9) and 44.9 (range, 18.4-84.2) years, respectively.

**Table I: The differences between adult and pediatric patients in terms of clinical presentation (n=100)**

| Variable                         | Adult | Pediatric | P-value |
|----------------------------------|-------|-----------|---------|
| Patients                         | 68    | 32        |         |
| Patients requiring IV Calcium    | 1     | 6         | 0.004   |
| RLN Injuries                     | 0     | 1         | 0.32    |
| Hematomas                        | 2     | 0         | 0.46    |
| Incidental Cancers               | 12    | 1         | 0.01    |
| Thyroid mass (g)/ Body mass (kg) | 0.67  | 0.94      | 0.05    |
| Operative Time (hour: in)        | 1:37  | 2:09      | 0.001   |
| Inpatient Post -Operative Days   | 1.03  | 1.41      | 0.004   |

Results from statistical testing were analyzed using

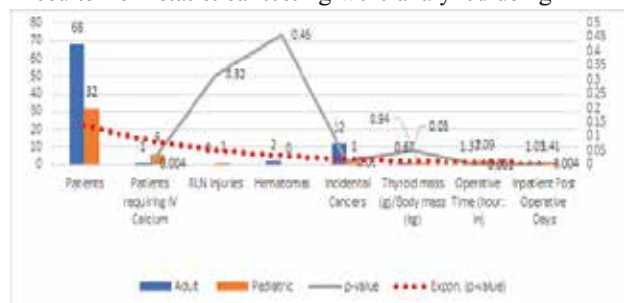


**Fig-1: Characteristics of adult and pediatric patients**

Pediatric procedures required longer operative time than adults ( $1.18 \pm 0.08$  hrs vs.  $2.09 \pm 0.03$  hrs,  $p = 0.003$ ). The average weight of thyroid tissue samples was  $48.0 \pm 6.4$  gm (range: 6.6-203 gm) in adults and  $38.6 \pm 8.9$  gm (9-293 gm) in children ( $p = 0.34$ ). Thyroidectomy specimens from children weighed  $0.94 \pm 0.11$  gm/kg, or significantly more than those from adults ( $0.66 \pm 0.07$  gm/kg,  $p = 0.05$ ), suggesting that the glands in children were bigger than those in adults. In one patient, a 2.5-centimetre-wide papillary carcinoma was just one of several malignant tumours. One adult patient had a Hürthle cell adenoma. Postoperative intravenous calcium infusion was needed in 18.0% of pediatric and 1.4% of adult patients ( $p = 0.004$ ), respectively. The greater demand for calcium infusions in children necessitated a lengthier hospital stay than in adults ( $1.41 \pm 0.12$  vs.  $1.03 \pm 0.03$  days,  $p = 0.004$ ). One out of 32 pediatric and 12 out of 68 adult patients ( $p = 0.03$ ) were found to have latent cancer after pathological examination of the operating material. One young patient was diagnosed with a papillary microcarcinoma of the thyroid capsule, measuring 0.40 cm at its widest point. In adults, papillary microcarcinomas with a maximum diameter of less than 0.3 cm accounted for 10 of 12 malignancies. When calcitriol was not administered prior to surgery. When calcitriol was administered, 50% of pediatric patients still needed a calcium infusion, but it was administered for an average of just 1.25 days in those patients ( $p < 0.02$  vs no calcitriol). A youngster who had temporary RLN neuropraxia and had surgery made a full recovery within 6 months. One youngster suffered an RLN transection during surgery, but it was quickly diagnosed and treated. Bilateral vocal cord mobility at 12 months post-surgery was indicative of RLN function restoration, as was found in the patients who had long-term follow-ups. In adults, there were no RLN injuries found. Two adults required operational examination for postoperative hematomas, but no children did ( $p = 0.46$ ). We found no incidences of lifelong hypoparathyroidism or deaths during or after surgery. The greatest follow-up time was 8 years, and the results showed that neither children nor adults experienced a recurrence of Hyperthyroidism. Both children and adults had similar overall incidences of significant issues.

### Discussion:

In youngsters, the incidence of Graves' disease is 1 in 10,000. (6) Because only a minority of pediatric patients achieve remission<sup>7</sup>, Surgery or radioactive iodine treatment will be necessary for the vast majority of individuals<sup>8</sup>. What we've seen lends credence to the idea that, in the hands of experienced thyroid surgeons, thyroidectomy can be a successful treatment for children. The Mayo Clinic has published the biggest series to date documenting the surgical management of GD in children<sup>9</sup>. As many as 78 young children, ranging in age from 3.1 to 17.9 years, were surgical candidates for GD repair. Seventy-seven per cent of patients had a whole or near-total thyroidectomy, and 23 % had bilateral subtotal thyroidectomy. To reduce the likelihood of RLN damage or hypoparathyroidism, a small quantity of thyroid tissue is left behind after a sub-total thyroidectomy<sup>10</sup>.

No RLN damage, hematomas, or cases of persistent hypoparathyroidism were recorded in the Mayo Clinic dataset. Transient RLN neuropraxia occurred in 1 patient (1%), and transient hypoparathyroidism in 5 individuals (6%). While the pathology specimens revealed the presence of 5 microcarcinomas (6%), 4 of the 18 patients (22%) who had bilateral partial thyroidectomy reported a return of their Hyperthyroidism<sup>9</sup>.

We took a more severe surgical strategy to the therapy of GD in both children and adults by doing entire or near-total thyroidectomies in all cases because of the significant recurrence rate following partial thyroidectomy. There was no recurrence of GD in our cohort of patients, proving the efficacy of our treatment method.

According to HCUP-NIS statistics, children are more likely than adults to experience problems after undergoing a thyroidectomy (9.3% vs. 6.1%,  $p < 0.01$ )<sup>11</sup>. The most prevalent mild consequence among children in our group was transitory hypocalcemia, likely caused by transient hypoparathyroidism. On the other hand, preoperative calcitriol treatment cut in half the percentage of patients who required intravenous calcium infusions after surgery and lowered the length of such infusions by more than half. RLN injury was observed in two of the children in our cohort. A soft voice was observed in one child. It was discovered immediately after surgery, and a direct laryngoscopy done two months later confirmed the diagnosis of unilateral vocal cord paresis. After six months, the vocal cords on both sides were working normally, and the patient's voice had returned to normal.

During surgery on a 4-year-old patient, surgeons noticed and rectified an RLN transaction. By using direct laryngoscopy, we identified unilateral vocal cord paresis at 6 months post-op. Direct laryngoscopy showed normal vocal cord movement and voice 18 months following surgery. It's worth noting that the RLN damage happened to the one patient who couldn't get preoperative SSKI treatment because of an allergic response.

Twelve of 68 adults and one of 32 children were diagnosed

with occult malignancy. Only one of the 12 malignancies seen in adults was a multifocal papillary carcinoma, with a maximal diameter of 2.5 cm, whereas the other 11 were unifocal papillary microcarcinomas. One child had a papillary microcarcinoma of the thyroid, measuring about 0.4 centimetres in diameter and staying entirely within the thyroid capsule. These findings emphasize the need for surgeons to obtain sonographic imaging of the thyroid gland if asymmetry or a change in gland size is noticed in the context of GD. If nodules are found, they must be assessed in accordance with current standards<sup>12</sup>.

There is no reason to prefer surgery over radioactive iodine for the final treatment of GD despite the detection of microcarcinomas in the context of GD, which will be difficult to diagnose by preoperative ultrasonography. Recommended radioactive iodine activities for the ablation of thyroid tissue in GD patients with microcarcinomas<sup>13</sup>. Microcarcinomas and healthy thyroid tissue are both expected to be eliminated. Thyrotoxicosis Study Group follow-up data corroborates this hypothesis by showing that patients treated with radioactive iodine or surgery have significantly lower rates of differentiated thyroid cancer compared to those treated with antithyroid medications alone who experienced spontaneous remission<sup>14</sup>. These observations support recent recommendations that high-volume endocrine surgical teams should operate on children and adults requiring surgery for GD<sup>8,15</sup>.

### Conclusion:

We show that a whole or near-total thyroidectomy in children is safe and does not increase the risk of a recurrence of GD when done by skilled surgeons. Our excellent surgical team consisting, massive in size, can achieve excellent outcomes with very low complication rates.

**Conflict of Interest:** None.

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### References:

1. Tuggle CT, Roman SA, Wang TS, Boudourakis L, Thomas DC, Udelsman R, et al. Pediatric endocrine surgery: who is operating on our children? *Surgery*. 2008; 144(6):869-77.  
<https://doi.org/10.1016/j.surg.2008.08.033>  
PMid:19040991
2. Sosa JA, Bowman HM, Tielsch JM, Powe NR, Gordon TA, Udelsman R. The importance of surgeon experience for clinical and economic outcomes from thyroidectomy. *Ann Surg*. 1998; 228(3):320-30.  
<https://doi.org/10.1097/00000658-199809000-00005>  
PMid:9742915 PMCID:PMC1191485
3. Lee JA, Grumbach MM, Clark OH. The Optimal Treatment for Pediatric Graves' Disease Is Surgery. *J Clin Endocrinol Metab*. 2007;92(3):801-3.  
<https://doi.org/10.1210/jc.2006-1238>

PMid:17341575

4. Udelsman R, Lakatos E, Ladenson P. Optimal surgery for papillary thyroid carcinoma. *World J Surg.* 1996;20(1):88-93.

<https://doi.org/10.1007/s002689900016>

PMid:8588420

5. Rivkees SA, Mazzaferri EL, Verburg FA, Reiners C, Luster M, Breuer CK, et al. The Treatment of Differentiated Thyroid Cancer in Children: Emphasis on Surgical Approach and Radioactive Iodine Therapy. *Endocr Rev.* 2011;32(6):798-826.

<https://doi.org/10.1210/er.2011-0011>

PMid:21880704 PMCID:PMC3591676

6. Rivkees SA. Pediatric Graves' disease: controversies in management. *Horm Res Paediatr.* 2010;74(5):305-11.

<https://doi.org/10.1159/000320028>

PMid:20924158

7. Glaser NS, Styne DM, Organization of Pediatric Endocrinologists of Northern California Collaborative Graves' Disease Study Group. Predicting the likelihood of remission in children with Graves' disease: a prospective, multi-center study. *Pediatrics.* 2008;121(3):e481-488.

<https://doi.org/10.1542/peds.2007-1535>

PMid:18267979

8. Bahn Chair RS, Burch HB, Cooper DS, Garber JR, Greenlee MC, Klein I, et al. Hyperthyroidism and other causes of thyrotoxicosis: management guidelines of the American Thyroid Association and American Association of Clinical Endocrinologists. *Thyroid Off J Am Thyroid Assoc.* 2011;21(6):593-646.

<https://doi.org/10.1089/thy.2010.0417>

PMid:21510801

9. Sherman J, Thompson GB, Lteif A, Schwenk WF, van Heerden J, Farley DR, et al. Surgical management of Graves disease in childhood and adolescence: an institutional experience. *Surgery.* 2006;140(6):1056-61.

<https://doi.org/10.1016/j.surg.2006.07.040>

PMid:17188157

10. Schneider DF, Chen H. New Developments In The Diagnosis And Treatment Of Thyroid Cancer. *CA Cancer J Clin.* 2013;63(6):373-94.

<https://doi.org/10.3322/caac.21195>

PMid:23797834 PMCID:PMC3800231

11. Sosa JA, Tuggle CT, Wang TS, Thomas DC, Boudourakis L, Rivkees S, et al. Clinical and economic outcomes of thyroid and parathyroid surgery in children. *J Clin Endocrinol Metab.* 2008;93(8):3058-65.

<https://doi.org/10.1210/jc.2008-0660>

PMid:18522977

12. Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, Mandel SJ, et al. Management guidelines for patients with thyroid nodules and differentiated thyroid cancer. *Thyroid Off J Am Thyroid Assoc.* 2006;16(2):109-42.

<https://doi.org/10.1089/thy.2006.16.109>

PMid:16420177

13. Peters H, Fischer C, Bogner U, Reiners C, Schleusener H. Treatment of Graves' Hyperthyroidism with radioiodine: results of a prospective randomized study. *Thyroid Off J Am Thyroid Assoc.* 1997;7(2):247-51.

<https://doi.org/10.1089/thy.1997.7.247>

PMid:9133695

14. Dobyns BM, Sheline GE, Workman JB, Tompkins EA, McConahey WM, Becker DV. Malignant and benign neoplasms of the thyroid in patients treated for Hyperthyroidism: a report of the cooperative thyrotoxicosis therapy follow-up study. *J Clin Endocrinol Metab.* 1974;38(6):976-98.

<https://doi.org/10.1210/jcem-38-6-976>

PMid:4134013

15. Leung AKC, Leung AAC. Evaluation and Management of Children with Thyrotoxicosis. *Recent Pat Endocr Metab Immune Drug Discov.* 2017;11(1):22-31.

<https://doi.org/10.2174/1872214812666180327112540>

PMid:29589552

# Efficacy of Rifaximin in Diarrhoea Predominant Irritable Bowel Syndrome: A Placebo Controlled Clinical Trial

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## Abstract

**Introduction:** Irritable bowel syndrome is a common chronic functional gastrointestinal disorder characterized by abdominal pain associated with altered bowel habit of either diarrhoea, constipation or both. Its pathogenesis is multifactorial and incompletely understood. The role of gut microbiota in the pathophysiology of IBS is supported by various evidences. These are differences in mucosal and faecal microbiota between patients with IBS and healthy individuals, development of post-infectious IBS and the efficacy of some probiotics and nonsystemic antibiotics such as Rifaximin. Previous study showed resetting microbial diversity via Rifaximin use may lead to a decrease in bacterial fermentation and a reduction in the clinical symptoms of IBS. This study is designed to assess efficacy of Rifaximin in diarrhoea predominant irritable bowel syndrome. **Objective:** This study was conducted to assess the effectiveness of Rifaximin in diarrhoea predominant irritable bowel syndrome patient. **Materials and Methods:** This quasi experimental study was conducted on patients aged 18-55 years with IBS-D in department of Gastroenterology, BSMMU during the period of September, 2020 to August, 2021. **Results:** There was significant improvement on abdominal pain ( $p < 0.001$ ), abdominal bloating ( $p = 0.001$ ) and satisfaction with bowel movement ( $p < 0.001$ ) in Rifaximin group at 4th week from baseline and most of which sustained upto 12th week of study. The total IBS-SSS at baseline ( $328.7 \pm 13.7$ ) decreased to ( $231.5 \pm 14.2$ ) at 12th week of study in Rifaximin group which was significant ( $p < 0.001$ ). In placebo group IBS-SSS also gradually decreased from baseline ( $323.4 \pm 17.29$ ) to 12th week ( $269.3 \pm 16.2$ ) but statistically not significant. IBS-QOL score at baseline in Rifaximin group was  $64 \pm 5.2$  and in placebo group was  $63.4 \pm 5.1$ . Total IBS-QOL score was increased with time in both Rifaximin and placebo group but none was significant. **Conclusion:** Rifaximin was more effective than placebo in controlling abdominal pain, abdominal bloating and dissatisfaction with bowel movement after 12th week of study. IBS QOL score was also increased in both groups.

**Keywords:** Irritable bowel syndrome, Rifaximin

Number of Tables: 07; Number of Figures: 02; Number of References: 17; Number of Correspondences: 02.

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## Introduction:

Irritable bowel syndrome is a common chronic functional Gastrointestinal disorder characterized by recurring symptoms of abdominal pain, bloating and altered bowel function in the absence of structural, inflammatory or biochemical abnormalities<sup>1</sup>. Bowel

alteration occurs in the form of diarrhoea, constipation or both. IBS is defined according to the Rome IV criteria by recurrent abdominal pain for at least 1 day/week in the last 3 months, which is related to defecation, associated with a change in frequency or form of stools with symptom onset at least 6 months before the diagnosis<sup>8</sup>. Pooled prevalence of IBS worldwide was 11.2%<sup>11</sup>. Its prevalence in Bangladesh is not well known. The overall, unadjusted estimate of IBS was 7.7%. The gender-specific prevalence was 8.6% in women, and 6.7% in men. IBS was 1.36 times more prevalent in females than in males<sup>13</sup>. IBS can be classified according to their predominant symptom. Data from one meta-analysis of community based studies suggest that 22% of sufferer have constipation predominant IBS (IBS-C), 23% diarrhea predominant IBS (IBS-D), 24% mixed (IBS-M) and remainder cannot be classified (IBS-U)<sup>12</sup>. The pathogenesis of IBS is still partly understood and composite. There is no known structural lesion for the symptoms. Factors incriminate in IBS pathogenesis including altered gut motility, abnormal intestinal microbiota, low grade inflammation, visceral hypersensitivity, altered pain modulation, 5-Hydroxytryptamine metabolism, CNS dysregulation, psychological and genetic factors<sup>6</sup>. There are non-pharmacological and pharmacological options to treat IBS. Pharmacological treatment of IBS remains elusive as there is no obvious pathophysiological target<sup>14</sup>. Rifaximin is an oral, non-systemic broad spectrum antibiotic. It is poorly absorbed in the digestive tract, which reduces the risk of serious

side effects. A number of mechanism of actions have been proposed to account for the clinical efficacy of rifaximin in patients with IBS-D, including a main hypothesis that rifaximin alters the composition of gut microbiota<sup>16</sup>. In addition to the direct antibiotic effects of rifaximin on gut microbiota, rifaximin impacts the function of the gut microbiota (i.e., metabolism, adherence and virulence)<sup>7</sup>.

#### Materials and Methods:

This quasi experimental study was conducted on patients aged 18-55 years with IBS-D in department of Gastroenterology, BSMMU during the period of September, 2020 to August, 2021. Any alternative diagnosis based on clinical history, examination & initial investigations with CBC with ESR, CRP, RBS, TSH, FT4 had been excluded from the study. Study population was divided equally in Rifaximin and placebo group. IBS symptoms were assessed by IBS- QOL and IBS-SSS questionnaire at baseline and during 4th and 12th weeks of study. The collected data were analyzed by computer with help of SPSS version 23. Statistical analysis was done by using appropriate statistical tool like Chi-square test, Students t-test.  $P < 0.05$  was considered significant.

#### Observation and Result:

A total of 126 patients with IBS-D patient visiting Gastroenterology OPD of BSMMU were enrolled in the study. Among them, 63 patients were allocated in the Rifaximin group, and 63 were in the placebo group. The results are described by the following tables and figures. It was observed that the mean age of the respondents in the rifaximin group were  $40.1 \pm 8.5$ (SD) years and in the placebo group were  $40.7 \pm 8.7$ (SD) years with more than half of the study population from the age group of 31-50 years (Rifaximin group: 79.4% and placebo group: 76.2%). The majority of the respondents with IBS-D were females in both rifaximin (65.1%) and placebo (60.3%) groups. The difference in age and sex distribution between the two groups were matched ( $p > 0.05$ ).

**Table-I: Distribution of demographic factors among the rifaximin and placebo group (n=126)**

| Variables         | Rifaximin Group (n=63)<br>n (%) | Placebo Group (n=63)<br>n (%) | p-value |
|-------------------|---------------------------------|-------------------------------|---------|
| Age group (years) |                                 |                               |         |
| 18-20             | 1 (1.6)                         | 1 (1.6)                       |         |
| 21-30             | 9 (14.3)                        | 9 (14.3)                      | 0.97*   |
| 31-40             | 18 (28.6)                       | 17 (27)                       |         |
| 41-50             | 32 (50.8)                       | 31 (49.2)                     |         |
| 51-60             | 3 (4.8)                         | 5 (7.9)                       |         |
| Mean age $\pm$ SD | $40.1 \pm 8.5$                  | $40.7 \pm 8.7$                | 0.66**  |
| Gender            |                                 |                               |         |
| Male              | 22 (34.9)                       | 25 (39.7)                     | 0.58*   |
| Female            | 41 (65.1)                       | 38 (60.3)                     |         |

\*chi-square test was performed to compare between groups.

\*\*Independent t-test was performed to compare between groups.

#### IBS-SSS score of the respondents with IBS-D:

The symptom severity score questionnaire consists of 5 questions related to abdominal pain and discomfort, bowel movements and habits and the affects and interference of IBS-D in the respondent's life. Each of the 5 questions generate a maximum score of 100 using prompted visual analogue scales, leading to a total possible score of 500.

Table-II shows the mean total scores of IBS-SSS and IBS-QOL at baseline for rifaximin and placebo groups. There was no significant difference between both groups at the baseline ( $p > 0.05$ ).

**Table-II: Distribution of IBS-SSS and IBS-QOL scores in rifaximin and placebo group at baseline (n=126).**

|                     | Rifaximin Group<br>(n=63)<br>Mean $\pm$ SD | Placebo Group<br>(n=63)<br>Mean $\pm$ SD | p-value* |
|---------------------|--------------------------------------------|------------------------------------------|----------|
| Total IBS-SSS score | $328.7 \pm 13.76$                          | $323.4 \pm 17.29$                        | 0.06     |
| Total IBS-QOL score | $64 \pm 5.2$                               | $63.4 \pm 5.1$                           | 0.62     |

\*Independent t-test was performed to compare between groups.

**Table-III: Distribution of IBS-SSS score in rifaximin and placebo group at baseline, 4<sup>th</sup> week and 12<sup>th</sup> week**

| Total IBS-SSS score | Baseline          | 4 <sup>th</sup> week | p-value* | 12 <sup>th</sup> week | p-value* |
|---------------------|-------------------|----------------------|----------|-----------------------|----------|
| Mean $\pm$ SD       |                   |                      |          |                       |          |
| Rifaximin group     | $328.7 \pm 13.76$ | $277.7 \pm 14.64$    | <0.001   | $231.5 \pm 14.2$      | <0.001   |
| Placebo group       | $323.4 \pm 17.29$ | $304.2 \pm 10.37$    | 0.31     | $290.3 \pm 16.2$      | 0.21     |

\*p-value between baseline and 4<sup>th</sup> week, obtained by t test.

\*\*p-value between baseline and 12<sup>th</sup> week, obtained by t test.

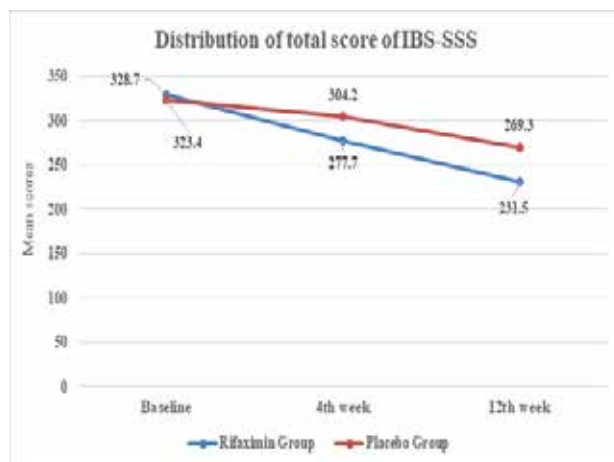
Overall, it was reported that the total IBS-SSS showed improvement in respondents of both the groups, as scores decreased gradually in both groups. Statistical significant improvements were reported in the total IBS-SSS score from baseline to 12th week in rifaximin group. Respondents in placebo group had no significant improvements in their scores from baseline to 4<sup>th</sup> week and 12<sup>th</sup> week.

**Table-IV: Distribution of clinical improvement in IBS-SSS score among the study participants**

| IBS-SSS score                 | 4 <sup>th</sup> week<br>n (%) | 12 <sup>th</sup> week<br>n (%) |          |
|-------------------------------|-------------------------------|--------------------------------|----------|
|                               | Rifaximin group               | Placebo group                  | p-value* |
| Decreased by 50 points        | 35 (61.4)                     | 3 (5.2)                        | <0.001   |
| Did not decrease by 50 points | 22 (38.6)                     | 55 (94.8)                      | 2 (3.6)  |
|                               |                               | 30 (53.6)                      | <0.001   |

\*p-value was obtained by chi-square test.

Clinically meaningful improvement in the IBS-SSS scale is defined as a decrease of 50 points in the score. In the current study, it was reported that 35 and 53 of the study participants showed clinically meaningful improvement in IBS-SSS total score in the rifaximin group at the 4<sup>th</sup> week of follow-up and 12<sup>th</sup> week of follow-up visit respectively. In the placebo group, 3 and 26 of the study participants showed improvement at the 4<sup>th</sup> week and 12<sup>th</sup> week of follow-up visit respectively. There was a clinically high significant improvement in the IBS-SSS total score in rifaximin group compared to placebo group at 4<sup>th</sup> week and 12<sup>th</sup> week of follow-up ( $p < 0.001$ ).



\* p-value at 4<sup>th</sup> week between rifaximin and placebo group, obtained by independent t-test

\*\*p-value at 12<sup>th</sup> week between rifaximin and placebo group, obtained by independent t-test

**Figure-1: The changes of Total score of IBS-SSS over the baseline, 4<sup>th</sup> week and 12<sup>th</sup> week in both groups**

Overall, it was reported that the total IBS-SSS showed a statistically significant improvement in the rifaximin group in the 4<sup>th</sup> and 12<sup>th</sup> week compared to the placebo group ( $p < 0.001$ ) as the severity score decreased gradually in both the groups.

#### IBS-QOL of Irritable Bowel Syndrome-Diarrhoea:

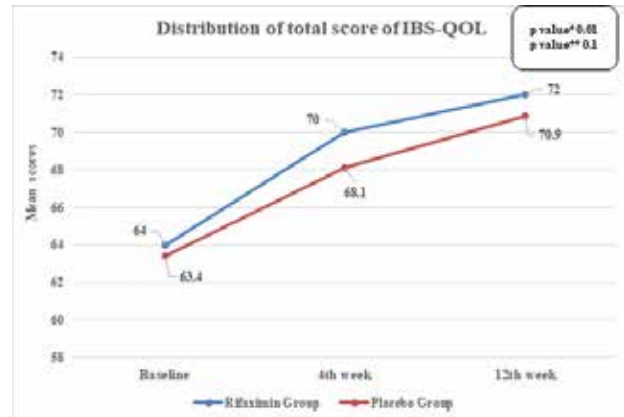
Disease-specific QOL was assessed using the 34-item IBS-QOL questionnaire. This questionnaire consists of eight domains: interference with activities, social reactions, food avoidance, relationships, dysphoria, health worry, sexual health, and body image. All the items are negatively framed with the greatest response scale indicating poorer QOL. As per the IBS-QOL scoring manual, all items were reversed when scored so that as the IBS scores increase, QOL increases as well. All the final raw scores were transformed into a 0 to 100 scale. Using this scale, the lowest possible score (poor QOL) and highest possible score (best QOL) were transformed to 0 and 100, respectively. Raw scores for each subscale were transformed into a scale of 0 to 100 and results were presented as a percentage of the total possible score achieved.

**Table-V: Distribution of IBS-QOL scores in rifaximin and placebo group at Baseline, 4<sup>th</sup> week and 12<sup>th</sup> week.**

| Total IBS-QOL score | Baseline       | 4 <sup>th</sup> week | p-value* | 12 <sup>th</sup> week | p-value* |
|---------------------|----------------|----------------------|----------|-----------------------|----------|
| Mean $\pm$ SD       |                |                      |          |                       |          |
| Rifaximin group     | 64 $\pm$ 5.2   | 70 $\pm$ 4.2         | 0.04     | 72 $\pm$ 3.43         | 0.33     |
| Placebo group       | 63.4 $\pm$ 5.1 | 68.1 $\pm$ 3.1       | 0.45     | 70.9 $\pm$ 3.02       | 0.69     |

\*p-value between baseline and 4<sup>th</sup> week, obtained by t-test

\*\*p-value between baseline and 12<sup>th</sup> week, obtained by t-test



\* p-value at 4<sup>th</sup> week between rifaximin and placebo group, obtained by independent t-test

\*\*p-value at 12<sup>th</sup> week between rifaximin and placebo group, obtained by independent t-test

**Figure-2: The changes of Total score of IBS-QOL over the baseline, 4<sup>th</sup> week and 12<sup>th</sup> week in both groups.**

The overall score of IBS-QOL in both groups showed improvement as the IBS-QOL score increased from baseline to 12<sup>th</sup> week. However, the improvement in the 12<sup>th</sup> week was not statistically significant in the rifaximin group when compared to the placebo group ( $p > 0.05$ ).

**Table-VI: Distribution of IBS-QOL score improvements between rifaximin and placebo group.**

| IBS-QOL score    | 4 <sup>th</sup> week<br>n (%) |               | p-value* | 12 <sup>th</sup> week<br>n (%) |               | p-value* |
|------------------|-------------------------------|---------------|----------|--------------------------------|---------------|----------|
|                  | Rifaximin group               | Placebo group |          | Rifaximin group                | Placebo group |          |
| $\geq 10$ points | 14 (24.6)                     | 10 (17.2)     | 0.33     | 27 (49.1)                      | 23 (41.1)     | 0.4      |
| $\geq 10$ points | 43 (75.4)                     | 48 (82.8)     |          | 28 (50.9)                      | 33 (58.9)     |          |

\*p-value was obtained by chi-square test.

Adverse events were observed during the study and were more common in the rifaximin group than the placebo group. However, we did not discontinue the use of rifaximin as the medication didn't lead to any severe harmful outcome. Nausea and headache were the more frequent

adverse events among the respondents of the rifaximin group.

**Table-VII: Adverse events between Rifaximin and placebo group (n=126)**

| Adverse events | Rifaximin Group<br>n=63<br>n (%) | Placebo Group<br>n=63<br>n (%) |
|----------------|----------------------------------|--------------------------------|
| Nausea         | 9 (14.5)                         | 3 (4.8)                        |
| Anorexia       | 5 (7.9)                          | 3 (4.8)                        |
| Insomnia       | 3 (4.8)                          | 2 (3.2)                        |
| Dry mouth      | 5 (7.9)                          | 2 (3.2)                        |
| Dizziness      | 4 (6.3)                          | 2 (3.2)                        |
| Anxiety        | 5 (7.9)                          | 2 (3.2)                        |
| Tremor         | 3 (4.8)                          | 2 (3.2)                        |
| Headache       | 10 (15.9)                        | 5 (7.9)                        |

#### Discussion:

Diarrhea-predominant irritable bowel syndrome (IBS-D) is a common gastrointestinal disorder characterized by recurring abdominal pain, bloating, and loose stools in the absence of structural or biochemical abnormalities<sup>10</sup>. Nonpharmacologic options for the treatment of IBS-D include psychological approaches, dietary and lifestyle modifications, probiotics, and fiber supplementation, although each has shown variable and less than optimal relief of IBS-D symptoms<sup>6,4</sup>. Medical treatment of IBS remains unsatisfactory for many patients and sufferers represent a considerable burden to the health service by consumption of medical consultations and valuable resources<sup>3</sup>. In an attempt to alleviate symptoms, improve quality of life, and reduce expenditure for the condition, several drugs had been sought to evaluate by several clinical researchers. The present study aimed to assess the effectiveness of Rifaximin in diarrhea-predominant IBS patients. Rifaximin is an oral, minimally absorbed, broad-spectrum antimicrobial agent that targets the gastrointestinal tract and is associated with a low risk of clinically relevant bacterial antibiotic resistance<sup>15,7,5,2</sup>. Due to the lack of intestinal absorption, rifaximin has no systemic side effects and is therefore suitable for chronic use. Administration of rifaximin was shown to be effective in the short-term treatment of small intestinal bacterial overgrowth<sup>17</sup>, and in managing intestinal gas production and related symptoms in open-label trials involving patients with functional abdominal symptoms and uncomplicated diverticular disease<sup>9</sup>. This study was held among 126 diagnosed patients of IBS-D according to Rome IV criteria, where the population was divided into two groups: Placebo Group and Rifaximin Group and each group included 63 respondents. The placebo group was treated with placebo drugs and the rifaximin group was treated with rifaximin. In the present study, the mean age of the respondents in the rifaximin group was  $40.1 \pm 8.5$ (SD) years and in the placebo group was  $40.7 \pm 8.7$ (SD) years with more than half of the study population from the age group of 31-50 years (Rifaxi-

min group: 79.4% and placebo group: 76.2%), which was correlated with a previous study where the mean age for individuals in group A (Rifaximin) was  $42.6 \pm 12.1$  yr versus  $39.6 \pm 10.9$  yr for those in group B (Placebo group)<sup>16</sup>.

In the current study, there was a female predominance found between the rifaximin group (65.1%) and the placebo group (60.3%). A previous study also reported a majority percentage of females in both groups (52.4% in Rifaximin group and 57.4% in placebo group)<sup>16</sup>. The symptom severity scores of abdominal pain and discomfort, bloating, bowel habit and affect and interference in life significantly decreased in the rifaximin group over the 12 weeks. At baseline before treatment, the scores in the patients in both the groups were high and not significant but as the duration of the treatment increased the mean scores eventually lowered indicating an improvement. A similar scenario was also observed in a study, where 124 patients with IBS-D were randomized to receive a placebo or rifaximin with a phase of three periods. By the end of phase 2, a significant difference in the subjective feeling of symptom relief was noted with 26/63 (41.3%) of patients in the rifaximin group reporting a decrease in the overall severity of symptoms versus 14/61 (22.9%) in the placebo group B(  $p = 0.03$ ). This symptomatic improvement was also maintained by the end of phase 3 in the rifaximin group (18/63[28.6%] vs 7/61 [11.5%],  $p = 0.02$ )<sup>16</sup>. In the present study, the mean scores of patients reporting symptoms of abdominal pain significantly improved at the 4th week, abdominal distension/bloating and satisfaction with bowel movements were significantly improved at the 4th week and 12th week in the rifaximin group. Similarly, AI Sharara et al. reported in their observations, the scores dropped significantly in the rifaximin group after treatment (at the end of phase 2) to a mean of  $104.9 \pm 11.4$  versus  $109.8 \pm 12.5$  for the placebo group (mean  $87.6 \pm 4.72$  vs  $2.7 \pm 1.8$ ). The drop was significantly more pronounced in the rifaximin arm when compared to placebo ( $p = 0.03$ ). A mild increase was observed in the symptom score at the end of phase 3 ( $106.4 \pm 12.1$  vs  $111.4 \pm 13.2$  for the rifaximin and placebo group, respectively)<sup>16</sup>. A previous study by A Rivkin et al. observed the role and efficacy of rifaximin in the treatment of IBS-D. Patients were randomized to 550 mg rifaximin by mouth 3times/day or placebo for 2 weeks and followed for a total of 3 months. The primary efficacy end point, the proportion of patients having adequate relief of global IBS symptoms for at least 2 of the 4 weeks during the primary follow-up period (weeks 3–6), was achieved by 9% more patients randomized to the rifaximin group when compared with placebo (40.7% vs 31.7%,  $p < 0.001$ ). Bloating was also reduced in 10.3% more patients given rifaximin ( $p < 0.001$  vs placebo). Looking at the secondary endpoints of these trials, both daily abdominal pain and daily stool consistency scores were significantly improved by rifaximin treatment both over the study period (3–6 wks,  $p < 0.001$  for both endpoints) and the 3-month follow-up period ( $p = 0.006$  and  $p < 0.001$ , respectively).

**Conclusion:**

In the treatment of IBS-D, rifaximin was safe and superior to placebo in controlling IBS symptoms of abdominal pain, bloating, satisfaction of bowel movements. Improvement in IBS-SSS was significant in rifaximin group compared to placebo. The quality of life domains such as the interference with activities, food avoidance and social reaction scores were significantly improved at 4th week in rifaximin group but there was no significant difference in the overall quality of life of the patients between both groups.

**Conflict of Interest:** None.

**References:**

1. Brandt, L.J., Chey, W.D., Foxx-Orenstein, A.E., et al. An evidence-based position statement on the management of irritable bowel syndrome. *The American journal of gastroenterology*. 2009; 104: S1-S35.  
<https://doi.org/10.1038/ajg.2008.122>  
PMid:19521341
2. Debbia, E.A., Maioli, E., Roveta, S. & Marchese, et al. Effects of rifaximin on bacterial virulence mechanisms at supra-and sub-inhibitory concentrations. *Journal of Chemotherapy*. 2008; 20(2): 186-194.  
<https://doi.org/10.1179/joc.2008.20.2.186>  
PMid:18467244
3. Ford, A.C., Forman, D., Bailey, A.G., et al. Irritable bowel syndrome: a 10-yr natural history of symptoms and factors that influence consultation behavior. *Official journal of the American College of Gastroenterology| ACG*. 2008; 103(5): 1229-1239.  
<https://doi.org/10.1111/j.1572-0241.2007.01740.x>
4. Ford, A.C., Quigley, E.M.M., Lacy, B.E., et al. Efficacy of prebiotics, probiotics, and synbiotics in irritable bowel syndrome and chronic idiopathic constipation: systematic review and meta-analysis. *Official journal of the American College of Gastroenterology| ACG*. 2014; 109(10): 1547-1561.  
<https://doi.org/10.1038/ajg.2014.202>
5. Gerard, L., Garey, K.W. & DuPont, H.L. Rifaximin: a nonabsorbable rifamycin antibiotic for use in nonsystemic gastrointestinal infections. *Expert review of anti-infective therapy*. 2005; 3(2): 201-211.  
<https://doi.org/10.1586/14787210.3.2.201>  
PMid:15918778
6. Holtmann, G.J., Ford, A.C. & Talley, N.J. Pathophysiology of irritable bowel syndrome. *The Lancet Gastroenterology and Hepatology*. 2016; 1(2): 133-146.  
[https://doi.org/10.1016/S2468-1253\(16\)30023-1](https://doi.org/10.1016/S2468-1253(16)30023-1)  
PMid:28404070
7. Jiang, Z.D. & DuPont, H.L. Rifaximin: in vitro and in vivo antibacterial activity-a review. *Chemotherapy*. 2005; 51(Suppl. 1): 67-72.  
<https://doi.org/10.1159/000081991>  
PMid:15855749
8. Lacy, Brian E PhD, MD; Lee, Ryan De MD. Irritable Bowel Syndrome. *Journal of Clinical Gastroenterology*. May 2005; 39 (5): S230-S242.  
<https://doi.org/10.1097/01.mcg.0000156110.69232.bb>  
PMid:15798490
9. Latella, G., Pimpo, M., Sottili, S., et al. Rifaximin improves symptoms of acquired uncomplicated diverticular disease of the colon. *International journal of colorectal disease*. 2003; 18(1): 55-62.  
<https://doi.org/10.1007/s00384-002-0396-5>  
PMid:12458383
10. Longstreth, G.F., Thompson, W.G., Chey, W.D., et al. Functional Bowel Disorders. *Gastroenterology*. 2006; 130(5): 1480-1491.  
<https://doi.org/10.1053/j.gastro.2005.11.061>  
PMid:16678561
11. Lovell RM, F.A. Global prevalence of and risk factors for irritable bowel syndrome: a meta-analysis. *Clin Gastroenterol Hepatol*. 2012; 10: 712-21.  
<https://doi.org/10.1016/j.cgh.2012.02.029>  
PMid:22426087
12. Lovell, RM., & Ford, A.C. Effect of gender on prevalence of irritable bowel syndrome in the community: Systematic review and meta-analysis. *American Journal of Gastroenterology*. 2012; 107(7): 991-1000.  
<https://doi.org/10.1038/ajg.2012.131>  
PMid:22613905
13. Masud MA, Hasan M, Azad Khan AK. Irritable bowel syndrome in a rural community in Bangladesh. Prevalence, symptom pattern and health seeking behavior. *Am J Gastroenterol*. 2001;96:1547-52.  
<https://doi.org/10.1111/j.1572-0241.2001.03760.x>  
PMid:11374697
14. Miller LE. Study design considerations for irritable bowel syndrome clinical trials. *Ann Gastroenterol*. 2014;27(4):338-345.
15. Pimentel, M., Lembo, A., Chey, W.D., et al. Rifaximin therapy for patients with irritable bowel syndrome without constipation. *New England journal of medicine*. 2011; 364(1):22-32.  
<https://doi.org/10.1056/NEJMoa1004409>  
PMid:21208106
16. Sharara, A.I., Aoun, E., Abdul-Baki, H., et al. A randomized double-blind placebo-controlled trial of rifaximin in patients with abdominal bloating and flatulence. *Official journal of the American College of Gastroenterology| ACG*. 2006; 101(2): 326-333.  
<https://doi.org/10.1111/j.1572-0241.2006.00458.x>
17. Stefano, D. Rifaximin versus chlortetracycline in the short term treatment of small intestinal bacterial overgrowth. *Alimentary pharmacology & therapeutics*. 2000; 14(5): 551-556.  
<https://doi.org/10.1046/j.1365-2036.2000.00751.x>  
PMid:10792117

# Physical and Psychological Health Problems Associated with Migration

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## Abstract

**Introduction:** Migration is a process of social change where an individual, alone or accompanied by others, because they may have different purposes especially for study, leaves one geographical area for a prolonged stay. Prolonged detention is seen to have impacted adversely on physical and mental health. The aim of this study was to evaluate the physical and psychological problems associated with the migration of foreign students compared to local ones.

**Materials and Methods:** A case-control study was conducted from March 2017 to August 2022 on the students of five different countries. A total of 280 students were enrolled in this study from Dhaka Dental College in Dhaka city. They were divided into case and control groups. To determine the physical and mental health of them, different parameters were used. **Results:** Total female-migrants were 3.24 times higher than male-migrants. Kashmir-migrants (47.14%) were higher whereas Bhutan-migrants (0.71%) were lowest in number. Psychological factors like depression, Insomnia, loneliness, and stress were more common in all migrants, particularly in the female. Physical health issues like diarrhea, food poisoning were common in males, however, urinary tract infection and skin problems were of insignificant magnitude in female-migrants. **Conclusion:** Migrant students' physical and mental health is heavily affected by the adopted country's environment, culture, tradition, language, food habits, and so on. The intensity of the psychological problem has been found to be higher among some migrant groups. Similarly, physical problems such as allergic reactions, respiratory diseases were the most common problems experienced by them.

**Keywords:** Migration, Physical Health, Psychological Health.

Number of Tables: 03; Number of References: 14; Number of Correspondence: 02.

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## Introduction:

Migration is considered as a process of social change where a person alone or accompanied by others, because of one or more reasons for education, political upheaval, economic settlement, or other purposes, leaves one geographical area for a prolonged stay or permanent settlement in another geographical location. This kind of process involves not only leaving own social networks behind but also includes experiencing at first a sense of loss, dislocation, alienation, and isolation, which will lead

to a process of acculturation. A series of factors in the environment combined with levels of stress, the ability to deal with stress, and the ability to root oneself according to one's personality traits, will produce either a sense of feeling isolated and alienated or a sense of settling down<sup>1</sup>. There is a strong relationship between climate and population migration. Altered climate affects human's both physical and mental health<sup>2</sup>. Migrants who have been displaced because of any above factors, often experience long-term psychological consequences. Prolonged detention, especially if accompanied by uncertainty, also impacts adversely on physical and mental health, as do negative attitudes towards migrants in the host country<sup>3</sup>.

## Materials and Methods:

This study was a case-control study on foreign students of five different countries of India (Kashmir), Malaysia, Maldives, Nepal, and Bhutan, and on the same number of local students during their stay and study in Bangladesh. A face to face structured questionnaire interview was used to obtain the data. All 140 migrant students were enrolled in the study during the six-year-study time as a case group. Students of five different countries were divided into male and female groups. Another 140 Bangladeshi students were taken as a control group from the same dental colleges in Dhaka city. The total number of male and female control groups was selected after counting the number of male and female migrants in the study having an equal number of males and females in both groups. Different parameters were considered to determine both the physical and mental health of both migrants and native students. The study was conducted from March 2017 to August 2022. SPSS version 19 was used for data analysis.

**Result:**

Table I shows the number of the case and control groups according to country and sex. Total female-migrants were higher 107(76.43%) than male-migrant 33(23.57%). Female-migrants were 3.24 times more than male-migrants. Total Kashmir-migrants (47.14%) were higher in number than other countries whereas Bhutan-migrants (.71%) were lowest in number. Here the number of male 33(23.57%) and female 107(76.43%) control group were enrolled following the number of case group's male-female numbers.

**Table I: Total number of case and control groups according to countries and sex with percentages:**

| Case group (140)                          |                                    |             |                                          | The control group (140) |                                 |
|-------------------------------------------|------------------------------------|-------------|------------------------------------------|-------------------------|---------------------------------|
| Country                                   | Sex with number and percentage (%) |             | Country-wise total number and percentage | Bangladeshi students    | Total number and percentage (%) |
| Bhutan                                    | Male                               | 1 (.71%)    | 4(2.86%)                                 | Male                    | 33(23.57%)                      |
|                                           | Female                             | 3 (2.14%)   |                                          |                         |                                 |
| India Kashmir                             | Male                               | 17 (12.14%) | 66(47.14%)                               |                         |                                 |
|                                           | Female                             | 49 (35%)    |                                          |                         |                                 |
| Maldives                                  | Male                               | 4 (2.86%)   | 23(16.43%)                               |                         |                                 |
|                                           | Female                             | 19 (13.58%) |                                          |                         |                                 |
| Malaysia                                  | Male                               | 2 (1.42%)   | 17(12.14%)                               |                         |                                 |
|                                           | Female                             | 15 (10.72%) |                                          |                         |                                 |
| Nepal                                     | Male                               | 9 (6.43%)   | 30(21.43%)                               |                         |                                 |
|                                           | Female                             | 21 (15%)    |                                          |                         |                                 |
| Total migrant male students 33 (23.57%)   |                                    |             |                                          |                         |                                 |
| Total migrant female students 107(76.43%) |                                    |             |                                          |                         |                                 |

Table II demonstrates that in case-group Bhutan migrants had relatively less psychological problems than others. Insomnia and loneliness were common among all migrants. Whereas, students from Malaysia, Maldives, and Nepal were affecting more with anxiety and depression. Female-migrants had a significant number of affecting rates with various psychological factors than males. On the other hand, a small number of Bangladeshi students were affecting depression but no remarkable other findings.

**Table II: Psychological factors associated with migration:**

| Factors    | Case group with the number of migrants |            |                      |             |               |             |               |             |            |             | Control group with the number |              |
|------------|----------------------------------------|------------|----------------------|-------------|---------------|-------------|---------------|-------------|------------|-------------|-------------------------------|--------------|
|            | Bhutan (4)                             |            | India (Kashmir) (66) |             | Malaysia (23) |             | Maldives (17) |             | Nepal (30) |             | Bangladesh (140)              |              |
|            | Male (1)                               | Female (3) | Male (17)            | Female (49) | Male (4)      | Female (19) | Male (2)      | Female (15) | Male (9)   | Female (21) | Male (33)                     | Female (107) |
| Anxiety    | -                                      | -          | -                    | -           | 2             | 8           | 1             | 9           | 3          | 15          | -                             | -            |
| Depression | -                                      | -          | -                    | -           | 2             | 9           | -             | 11          | -          | 17          | 4                             | 6            |
| Insomnia   | -                                      | 1          | 13 (19.70)           | 31          | 1             | 11          | 1             | 10          | 2          | 13          | -                             | 2            |
| Loneliness | 1                                      | -          | 12 (18.18)           | 38          | 3             | 17          | 2             | 14          | 8          | 20          | -                             | -            |
| Stress     | -                                      | -          | -                    | -           | 4             | 2           | 8             | 4           | 17         | -           | -                             | -            |

Table III illustrates that food poisoning was common in all five countries both male and female migrants. Similarly, all countries migrants became the victim of respiratory problems except India. Among all countries, female-migrants were more prone to urinary tract infection and skin diseases whereas male-migrants were affected more by diarrheal diseases. An allergic reaction was a common problem for all migrants. On the other hand, only one

Bangladeshi student was reported with skin problem however all other were no remarkable health problem during the study.

**Table III: Physical health issues associated with migration:**

| Diseases                | Case group with the number of migrants |            |                      |             |               |             |               |             |            |             | Control group with the number |              |
|-------------------------|----------------------------------------|------------|----------------------|-------------|---------------|-------------|---------------|-------------|------------|-------------|-------------------------------|--------------|
|                         | Bhutan (4)                             |            | India (Kashmir) (66) |             | Malaysia (23) |             | Maldives (17) |             | Nepal (30) |             | Bangladesh (140)              |              |
|                         | Male (1)                               | Female (3) | Male (17)            | Female (49) | Male (4)      | Female (19) | Male (2)      | Female (15) | Male (9)   | Female (21) | Male (33)                     | Female (107) |
| Allergic reaction       | -                                      | -          | 4                    | 21          | -             | 4           | 1             | 4           | 3          | 6           | -                             | -            |
| Diarrhea                | -                                      | -          | 5                    | -           | 2             | -           | -             | -           | 5          | 7           | -                             | -            |
| Food poisoning          | -                                      | 1          | 6                    | 17          | 2             | 8           | -             | 5           | 4          | 11          | -                             | -            |
| Respiratory problem     | -                                      | -          | 5                    | 19          | 1             | 6           | 1             | 3           | 5          | 5           | -                             | -            |
| Skin diseases           | -                                      | -          | 12                   | 30          | -             | 9           | -             | 11          | -          | 4           | -                             | 1            |
| Urinary tract infection | -                                      | -          | -                    | 9           | -             | 7           | -             | 6           | -          | 9           | -                             | -            |

**Discussion:**

Migration is a process of population movement either across an international border or within a country<sup>4</sup>. Notably, migration itself is a social determinant of physical and mental health that can influence and be influenced by other determinants. Being a migrant makes both men and women more vulnerable to positive or negative physical and mental effects of migration<sup>5</sup>. Women usually have their own motives including educational opportunities, family reunification, economic incentives. In this study woman-migrants, the number was 107 (76.43%) which is three-time more than male-migrant. Women-migrants are more as to escaping from gender-based discrimination and/or political violence and gaining more social independence<sup>6</sup>.

Loneliness, depression, and insomnia are common among all groups of the migrants that I noticed in this study. Staying in an adopted country for a long period of time, leaving their loved ones is a prime factor of this which is responsible for anxiety and depression<sup>7</sup>. The language barrier is another factor of depression with which migrants of Malaysia, Maldives, and Nepal are suffering more. In a recent study, depression has been identified as the leading cause of illness and disability among migrants<sup>8</sup>. High levels of emotional distress may cause immigrants to have more sleep disorder symptoms than non-immigrants<sup>9</sup>. Female-migrants were the major subject of the enormous psychological stress in the recent study. Due to the unstable social condition, lack of social security, some traditional customs, social and Religious barriers, political pressure, educational stress, and language barriers are some of the factors for female-migrant to get more psychological stress<sup>10</sup>. During the study, I found that migrants were suffering from various infectious and different health problems. Lack of awareness regarding common health problems which is

related to environmental change and their preventive measures makes them vulnerable to endemic diseases like respiratory tract infections, diarrhea, worm infestations, high prevalence of skin diseases, and fungal infections among migrants<sup>11</sup>. Food poisoning and diarrhea were common in all countries migrants particularly males in this study. Among the more common infections that one can be infected from contaminated foods and drinks are *Escherichia coli* infections, shigellosis or bacillary dysentery, giardiasis, cryptosporidiosis, another salmonellosis, cholera is more common<sup>12</sup>. Migrant students' respiratory problems had been found in the dire condition during my study. The rise in respiratory diseases in Bangladeshi migrants is due to increasing air pollution. Dhaka has been ranked the top several times for 'extremely unhealthy' air quality which is causing more respiratory problems among all<sup>13</sup>. Urinary Tract Infection had been experienced only by the female-migrants in this study, and nosocomial infection is suspected as the main cause. The use of a common toilet and lack of personal hygiene are also maybe some of the causes of this problem<sup>14</sup>.

Bangladeshi students were found more stable in both psychological and physical health conditions. It may be due to their stay in close contact with their family members and not feeling lonely or being depressed for any anxiety. Their loved ones are always with them to support themselves mentally. For staying in their environment, sufferings from physical problems were not so remarkable to them.

#### Conclusion:

The present study suggests that there is a strong relationship between migrants' physical and mental health which is influenced by the adopted country's environment, culture, tradition, language, food habits, and so on. The rate of depression, anxiety, stress, sense of alienation, and insomnia are higher among some migrant groups, while allergic reaction, respiratory diseases, gastrointestinal diseases, and urinary infections are the most common physical health problems experienced by them. A simple recommendation would be for the Government of Bangladesh to take responsibility for the migrants in terms of making them aware of their health risks and to ensure preventive health measures.

**Conflict of Interest:** None.

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#### References:

1. Bhugra D. Migration, distress, and cultural identity. *British Medical Bulletin*. 2004;69:129-141. <https://doi.org/10.1093/bmb/ldh007> PMID:15226202
2. McMichael C, Barnett J, and McMichael AJ. An Ill Wind? Climate Change, Migration, and Health. *J Environmental Health Perspectives*. 2012; 120(5):646-654. <https://doi.org/10.1289/ehp.1104375> PMID:22266739 PMCID:PMC3346786
3. Permanand G. Europe's migration challenges: mounting an effective health system response. *European Journal of Public Health*. 2016; 26(1); 3-4. <https://doi.org/10.1093/eurpub/ckv249> PMID:26839337
4. International Organization of Migration, International Migration Law. Glossary on Migration, International Organization of Migration, Geneva, Switzerland, 2004, [http://www.iomvienna.at/sites/default/files/IML\\_1\\_EN.pdf](http://www.iomvienna.at/sites/default/files/IML_1_EN.pdf).
5. Davis A, Basten A, and Frattini C (2006) Migration: A Social Determinant of the Health of Immigrants. International Organization of Migration (IOM), Geneva, Switzerland [http://ec.europa.eu/ewsi/UDRW/images/items/docl\\_9914\\_392596992.pdf](http://ec.europa.eu/ewsi/UDRW/images/items/docl_9914_392596992.pdf).
6. DeLaet DL, Kelson GA. Introduction: the invisibility of women in scholarship on international migration in *Gender and Immigration*. Eds., 1999; pp. 1-17, New York University Press, New York, NY, USA. [https://doi.org/10.1057/9780333983461\\_1](https://doi.org/10.1057/9780333983461_1)
7. Bill KWM, John FZ. Sadler and Hoff P. History and philosophy Conceptual relations between loneliness and culture. van Staden, Werdie (CW), Coetzee Kobus. 2010; 23(6);524-529. <https://doi.org/10.1097/YCO.0b013e32833f2ff9> PMID:20838346
8. Lim, GY, Tam WW, Lu Y, Ho CS, Zhang MW, and Ho RC. Prevalence of Depression in the Community from 30 Countries between 1994 and 2014. *Sci. Rep*. 2018; 8;2861-67. <https://doi.org/10.1038/s41598-018-21243-x> PMID:29434331 PMCID:PMC5809481
9. Seixas A. Differences in Disturbed Sleep between Immigrants and Non-Immigrants in Switzerland attributed to Emotional Distress: Analysis of the Swiss Health Survey. 2018.
10. HongY, Li XM. Behavioral studies of female sex workers in China: a literature review and recommendation for future research. *AIDS Behav*. 2008;12(4):623-636. <https://doi.org/10.1007/s10461-007-9287-7> PMID:17694431
11. Kumar SP, Brig, Shama KS., Nischitha V, and Pradyumna MB. A study on the pattern of skin diseases among migrant laborers visiting a teaching hospital. *International Journal of Community Medicine And Public Health*. 2008; 5:239-243.
12. Labu ZK, Mohiuddin AK, and Bake MA. Food contaminants: Bangladesh perspective. 2019; *JWUB* 2:1-6.
13. Gupta K, Stapleton AE, Hooton TM, Roberts PL, Fennell CL, Stamm WE. Inverse association of H2O2-producing lactobacilli and vaginal *Escherichia coli* colonization in women with recurrent urinary tract infections. *J Infect Dis*. 1998;178:446-450. <https://doi.org/10.1086/515635> PMID:9697725
14. Gupta K, Trautner BW. Diagnosis and management of recurrent urinary tract infections in non-pregnant women. *BMJ*. 2013;346:31-40. <https://doi.org/10.1136/bmj.f3140> PMID:23719637 PMCID:PMC4688544

# Correlation of Body Mass Index with Vitamin D and Parathormone (PTH) in Obese and Overweight Children, Study from a Tertiary Care Hospital of Bangladesh

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## Abstract

**Introduction with aim and objectives:** Childhood obesity and vitamin D deficiency both are emerging health issues. Vitamin D is essential for normal growth and development and frequently found low in obese and overweight children. The aim of this study was to assess serum vitamin D level, calcium, inorganic phosphate, alkaline phosphatase and parathormone (PTH) in obese and overweight children and to see the correlation between BMI, vitamin D and parathormone. **Materials and Methods:** This study was conducted at Pediatric Endocrinology clinic of department of Paediatrics of Bangabandhu Sheikh Mujib Medical University from the period of November 2016 to October 2018. We assessed 50 obese and overweight children for serum vitamin D, calcium, inorganic phosphate, alkaline phosphatase, and parathormone and we also tried to find out the correlations among the parameters in this cross sectional study. **Results:** Endocrine society clinical practice guideline was used to define vitamin D status. Result found that all of the obese/overweight children had low vitamin D (82% had deficiency and 18% had insufficiency). There was a statistically significant negative correlation between BMI and serum vitamin D level and positive correlation between BMI and the parathormone level ( $p$  value  $< 0.05$ ). In this study significant negative association was found between vitamin D level and the PTH level  $p$  value  $< 0.05$ . **Conclusion:** All the studied obese and overweight had vitamin D deficiency or insufficiency. There was negative correlation between BMI and serum vitamin D level and positive correlation between BMI and the parathormone level (PTH).

**Keywords:** BMI, Correlation, vitamin D, PTH, Bangladesh.

**Number of Tables:** 03; **Number of Figure:** 01; **Number of References:** 17, **Number of Correspondences:** 03.

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## Introduction:

Childhood obesity is one of the serious health challenges of 21st century. The problem is steadily affecting in developed as well as developing countries like Bangladesh. In Bangladesh the prevalence of obesity and overweight among Bangladeshi school children was 3.5% and 9.5% respectively<sup>1</sup>. Vitamin D has a crucial role in calcium, phosphorus metabolism and bone mineral homeostasis. It has also anti-proliferative, pro-differentiation, anti-bacterial, immune-modulatory and anti-inflammatory properties within the body<sup>2</sup>. Vitamin D deficiency is more prevalent in obese and overweight children and also found inverse association between BMI and vitamin D levels<sup>3, 4</sup>. Deficiency of vitamin D in obese children have been related to the many obesity related co-morbidities such as insulin resistance and type 2 diabetes<sup>5</sup>, hypertension<sup>6</sup>, dyslipidemia and metabolic syndrome in obese children<sup>7</sup>. This study had been designed to assess vitamin D calcium, inorganic phosphate, alkaline phosphatase, prohormone and to see the correlation between BMI, vitamin D and parathormone.

## Materials and Methods:

This study was conducted at Pediatric Endocrinology clinic of department of Paediatrics of Bangabandhu Sheikh Mujib Medical University from the period of November 2016 to October 2018. Study population was 50 obese and overweight children aged 5.5 to 18 years. We excluded the obese children who were taking systemic steroid for

any cause, suffering from genetic, endocrine or any neurological diseases that might lead to overweight or obesity, who had known liver or renal disease and those were getting vitamin D and/or calcium supplementation. Informed written consent was taken from all the participants or parents or guardians. Proper history, physical examination including anthropometric indices like weight, height, BMI were taken. The weight was measured by using electronic weighing machine and height was recorded using stadiometre. BMI was calculated dividing weight (kg) by height (meter) <sup>2</sup>. Patients were categorized into obese or overweight according to CDC BMI chart for particular age and sex.

Overweight: BMI 85th to < 95th centile

Obese: BMI ≥ 95th centile.

#### Biochemical assessment:

#### Observation and Result:

Vitamin D, parathormone and other biochemical parameters were estimated from venous blood of the study population in the Department of Biochemistry of the same university. Here 25(OH) D3 is used to measure the vitamin D level in the body as it is the major circulating form of vitamin D and has a half-life of approximately 2-3 weeks. Estimation of serum 25(OH) D was done by Chemiluminescence microparticle immune assay (CMIA) technique using the analyzer Architect Abbott, Ci 4100, USA 2012. Vitamin D level was classified into 3 categories: (According to Endocrine Society Clinical Practice Guideline, Hollick et al. 2011).

Vitamin D deficiency : < 20 ng/ml

Vitamin D Insufficiency: 20 –<30 ng/ml

Vitamin D sufficiency : 30-100 ng/ml

#### Statistical analysis of data

Statistical calculations were done using the appropriate statistical software SPSS 22.0. Pearson correlation test and scatter diagram was applied to evaluate the association between the variables. P-value less than 0.05 was considered as significant.

#### Ethical consideration

Ethical clearance was taken from Institutional Review Board of BSMMU.

#### Result:

We studied 50 overweight and obese children, among them 37 (74%) were overweight and 13 (26%) were obese. Table I showed demographic characteristics of the study subjects, majority of the obese and overweight children were of adolescent age group (10 to 18 years). Males were predominant. Among the study population 12% had hypertension and advanced tanner stage, almost all (98%) of them had acanthosis nigricans and 62% had striae. Result also showed that 82% of the obese/overweight children had vitamin D deficiency, 18% had insufficiency. None of them had sufficient vitamin D level. All of them had normal serum calcium level and most of them had normal level of alkaline phosphatase. Serum inorganic phosphate was normal in 80%

of the cases. Serum PTH was normal in 70% of obese/overweight children and high in 30% of them.

**Table I: Demographic and clinical characteristics of the study population (n=50)**

| Characteristics      | Number | Frequency % |
|----------------------|--------|-------------|
| Age group            |        |             |
| Childhood            | 18     | 36          |
| Adolescent           | 32     | 64          |
| Sex                  |        |             |
| Male                 | 30     | 60          |
| Female               | 20     | 40          |
| Blood pressure       |        |             |
| Hypertension         | 6      | 12          |
| Normal               | 44     | 88          |
| Acanthosis nigricans |        |             |
| Present              | 48     | 96          |
| Absent               | 2      | 4           |
| Striae               |        |             |
| Present              | 19     | 38          |
| Absent               | 31     | 62          |
| Tanner stage         |        |             |
| Advanced             | 6      | 12          |
| Age appropriate      | 44     | 88          |

**Table II: Status of Biochemical parameters in the obese/overweight group (n= 50)**

| Biochemical parametres                | Frequency | Percentage |
|---------------------------------------|-----------|------------|
| <b>S. vitamin D (ng/ml)</b>           |           |            |
| Sufficiency (30-100 ng/ml)            | 0         | 00         |
| Insufficiency (20-<30 ng/ml)          | 9         | 18         |
| Deficiency ( <20 ng/ml)               | 41        | 82         |
| <b>S. calcium (mg/dl)</b>             |           |            |
| Normal                                | 50        | 100%       |
| Low                                   | 0         | 0%         |
| <b>S. inorganic-phosphate (mg/dl)</b> |           |            |
| Normal                                | 40        | 80%        |
| High                                  | 10        | 20%        |
| Low                                   | 0         | 00%        |
| <b>S. alkaline phosphatase (u/l)</b>  |           |            |
| Normal                                | 49        | 98%        |
| High                                  | 1         | 2%         |
| <b>S. parathormone (pg/ml)</b>        |           |            |
| Normal                                | 35        | 70%        |
| High                                  | 15        | 30%        |

There was a statistically significant negative correlation between BMI and serum vitamin D level, a significant negative correlation between BMI and the parathormone level and p value <0.05 (Figure 1). Result also showed that serum PTH has a negative correlation with vitamin D level (table III). There were no significant correlation of serum calcium, inorganic phosphate and alkaline phosphatase with BMI or vitamin D level.

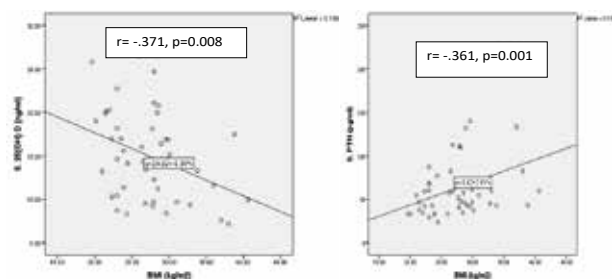


**Figure 1: Correlation of BMI with serum vitamin D and parathormone in studied subjects.**

**Table III: Correlation of Vitamin D with other lab parameters in study population**

| Lab parameters             | Pearson's correlation |         |
|----------------------------|-----------------------|---------|
|                            | r-value               | p-value |
| S. Calcium (mg/dl)         | -0.018                | 0.900   |
| S.iPO <sub>4</sub> (mg/dl) | 0.141                 | 0.330   |
| S. ALP (U/L)               | 0.215                 | 0.137   |
| S. PTH (pg/ml)             | -0.425                | 0.002   |

### Discussion:

Vitamin D deficiency is a current health issue. It is estimated that worldwide as many as one billion people suffer from vitamin D deficiency or insufficiency and this was shown to be prevalent across all age groups, genders, and geographic regions<sup>8</sup>. Present study included a total of 50 obese and overweight children. The study revealed that low vitamin D was in 100% (82% plus 18%) of these children. Most of the study in recent and in the past got the high prevalence of hypovitaminosis vitamin D in obese children. Dura-Trave et al. 2017 found in a study among 546 children that vitamin D deficiency was present 68.2 % of the obese children<sup>5</sup>. Study done in Indian children is also consistent with our study<sup>4</sup>. In this study vitamin D level showed strong negative correlation with BMI ( $r = -0.371$ ,  $p = 0.008$ ). In a cross sectional study done in 301 Turkey children, similar result was found<sup>10</sup>. Turer et al. 2013 also found the negative correlation between BMI and vitamin D level in american children<sup>3</sup>. The inverse association between higher body mass and lower vitamin D levels may have been attributed to sequestration of the fat-soluble vitamin D within the adipose tissue<sup>11</sup>. Several confounding factors such as sedentary lifestyle causing limited sun exposure, poor dietary habit and there by low dietary vitamin D intake have also been cited as possible cause of lower vitamin D in children with higher BMI<sup>11, 12</sup>. We found that serum PTH was showed the positive correlation with BMI ( $r = 0.371$ ,  $p = 0.008$ ). The value of parathormone increased as the BMI increased. Several study done in obese children showed that serum PTH is elevated in obese children. Reinehr along with colleagues conducted a study on 133 obese children and found PTH was positively related with BMI. They observe PTH level before and after weight loss in 67 obese children and found that the level of PTH normalizes after weight loss. So they postulated that high PTH is a consequence of obesity<sup>15</sup>. In this study the

negative association was found between vitamin D level and the PTH level in obese/overweight group ( $r = -0.425$ ,  $p = 0.002$ ). In a study done in Turkey children serum 25-OHD levels and iPTH levels were measured and evaluated. They found that the PTH level rises when the vitamin D level decreases<sup>14</sup>. Raised PTH may be due to secondary hyperparathyroidism as vitamin D deficiency causes less absorption of serum calcium leading to hypocalcaemia which in turns leads to increase PTH secretion. This study found no significant correlation between vitamin D level or BMI with serum calcium, inorganic phosphate (iPO<sub>4</sub>), alkaline phosphatase (ALP) in the study subjects. Serum calcium and alkaline phosphatase was normal in most of the obese/overweight children. Majority of the study done in obese children found normal level of serum calcium, inorganic phosphate (iPO<sub>4</sub>), alkaline phosphatase (ALP)<sup>16</sup>. Low serum 25(OH) vitamin D levels usually not associated with a concomitant reduction in serum calcium because secondary hyperparathyroidism increases mobilization of calcium from the skeleton and increased calcium reabsorption in the kidney<sup>17</sup>. Thus, it is expected that calcium levels will not decline in patients with vitamin D deficiency until most of the calcium has been depleted from the skeleton which may also rise alkaline phosphatase level.

### Conclusion

The study showed that 100% of the obese/overweight children had low vitamin D level. It also showed the negative relationship between BMI and 25 (OH) D levels in obese/overweight children. Serum parathormone showed a positive correlation with BMI and negative correlation with vitamin D level.

**Conflict of Interest:** None.

### References

- Bulbul T, Hoque M. Prevalence of childhood obesity and overweight in Bangladesh: findings from a countrywide epidemiological study. *BMC Pediatrics*. 2014; 14:86. <https://doi.org/10.1186/1471-2431-14-86> PMID:24690395 PMCID:PMC3974229
- Vojinovic J, Cimaz R. Vitamin D- update for the pediatric rheumatologists. *Pediatric Rheumatology*. 2015; 13(1):18. <https://doi.org/10.1186/s12969-015-0017-9> PMID:26022196 PMCID:PMC4446840
- Turer CB, Lin H, Flores G. Prevalence of vitamin D deficiency among overweight and obese US children. *Pediatrics*. 2013; 131(1):152-161. <https://doi.org/10.1542/peds.2012-1711> PMID:23266927
- Reddy TP, Reddy K, Reddy MS, Manjunath GA. Levels of vitamin D among overweight and obese adolescents: an observational study. *Int J Contemp Pediatr*. 2017; 4(6):1934-1939. <https://doi.org/10.18203/2349-3291.ijcp20174136>
- Durá-Travé T, Gallinas-Victoriano F, Chueca-Guindulain MJ, Berrade-Zubiri S. Prevalence of hypovitaminosis D and

associated factors in obese Spanish children. *Nutrition & diabetes*. 2017; 7(3): 248.

<https://doi.org/10.1038/nutd.2016.50>

PMid:28287628 PMCID:PMC5380890

6. Olson ML, Maalouf NM, Oden JD, White PC, Hutchison MR. Vitamin D deficiency in obese children and its relationship to glucose homeostasis. *The Journal of Clinical Endocrinology & Metabolism*. 2012; 97(1):279-285.

<https://doi.org/10.1210/jc.2011-1507>

PMid:22072738 PMCID:PMC3251943

7. Williams R, Novick M, Lehman E. Prevalence of hypovitaminosis D and its association with comorbidities of childhood obesity. *The Permanente Journal*. 2014; 18(4):32.

<https://doi.org/10.7812/TPP/14-016>

PMid:25662524 PMCID:PMC4206169

8. Alaklabi A, Alsharairi. Current Evidence on Vitamin D Deficiency and Metabolic Syndrome in Obese Children: What Does the Evidence from Saudi Arabia Tell Us? *Children*. 2018; 5(1):11.

<https://doi.org/10.3390/children5010011>

PMid:29342981 PMCID:PMC5789293

9. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism*. 2011; 96(7):1911-1930.

<https://doi.org/10.1210/jc.2011-0385>

PMid:21646368

10. Çizmecioglu FM, Etiler N, Görmü U, Hamzaolu O, Hatun . Hypovitaminosis D in obese and overweight school children. *Journal of clinical research in pediatric endocrinology*. 2008; 1(2):89.

<https://doi.org/10.4008/jcrpe.v1i2.43>

PMid:21318069 PMCID:PMC3005643

11. Wortsman J, Matsuoka LY, Chen TC, Lu Z, Holick MF. Decreased bioavailability of vitamin D in obesity. *The American journal of clinical nutrition*. 2000; 72(3):690-693.

<https://doi.org/10.1093/ajcn/72.3.690>

PMid:10966885

12. Harel Z, Flanagan P, Forcier M, Harel D. Low vitamin D status among obese adolescents: prevalence and response to treatment. *Journal of adolescent health*. 2011; 48(5):448-452.

<https://doi.org/10.1016/j.jadohealth.2011.01.011>

PMid:21501802

13. Dong Y, Pollock N, Stallmann-Jorgensen IS, Gutin B, Lan L, Chen TC, et al. Low 25-hydroxyvitamin D levels in adolescents: race, season, adiposity, physical activity, and fitness. *Pediatrics*. 2010; 125(6):1104-1111.

<https://doi.org/10.1542/peds.2009-2055>

PMid:20439594 PMCID:PMC3935324

14. Epstein LH, McCurley J, Valoski A, Wing RR. Growth in obese children treated for obesity. *American Journal of Diseases of Children*. 1990; 144(12):1360-1364.

<https://doi.org/10.1001/archpedi.1990.02150360086029>

PMid:2244623

15. Reinehr T, Sousa GD, Alexy U, Kersting M, Andler W. Vitamin D status and parathoroid hormone in obese children before and after weight loss. *European journal of Endocrinology*. 2007; 157:225-232.

<https://doi.org/10.1530/EJE-07-0188>

PMid:17656603

16. Sahin ON, Serdar M, Serteser M, Unsal I, Ozpinar A. Vitamin D levels and parathyroid hormone variations of children living in a subtropical climate: a data mining study. *Italian journal of pediatrics*. 2018; 44(1):40.

<https://doi.org/10.1186/s13052-018-0479-8>

PMid:29562938 PMCID:PMC5863369

17. Motlaghzadeh Y, Sayarifard F, Allahverdi B, Rabbani A, Setoodeh A, Sayarifard A, et al. Assessment of vitamin D status and response to vitamin D3 in obese and non-obese Iranian children. *Journal of tropical pediatrics*. 2016; 62(4):269-275.

<https://doi.org/10.1093/tropej/fmv091>

PMid:26995012

# Risk Factors in Post Operative Wound Infections Following Elective Abdominal Operations

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## Abstract

**Introduction:** Surgical site infections are common post operative complication and cause significant post operative morbidity and mortality, and have serious consequences for outcomes and costs. Different risk factors are involved, including age, sex, smoking, nutrition, diabetes, pre existing illness, pre operative hospital stay time, pre operative shaving, level of surgeon, length of incision, duration of operation, per operative blood transfusion, wound drainage and nature of wound. The objective of this study was to determine the risk factors affecting abdominal surgical site infections and their rate at Dhaka Medical College & Hospital, a major referral teaching hospital in Bangladesh. **Objectives:** were to identify risk factors in post operative wound infections following elective abdominal surgery. **Materials and Methods:** A Cross sectional type of observation study was carried out among 153 patients in Department of Surgery, Dhaka Medical College Hospital, Dhaka from January 2008 to December 2009. **Results:** Patients (n = 153) who had undergone elective surgery were studied and the relationships among variables were analyzed by Student's t and Chi-square tests. To test the independence of the risk factors, the significant variables (p ≤ .05) in the univariate analyses were entered into a stepwise logistic regression equation. Data were collected through pre and postoperative examinations. The subjects were followed till discharge. Of the 153 patients, 13 suffered from SSI (8.5%). Among the infections superficial SSI was in 8 cases (61.54%), deep SSI in 3 cases (23.08%), and organ/space SSI in 2 (15.38%) cases. There were 14 different variables in study to determine the risk factors. In univariate analysis ten risk factors were identified: age, underweight, diabetes, ASA score, pre operative hospital stay, per operative blood transfusion, length of incision, duration of operation, wound drain and contaminated wound. And in multivariate analysis duration of operation, diabetes mellitus and ASA score appeared to be independent risk factors for wound infection. **Conclusion:** The total elimination of wound infection is not possible, a reduction in the infection rate to a minimal level could have significant benefits in terms of both patient comfort and medical resources used. The SSI may be reduced to a more acceptable level by reducing the average operation time to less than 2 hours, pre operative hospital stay, and by reducing contamination during operation and wound drainage. Furthermore post operative study in large scale is recommended.

**Keywords:** Wound Infections, Abdominal Operations.

Number of Tables: 08; Number of Figures: 02; Number of Bibliography: 25; Number of Correspondences: 05.

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## Introduction:

Surgical site infections are the third most frequently reported nosocomial infection, accounting for 14%- 16% of all nosocomial infections among hospitalized patients. Among surgical patients, SSIs were the most common nosocomial infection, accounting for 38% of all such infections. (Alicia et al, 1999<sup>1</sup>) Infection rates in US National Nosocomial Infection Surveillance system hospitals

were reported to be: clean 2.1%, clean-contaminated 3.3%, contaminated 6.4% and dirty 7.1% (Culver et al, 1991)<sup>2</sup>. Estimating the cost of SSIs has proved to be difficult but many studies agree that additional bed occupancy is the most significant factor. In 1980, Cruse estimated that an SSI increases a patient's hospital stay by approximately 10 days and cost an additional \$2000. Many factors influence surgical wound healing and determine the potential for, and the incidence of, infection. There are some patient related factors such as age, sex, diabetes, smoking, poor nutrition, obesity etc. Surgical considerations like, skin preparation, length of incision, intraoperative aseptic measures, surgical techniques, duration of surgery, per operative blood transfusion, wound class and level of surgeon also influences SSIs (Razavi et al, 2005)<sup>3</sup>. Usually postoperative wound infection appears between 3rd to 5th post operative days. But presentation may be delayed for 2 to 3 weeks. Clinical features of post operative wound infection include wound pain and swelling, pyrexia, wound tenderness, erythema, purulent or serosanguinous discharge, and wound dehiscence (Alicia et al, 1999)<sup>1</sup>.

Surgical site infection can be classified as-

- Superficial incisional SSI
- Deep incisional SSI
- Organ/ space SSI.

Of these SSIs, two thirds are confined to the incision, and one third involve organs or spaces accessed during operation (Alicia et al, 1999)<sup>1</sup>. Organ/space SSIs as compared to incisional SSIs are associated with greater increase in morbidity and mortality. Wound infection is a clinical outcome indicator of fundamental importance in elective surgery, surgical practice depends upon healing by primary intension and without serious complication. Post operative sepsis can have serious and significant effect on ultimate result of the operation as well as the patient is general wellbeing. To achieve a good surgical outcome, it is important to identify the risk factors that increase the incidence of SSI. This issue has been addressed in many centers in the world with differing results and recommendations. But in our hospital no such study has been conducted to measure the rate and risk factors for SSI. So SSI surveillance should be conducted and maintained in all hospitals to promote better surgical outcome.

#### Materials and Methods:

A Cross sectional type of observation study was carried out among 153 patients in Department of Surgery, Dhaka Medical College Hospital, Dhaka from January 2008 to December 2009. Inclusion criteria were only elective abdominal surgery, Non- pregnant patients and Patients who agreed to participate in the study. Exclusion criteria were the patient who had emergency operation, Other than abdominal surgery, pregnant patient, moribund patient who were treated in I.C.U. and Laparoscopy surgery.

#### Result:

In the study period 153 patients from surgery unit were included for investigation and studied. Among them 13 (8.50%) patients developed post operative wound infection.

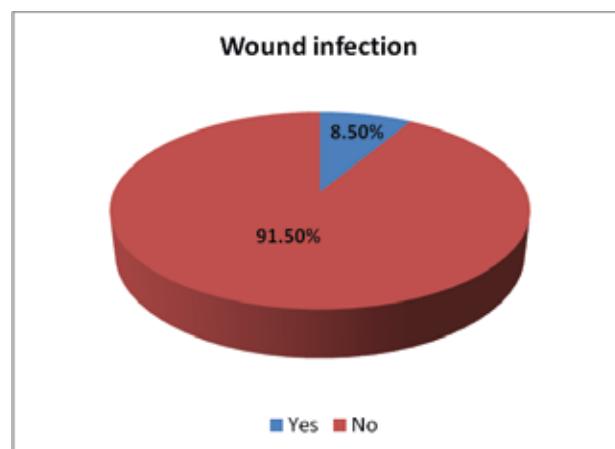


Figure 1: Wound infection rate in the study

In this study, 8 cases (61.54%) of wound infection involved only skin or subcutaneous tissue of the incision. In 3 cases (23.08%) of infection involved deep fascia/ muscle of the incision. In 2 cases (15.38%) of infection involved organ/space manipulated during operation.

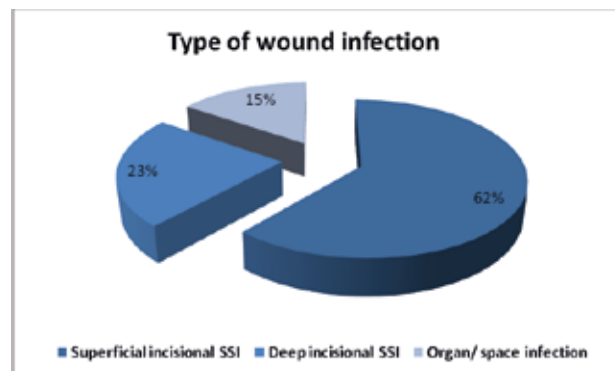


Figure 2: Types of wound infection

Table I shows that, common indications for operation in descending order include chronic calculus cholecystitis followed by, inguinal hernia, recurrent appendicitis, incisional hernia, colostomy and Illiostomy, and colo-rectal carcinoma.

Table I: Clinical condition for operation

| Clinical Diagnosis             | No(%) of patients |
|--------------------------------|-------------------|
| Chronic Calculus Cholecystitis | 45(29.41)         |
| Inguinal Hernia                | 38(24.84)         |
| Recurrent Appendicitis         | 14 (9.15)         |
| Incisional hernia              | 9 (5.88)          |
| Colostomy Closer               | 7 (4.58)          |
| Illiostomy Closer              | 6 (3.92)          |

| Clinical Diagnosis                         | No(%) of patients  |
|--------------------------------------------|--------------------|
| Carcinoma Stomach                          | 5 (3.26)           |
| Rectal carcinoma                           | 4 (2.61)           |
| Epigastric Hernia                          | 4 (2.61)           |
| Choledocholithiasis                        | 3 (1.96)           |
| Colonic Cancer                             | 2 (1.30)           |
| Pyloric Stenosis (D.U.)                    | 2 (1.30)           |
| Gastric Outlet Obstruction (antral growth) | 2 (1.30)           |
| Empyema G.B.                               | 2 (1.30)           |
| Umbilical Hernia                           | 2 (1.30)           |
| Hepatolithiasis                            | 1 (0.65)           |
| Nephrolithiasis                            | 1 (0.65)           |
| Others                                     | 6 (3.92)           |
| <b>Total</b>                               | <b>153 (100.0)</b> |

Table II shows, common operation categories with rate of SSI. The table shows that the most common intervention was hernia repair followed by biliary surgery, colonic surgery, gastric surgery and rectal surgery. Wound infection was more common colonic surgery, gastric surgery and hernia repair.

**Table II: Type of interventions with frequency and SSI rate(n=153)**

| Interventions      | No(%) of patients | No(%) of wound infection |
|--------------------|-------------------|--------------------------|
| Hernia repair      | 53 (34.64)        | 3 (23.07)                |
| Biliary surgery    | 51 (33.33)        | 1 (7.69)                 |
| Colonic Surgery    | 15 (9.80)         | 4 (30.76)                |
| Appendices surgery | 14 (9.15)         | 0 (0)                    |
| Gastric surgery    | 9 (5.88)          | 3 (23.07)                |
| Rectal Surgery     | 4 (2.61)          | 1 (7.69)                 |
| Others             | 7 (4.58)          | 1 (7.69)                 |

In this study, thirteen patients (8.50%) were diabetic. Among them 4 (30.77%) patients developed post operative wound infection. This is statistically highly significant with a p value of <0.013.

**Table III: Diabetes mellitus versus Wound Infection.**

| Diabetes mellitus | Wound infection |            | Total (%)  | The Chi-square value | P value |
|-------------------|-----------------|------------|------------|----------------------|---------|
|                   | Yes (%)         | No (%)     |            |                      |         |
| Present           | 4(30.77)        | 9(69.23)   | 13(8.50)   | 6.20                 | <0.013  |
| Absent            | 9(6.43)         | 131(93.57) | 140(91.50) |                      |         |
| <b>Total</b>      | <b>13</b>       | <b>140</b> | <b>153</b> |                      |         |

In the study, 141(92.16%) patients had ASA score of 1 or 2 and 12 (7.84%) patients had ASA score of  $\geq 3$ . Among the 12 patients with ASA score of  $\geq 3$ , 4(33.3%) patients developed post operative wound infection. This result indicates that post operative wound infection rate is significantly higher in patients with ASA score of  $\geq 3$  with a p value of <0.007.

**Table IV: ASA score versus Wound Infection**

| ASA score    | Wound infection |            | Total (%)  | The Chi-square value | P value |
|--------------|-----------------|------------|------------|----------------------|---------|
|              | Yes (%)         | No (%)     |            |                      |         |
| 1 or 2       | 9 (6.38)        | 132(93.62) | 141(92.16) | 7.16                 | <0.007  |
| $\geq 3$     | 4 (33.33)       | 8 (66.67)  | 12 (7.84)  |                      |         |
| <b>Total</b> | <b>13</b>       | <b>140</b> | <b>153</b> |                      |         |

Majority of operations (85) took less than or equal to 60 minutes from skin incision to skin closure: 12 (7.84%) operations required more than 2 hours to be completed. The duration of surgical operation also proved to be a significant factor: only 3.53% of operations lasting 60 minutes or less led to infection, while for operations lasting more than 2 hours this rate leapt to 33.33%.

**Table V: SSI rate in relation to duration of operation**

| Duration of operation | Wound infection |            | Total (%)  | The Chi-square value | P value |
|-----------------------|-----------------|------------|------------|----------------------|---------|
|                       | Yes (%)         | No (%)     |            |                      |         |
| $\leq 60$ minutes     | 3(3.53)         | 82(96.47)  | 85(55.56)  | 12.57                | <0.002  |
| 61 - 120 minutes      | 6(10.71)        | 50(89.29)  | 56(36.60)  |                      |         |
| >120 minutes          | 4(33.33)        | 8(66.67)   | 12(7.84)   |                      |         |
| <b>Total</b>          | <b>13</b>       | <b>140</b> | <b>153</b> |                      |         |

So far as wound type is concerned, it was found clean wounds in 59 cases (38.56%); clean-contaminated wounds in 75 cases (49.02%) and contaminated wounds in 19 cases (12.42%). SSI rate was significantly higher in contaminated wound with a 'p' value of <0.011.

**Table VI: Wound class versus wound infection**

| Wound class        | Wound infection |            | Total (%)  | The Chi-square value | P value |
|--------------------|-----------------|------------|------------|----------------------|---------|
|                    | Yes (%)         | No (%)     |            |                      |         |
| Clean              | 4 (6.78)        | 55 (93.22) | 59 (38.56) | 8.95                 | <0.011  |
| Clean contaminated | 4 (5.33)        | 71(94.67)  | 75(49.02)  |                      |         |
| Contaminated       | 5 (26.32)       | 14 (73.68) | 19 (12.42) |                      |         |
| <b>Total</b>       | <b>13</b>       | <b>140</b> | <b>153</b> |                      |         |

In the study the culture sensitivity report showed 2 negative and 11 positive growths. The most frequent organism was Escherichia coli (E. coli).

**Table VII : Most frequent isolated organism (n=13)**

| Organism Isolated        | No. of wound |       |
|--------------------------|--------------|-------|
| Escherichia coli         | 7            | 53.84 |
| Pseudomonas spp          | 2            | 15.38 |
| Kleb siella spp          | 0            | 0     |
| Proteus spp              | 1            | 7.69  |
| Staphylococcus aureus    | 1            | 7.69  |
| Acinetobacter spp        | 0            | 0     |
| Peptostreptococcus       | 0            | 0     |
| βhaemolytic streptococci | 0            | 0     |

All the risk factors for SSI with  $p$  value  $\leq 0.05$  in univariate analysis were entered into a stepwise logistic regression model for multivariate analysis. Duration of operation ( $p<.001$ ), Diabetes mellitus ( $p<.003$ ) and ASA score ( $p<.026$ ) were found to be independent risk factors for wound infection.

Model Summary<sup>d</sup>

**Table VIII: Multivariate analysis: stepwise logistic regression model summary (taken from SPSS output)**

| Model | R       | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics |          |     |     |               |
|-------|---------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
|       |         |          |                   |                            | R Square Change   | F Change | df1 | df2 | Sig. F Change |
| 1     | .269(a) | .072     | .066              | .270                       | .072              | 11.800   | 1   | 151 | .001          |
| 2     | .355(b) | .126     | .114              | .263                       | .054              | 9.202    | 1   | 150 | .003          |
| 3     | .394(c) | .155     | .138              | .260                       | .029              | 5.073    | 1   | 149 | .026          |

a Predictors: (Constant), duration of operation

b Predictors: (Constant), duration of operation, diabetes mellitus

c Predictors: (Constant), duration of operation, diabetes mellitus, ASA score

d. Dependent Variable: wound infection

#### Discussion:

This study was carried out in the department of Surgery, Dhaka Medical College & Hospital. From December 2008 to November 2009 with an aim to estimate rate of SSI in elective surgical procedure and to determine risk factor associated with infection. There were 153 patients, of them 13 developed wound infections. The overall infection rate was 8.5%. The overall incidence of surgical wound infection varied in different studies from 4.7 to 17 percent. SSI rate was found between 4-30% (Suchitra et al, 2009)<sup>4</sup>. So our result was in agreement in findings with them. Of the 13 cases of SSI, in 8 cases (62%) infections were limited within skin and superficial tissue, in 3 cases (23%) deeper incisional tissue was involved and organ/ space infections occurred in

the rest 2 (15%) cases, of these SSIs, two thirds were confined to the incision and one third involved organ/ space, (Alicia et al, 1999)<sup>1</sup>. The rate of wound infection varies according to wound class as follows 6.78% for clean operation, 5.33% for clean and contaminated operation and 26.32% for contaminated operation, Similar observation was reported in some other literature but Culver et al<sup>2</sup>, described much lower infection rate in all three wound classes (Razavi et al, 2005)<sup>3</sup>. It should be made clear that our hospital was a tertiary level hospital and a reference centre within Bangladesh National Health Service and that the patients sent to our hospital were those selected from other hospitals all over the country who were more likely to be severely ill. This relative high rate of post operative wound infection in this series was most probably because of high underlying severity of illness in our patients. In this series, common indications for operation in descending order include chronic calculus cholecystitis, recurrent appendicitis, gastric carcinoma, rectal carcinoma, inguinal hernia. Common operation category includes hernia repair, colonic surgery, appendices surgery, gastric surgery, rectal surgery. SSI rate was higher in colonic surgery (30.76%), gastric surgery (23.07%), hernia repair (23.07%), rectal surgery (7.69%), biliary surgery (7.69%) respectively. Among the 14 studied independent variables, in univariate analysis the following 10 risk factors for post operative infectious complications were identified: age>50 years, underweight, diabetes mellitus, ASA score $\geq 3$ , preoperative hospital stay, prolonged operative time, peroperative blood transfusion, length of incision, wound class 3 and wound drainage. Age was a risk factor for postoperative infection complications, commonly reported in the medical literature. Age above 45 years was associated with SSIs (Nicolle et al, 1992)<sup>5</sup>. Increasing age is related with chronic conditions, malnutrition and fall in the body immunological efficiency, causing more extensive SSI. The present findings supported this argument. SSI was not related with sex, this was in agreement with previous findings (Razavi et al, 2005<sup>3</sup>; Pessaux et al,<sup>6</sup> 2003; Watanabe et al, 2008<sup>7</sup>; Petrosillo et al, 2008<sup>8</sup>; Heal et al, 2006)<sup>9</sup>. In the study, mean BMI of patients was 22.83kg/m<sup>2</sup> (SD $\pm$ 2.9), in a range of 17.29-32.05. Nutritional state is regarded as an important factor in wound healing (Clark et al, 2000)<sup>10</sup>. Underweight indicates poor nutritional status of patients. Some other investigators also mentioned association of malnutrition with SSI rate, our result is in agreement with finding of (Leite et al, 1987<sup>11</sup>; Katelaris et al, 1986)<sup>12</sup>. In this study although differences in SSI rates were not significantly related to shaving pattern, a trend was apparent: SSI rate was higher when shaving done day before surgery than prior to surgery

(10.53%). This is one area where we can lower the risk by approximating the time of shaving as much as possible to that of operation i.e. prior to surgery or none (5.17%). An infection rate was 17.4% when pre operative stay was 0-7 days. An infection rate was 71.4% with a pre operative stay of more than 21 days. Pre operative hospital stay predisposed an individual to 1.76% risk of acquiring an infection. A pre operative stay of one week increased the risk rate to 5%. (Suchitra et al, 2009)<sup>4</sup>. This was marginally supported by this study ( $P < 0.05$ ). This is one of the factors to be taken in to account by reducing pre-operative hospital stay we may decrease SSI. The individual surgeon performing the procedure can have an impact on outcome for the patient. There is evidence to suggest that grade of surgeon can have an impact on SSI rate (Mishriki et al, 1990)<sup>13</sup>. Guidance from the Specialist Advisory Committee of the Joint Committee on Higher Surgical Training of Scotland suggests that where a consultant does not perform the procedure, one should be present in the operating theatre in order to minimize this risk. But in this study, SSI rate was unusually higher when done by consultants. The probable explanation is that: most of the elective procedures done by residents in our hospital are minor clean operation (e.g. inguinoscrotal surgery), take short duration, and usually done under supervision of consultants, discharged in earlier and thus infection rate is low; infection rate is high in emergency operation, done by residents without supervision which was not included in this study. Blood transfusion was a predictor of SSI in this study. The adverse effects of blood transfusion have been well documented in patients having colorectal, gastrointestinal and cancer surgery (Reiping et al, 2001<sup>14</sup>; Morris et al, 2003; Vamvakas et al, 1996<sup>15</sup>; Walz et al, 2006)<sup>16</sup>. In this study, blood recipient are also of similar category. In the present study, drain usage or type of drain have shown impact on SSI rate, but presence of drain for longer than 3 days increased wound infection rate significantly. Similar observation was reported in medical literature (Simchen et al, 1981<sup>17</sup>; Claesson et al, 1988<sup>18</sup>; Watanabe et al, 2008<sup>7</sup>; Moro et al, 1996)<sup>19</sup>. In some studies, use of drain was found to be independent risk factor for SSI (Pessaux et al, 2003<sup>6</sup>; Petrosillo et al, 2008<sup>8</sup>; Reiping et al, 2001<sup>14</sup>; Velasco et al, 1996)<sup>20</sup>. The main aim of drainage is to evacuate residual effusions to avoid infection. Thus, every drainage has its own limitation because of obstruction and mobility. It can be at the origin of retrograde bacterial colonization, especially when the drainage is no longer an aspirate. In this study, contaminated wound is significantly associated with post operative wound infection. The finding is comparable with other studies (Razavi et al, 2005<sup>3</sup>; Pessaux et al, 2003<sup>6</sup>;

Watanabe et al, 2008<sup>7</sup>; Mishkiri et al, 1990<sup>13</sup>; Garibaldi et al, 1991<sup>21</sup>; Velasco et al, 1996<sup>20</sup>; Nguyen et al, 2001<sup>22</sup>; Barber et al, 1995)<sup>23</sup>. The multivariate logistic analysis found three independent risk factors. These in descending order are as follows: Duration of operation > 2 hours, diabetes mellitus and ASA score  $\geq 3$ . These factors were also significant in univariate analysis. Diabetes mellitus was a predictor of postoperative wound infection in this study. ASA score 3 indicates presence of a severe systemic disease. Patients with ASA score >2 may be compared with elderly people. Thus SSI rate is likely to be higher in them. In this study ASA score  $\geq 3$  was most significant predictor of SSI in both univariate and multivariate analysis. Similar finding was reported by (Culver et al, 1991<sup>2</sup>; Garibaldi et al, 1991<sup>21</sup>; and Velasco et al, 1996)<sup>20</sup>. Morris et al,<sup>24</sup> Nichole et al<sup>5</sup>, Garibaldi et al<sup>21</sup>, Velasco et al<sup>20</sup>, Razavi et al<sup>13</sup> and Moro et al<sup>19</sup>, showed the existence of a direct relationship between operative time and postoperative infectious risk. Pessaux et al<sup>6</sup> showed that risk doubled with each additional operative hour. Our results agree with this finding, as our rates of postoperative infection were 3.53% for 1 hour, 10.71% for 1 to 2 hours, and 33.33% for longer than 2 hours. Certainly, longer procedures are associated with greater blood loss and perhaps an associated washout of prophylactic antibiotics. Unlike blood products, which are administered on need basis, antibiotics are usually dispensed once during operation. Hence, as blood is lost and replaced, the concentrations of circulating antibiotics diminish disproportionately. Thus, for prolonged operations, periodic reinjection of antibiotic agents (according to half-life) during the intervention should be favored (Cheadle et al, 2006)<sup>25</sup>. Regarding culture sensitivity report majority of the organism causing wound infection were gram negative, of which *Escherichia coli* was found to be the commonest (53.84%), followed by *Pseudomonas* (15.78%), *Proteus* spp & *Staphylococcus aureus* (7.69%). *E. coli* was isolated from the wound following operation on the gastro intestinal tract.

- *E. coli* is sensitive to ciprofloxacin, ceftriaxone, azithromycin, pivmecillin, nalidixic acid, and resistant to amoxycillin, cotrimoxazole.
- *Proteus* spp is sensitive to gentamicin, meropenem and resistant to ceftazidime, ceftriaxone, ciprofloxacin, cotrimoxazole, flucloxacillin.
- *Pseudomonas* is sensitive to gentamicin and ciprofloxacin and resistant to doxycycline, ceftazidime, ceftriaxone, cefixime, meropenem.
- *Staphylococcus Aureus* is sensitive to gentamicin, ceftazidime, flucloxacillin, cefuroxime and resistant to ceftriaxome, ciprofloxacin, cotrimoxazole, cefixime.

All the gram negative organisms were sensitive to newly introduced chemotherapeutic agent imipenem.

#### Conclusion:

This study provided information on rate and risk factors for SSI occurrence in elective abdominal operations in Department of General Surgery of Dhaka Medical College & Hospital. In this study three independent risk factors were identified in both univariate and multivariate analyses. Another seven risk factors were identified in univariate analysis but not in multivariate analysis. By modifying the factors before or during surgery, the SSI can be reduced as well as post operative morbidity and mortality rate. In conclusion, further study in large scale is needed.

**Conflict of Interest:** None.

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#### Bibliography:

1. ALicia J. Managam MD, Teresa C. Horan MPH. 'Guideline for Prevention of Surgical Site infection'. AJIC- American Journal of Infection Control. 1999; 27: 97-134.  
[https://doi.org/10.1016/S0196-6553\(99\)70088-X](https://doi.org/10.1016/S0196-6553(99)70088-X)  
PMid:1656747
2. Culver DH, Horan TC, Gaynes RP. 'Surgical wound infection rates by wound class, operative procedure, and patient risk index: National Nosocomial Infections Surveillance System'. Am J Med. 1991; 91: 152-157.  
[https://doi.org/10.1016/0002-9343\(91\)90361-Z](https://doi.org/10.1016/0002-9343(91)90361-Z)  
PMid:1656747
3. Razavi S M, Mohammad Ibrahimpoor, Ahmad Sabouri Kashani and Ali Jafarian. 'Abdominal surgical site infections: incidence and risk factors at an Iranian teaching hospital'. BMC Surgery. 2005;5(2)Available from: <http://www.biomedcentral.com/1471-2482/5/2>.  
<https://doi.org/10.1186/1471-2482-5-2>  
PMid:15733323 PMCID:PMC555554
4. Suchitra Joyce B. and Lakshmi devi N. 'Surgical site infections: Assessing risk Factors, outcomes and antimicrobial sensitivity patterns'. African Journal of Microbiology Research. 2009;3(4): 175-197.
5. Nicolle LE, Huchcroft SA, Cruse PJ. 'Risk factors for surgical wound infection among the elderly'. J Clin Epidemiol. 1992;45: 357-364.  
[https://doi.org/10.1016/0895-4356\(92\)90036-M](https://doi.org/10.1016/0895-4356(92)90036-M)  
PMid:1569431
6. Pessaux P, Simon Msika, David Atalla, Jean-Marie Hay, Yves Flamant. 'Risk Factors for Postoperative Infectious Complications in Noncolorectal Abdominal Surgery : A Multivariate Analysis Based on a Prospective Multicenter Study of 4718 Patients'. Arch Surg. 2003; 138: 314-324.  
<https://doi.org/10.1001/archsurg.138.3.314>  
PMid:12611581
7. Watanabe Akihiro, Shunji kohnoe, Rinshun Shimabukuro, Takeharu Yamanaka, Yasunori iso, Hideo Baba, et al. 'Risk Factors Associated with Surgical Site Infection in Upper and Lower Gastrointestinal Surgery'. Surg Today. 2008; 38: 404-412.  
<https://doi.org/10.1007/s00595-007-3637-y>  
PMid:18560962
8. Petrosillo N, Cecilia MJD. 'Surgical Site Infection in Italian Hospital: a Prospective Multicentre Study'. BMC Infect Disease. 2008; 8: 34.  
<https://doi.org/10.1186/1471-2334-8-34>  
PMid:18328101 PMCID:PMC2311314
9. Heal C, Petra Buettner and Sheldon Browning. 'Risk factors for wound infection after minor surgery in general practice'. MJA. 2006;185(5):255-258.  
<https://doi.org/10.5694/j.1326-5377.2006.tb00555.x>  
PMid:16948620
10. Clark M A, M.B, Ch.B, Lindsay D. Plank, Ph.D., et al. 'Wound Healing Associated with Severe Surgical Illness'. World J. Surg. 2000;24: 648-654.  
<https://doi.org/10.1007/s002689910106>  
PMid:10773116
11. Leite JF, Antunes CF, Monteiro JC, Pereira BT. 'Value of nutritional parameters in the prediction of postoperative complications in elective gastrointestinal surgery'. Br J Surg. 1987;74(5): 426-9.  
<https://doi.org/10.1002/bjs.1800740538>  
PMid:3594145
12. Katelaris PH, Bennett GB, Smith RC. 'Prediction of postoperative complications by clinical and nutritional assessment'. Aust N Z J Surg. 1986;56: 743-7.  
<https://doi.org/10.1111/j.1445-2197.1986.tb02319.x>  
PMid:3533022
13. Ming Chau Chang. 'Povidone Iodine irrigation may prevent wound infection following surgery'.

2005;30:1689-1693.

14. Reiping T, Chen H H. 'Risk Factors For Surgical Site Infection After Elective Resection of The Colon And Rectum: A Single Centre Prospective Study of 2809 Patients'. *Ann Surg.* 2001;234(2) : 181-189.

<https://doi.org/10.1097/00000658-200108000-00007>

PMid:11505063 PMCID:PMC1422004

15. Vamvakas EC, Carven JH, Hibberd PL. 'Blood transfusion and infection after colorectal cancer surgery'. *Transfusion.* 1996;36:1000-8.

<https://doi.org/10.1046/j.1537-2995.1996.36111297091746.x>

PMid:8937412

16. Walz JM, Peterson CA. 2006, 'Surgical Site Infection Following Bowel Surgery: A Retrospective Analysis Of 1446 Patients', *Ann Surg.* vol. 141, no.10, pp. 1014-8.

<https://doi.org/10.1001/archsurg.141.10.1014>

PMid:17043280

17. Simchen E, Shapiro M, Michel J, Sacks T. 'Multivariate analysis of determinants of postoperative wound infection: a possible basis for intervention'. *Rev Infect Dis.* 1981;3:678-682.

<https://doi.org/10.1093/clinids/3.4.678>

PMid:7339781

18. Claesson B E B, Holmlund DE. 'Predictors of intraoperative bacterial contamination and postoperative infection in elective colorectal surgery'. *J Hosp Infect.* 1988;11(2) : 127-35.

[https://doi.org/10.1016/0195-6701\(88\)90054-0](https://doi.org/10.1016/0195-6701(88)90054-0)

PMid:2896680

19. Moro ML, Carrieri MP, Tozzi AE, Lana S, Greco D. 'Risk factors for surgical wound infections in clean surgery: a

multicenter study', Italian PRINOS Study Group. *Ann Ital Chir.* 1996;67(1):13-9.

20. Velasco E, Thuler LC, Martins CA, Dias LM, Conalves VM. 'Risk factors for infectious complications after abdominal surgery for malignant disease'. *Am J Infect Control.* 1996;24, (1) :1-6.

[https://doi.org/10.1016/S0196-6553\(96\)90046-2](https://doi.org/10.1016/S0196-6553(96)90046-2)

PMid:8651514

21. Garibaldi RA, Cushing D, Lerer T. 'Risk factors for postoperative infection'. *Am J Med.* , 1991; 91: 158-163.

[https://doi.org/10.1016/0002-9343\(91\)90362-2](https://doi.org/10.1016/0002-9343(91)90362-2)

PMid:1928157

22. Nguyen D. 'Incidence and predictor of surgical site infection in Vietnam'. *Infect Control Hospital Epidemiol.* 2001;22(8):485-92.

<https://doi.org/10.1086/501938>

PMid:11700875

23. Barber GR, Miransky J, Brown AE, Coit DG, Lewis FM, Thaler HT, et al. 'Direct observation of surgical wound infections at a comprehensive cancer centre'. *Arch Surg.* 1995; 130(10) : 1042-1047.

<https://doi.org/10.1001/archsurg.1995.01430100020005>

PMid:7575114

24. Morris D, Kent S. 'Prospective Identification Of Risk Factors For Wound Infection After Lower Extremity Oncologic Surgery'. *Ann Sur Onco.* 2003; 10: 778-782.

<https://doi.org/10.1245/ASO.2003.07.023>

PMid:12900369

25. Cheadle W G. 'Risk Factors for Surgical Site Infection'. *Surgical Infections.* 2006;7(1):7-11.

<https://doi.org/10.1089/sur.2006.7.s1-7>

PMid:16834549

## Pattern and Frequency of Microalbuminuria with Different Types of Stroke

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### Abstract

**Introduction with aim and objectives:** Cerebrovascular diseases have recently emerged as a major health problem affecting the elderly population. The spectrum includes some of the most common and devastating disorders like ischemic stroke, hemorrhagic stroke and anomalies in vascular system. Microalbuminuria is an early finding in urine in the patients of diabetes and hypertension and it is associated with macrovascular complications like cerebrovascular accident and myocardial infarction. The aim of this study was to find out the pattern and frequency of microalbuminuria with different types of stroke. **Materials and Methods:** Fifty cases of stroke Patients admitted in CMCH medicine and neurology department from 1 January 2019 to 31 June 2019 were analyzed and urine for microalbumin was done. Univariate statistical analyses were performed to see the outcome in relation with blood volume by SPSS-19. **Results:** Regarding analysis of gender distribution of 50 study patients, 27(60%) were found male and 23(40%) were found female. Male to female ratio was 1:0.4. Among the 50 patients, different types of occupation were found. House wife was common occupation. Among the total patients, most of them were from lower middle class 24(61.4%). Others were from low 16(32.0%) and upper middle class 10(5.75%) group. Most of the patients were from rural residence 41(80%). In our study, 13(71.42%) patients had hypertension. Diabetes mellitus was found among 13(8.57%). Different examination findings were analyzed where mean GCS of ischaemic stroke was 14.5 and mean GCS of hemorrhagic stroke was 10.6, 12 patients had abnormal fundoscopic findings. Regarding analysis of serum LDL and serum Creatinine, mean LDL level was 123.95 and mean serum Creatinine level was 1.19. After analysis, mean of urine for Microalbumin of 30 Ischaemic stroke patients was 71.96mg/L and mean of urine for Microalbumin of 20 Hemorrhagic stroke patients was 80.70mg/L. **Conclusions:** We found high frequency of microalbuminuria in patients with stroke Therefore; microalbuminuria could be a useful modifiable factor, in addition to conventional risk factors, in identifying those at increased risk of stroke.

**Keywords:** Risk factors, Stroke, Microalbuminuria.

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### Introduction:

Stroke is a global health problem. It is the leading cause of adult disability and the second leading cause of mortality worldwide<sup>1</sup>. It is a leading cause of functional impairment, with 20% of survivors requiring institutional care after three months and 15%-30% being permanently disabled<sup>1</sup>. Compared with the volume of prospective studies in coronary heart disease, there have been relatively fewer population studies investigating the risk of stroke. Current treatments for patients with established stroke are relatively less effective and risk factor interventions are the real hope of reducing stroke morbidity and mortality in populations<sup>2,3</sup>. Stroke or cerebrovascular disease (CVD) is the clinical designation for a rapidly developing loss of brain function due to a disturbance in the blood vessels supplying blood to the brain. This phenomenon can be due to ischemia (lack of blood supply) caused by thrombosis or embolism or due to a hemorrhage<sup>4</sup>. Microalbuminuria is the excretion of greater than 30 mg and less than 300 mg a day of albumin in the urine. The normal urinary albumin is less than 30 mg per 24 hours. Stroke is a medical emergency and can cause permanent neurological damage, complications and death if not promptly diagnosed and treated. It is the third leading cause of death and the leading cause of serious disability<sup>5</sup>, with major societal consequences. Risk factors for stroke include advanced age, hypertension (high blood pressure), previous stroke or

transient ischaemic attack (TIA), diabetes mellitus, high cholesterol, cigarette smoking, atrial fibrillation, migraine with aura, and thrombophilia (a tendency to thrombosis). Although microalbuminuria is associated with clinical risk factors for stroke, including diabetes, hypertension, aging, history of myocardial infarction, and left ventricular hypertrophy, there is surprisingly little information regarding it as an independent risk factor for stroke or as a predictor of stroke outcome. A large prospective study<sup>6</sup> has reported that microalbuminuria is a risk factor for stroke in men, and a limited case-control study<sup>7</sup> found that the highest quintile of microalbuminuria values was associated with a 13- fold increased risk for stroke. Although microalbuminuria is more prevalent in diabetes and/or hypertension, 2 classic risk factors associated with intracranial arteriosclerosis, reduced microvascular perfusion, and lacunar infarcts, there is scant data regarding the incidence of microalbuminuria in lacunar stroke. More recently, a highly significant association between microalbuminuria and carotid artery intima-media thickness has been reported, a finding which suggests that microalbuminuria may be a marker for early development of carotid artery atherosclerosis and points to a possible linkage between microalbuminuria and atherothrombotic stroke mechanism<sup>8</sup>. With the introduction of more sensitive and relatively inexpensive dipstick methods, patients can now be readily screened for microalbuminuria. This present study is designed, therefore, to determine (1) the incidence of microalbuminuria in different types of stroke, (2) its relationship to risk factors for stroke, (3) its prevalence in major subtypes of stroke, and (4) its potential use as a marker for stroke recurrence.

#### Materials and Methods:

Fifty cases of stroke Patients admitted in CMCH medicine and neurology department from 1 January 2019 to 31 June 2019 were analyzed and urine for microalbumin was done. Patients with a history of stroke and/or transient ischemic attack were eligible for the risk group provided they had experienced no cerebrovascular symptoms for at least 6 months prior to enrollment. Patients with urinary tract infection, chronic renal failure, malignancy, and vasculitis were excluded. A detailed description of additional exclusions, diagnostic criteria for risk factor assessment, and definition of vascular end points has been published. 5 Vascular end points included recurrent stroke, myocardial infarction, and vascular death; transient ischemic attacks were noted but not counted as end points. Participants in all groups were examined at enrollment, 6 to 8 weeks, 6 months, 1 year, and once a year thereafter until termination of the study or the occurrence of a vascular event. To minimize potentially confounding factors present at onset of stroke, urinary albumin levels in the recent stroke group were studied at the first outpatient clinic visit 6 to 8 weeks after the indexing infarction. Collection kits and instructions for obtaining first morning void urine samples on 2

consecutive days were mailed to patients prior to clinic. Urine samples were kept at 4°C for a maximum of 5 days. Duplicate determinations were performed on samples from each day and the results averaged. Normoalbuminuria was defined as a urinary albumin concentration 20 mg/L or lower, microalbuminuria as higher than 20 mg/L but lower than 200 mg/L, and macroalbuminuria as higher than 200 mg/L. Univariate statistical analyses were performed to see the outcome in relation with blood volume by SPSS-19. Except when stated otherwise, summary statistics are expressed as the mean±SD.

#### Result:

Regarding analysis of gender distribution of 50 study patients, 27(60%) were found male and 23(40%) were found female. Male to female ratio was 1:0.4. Among the 50 patients, different types of occupation were found. House wife was common occupation. Among the total patients, most of them were from lower middle class 24(61.4%). Others were from low 16(32.0%) and upper middle class 10(5.75%) group. Most of the patients were from rural residence 41(80%). In our study, 13(71.42%) patients had hypertension. Diabetes mellitus was found among 13(8.57%). Different examination findings were analyzed where mean GCS of ischaemic stroke was 14.5 and mean GCS of hemorrhagic stroke was 10.6, 12 patients had abnormal fundoscopic findings. Regarding analysis of serum LDL and serum Creatinine, mean LDL level was 123.95 and mean serum Creatinine level was 1.19. After analysis, mean of urine for Microalbumin of 30 Ischaemic stroke patients was 71.96mg/L and mean of urine for Microalbumin of 20 Hemorrhagic stroke patients was 80.70mg/L.

**Table-I: Distribution of the stroke patients diagnosed by CT scan (n = 50)**

| CT Scan Diagnosis   | Frequency | Percentage (%) |
|---------------------|-----------|----------------|
| Ischaemic Stroke    | 30        | 60.0           |
| Haemorrhagic Stroke | 20        | 40.0           |
| Total               | 50        | 100.0          |

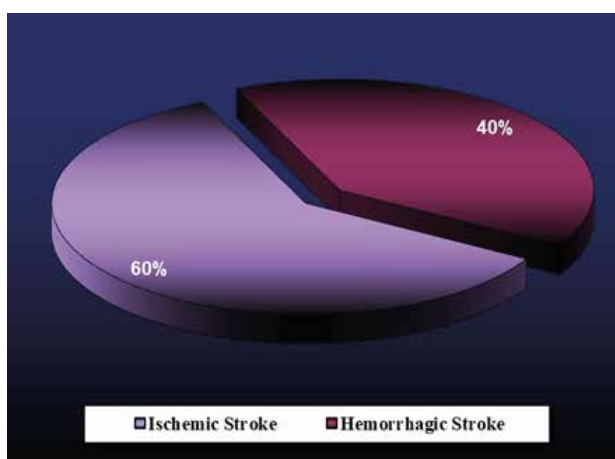


**Fig-1: Distribution of the stroke patients.**

**Table- II: Distribution of socio-demographic variables among the stroke patients (n = 50)**

| Socio-Demographic Variables |                | CT Scan Diagnosis        |      |                             |      | Total |      |
|-----------------------------|----------------|--------------------------|------|-----------------------------|------|-------|------|
|                             |                | Ischemic Stroke (n = 30) |      | Hemorrhagic Stroke (n = 20) |      |       |      |
|                             |                | n                        | %    | n                           | %    | n     | %    |
| Sex                         | Male           | 14                       | 46.7 | 09                          | 45.0 | 23    | 46.0 |
|                             | Female         | 16                       | 53.3 | 11                          | 55.0 | 27    | 54.0 |
| Age Group                   | 30-39 Years    | 01                       | 3.3  | 01                          | 5.0  | 02    | 4.0  |
|                             | 40-49 Years    | 03                       | 10.0 | 03                          | 15.0 | 06    | 12.0 |
|                             | 50-59 Years    | 08                       | 26.7 | 07                          | 35.0 | 15    | 30.0 |
|                             | ≥ 60 Years     | 18                       | 60.0 | 09                          | 45.0 | 27    | 54.0 |
| Residence                   | Urban          | 04                       | 13.3 | 05                          | 25.0 | 09    | 18.0 |
|                             | Rural          | 26                       | 86.7 | 15                          | 75.0 | 41    | 82.0 |
| Occupation                  | Service Holder | 03                       | 10.0 | 01                          | 5.0  | 04    | 8.0  |
|                             | Businessman    | 01                       | 3.3  | 02                          | 10.0 | 03    | 6.0  |
|                             | House Wife     | 07                       | 23.3 | 06                          | 30.0 | 13    | 26.0 |
|                             | Others         | 19                       | 63.4 | 11                          | 55.0 | 30    | 60.0 |
| Socio - Economic Condition  | Lower          | 09                       | 30.0 | 07                          | 35.0 | 16    | 32.0 |
|                             | Lower Middle   | 13                       | 43.3 | 11                          | 55.0 | 24    | 48.0 |
|                             | Upper Middle   | 08                       | 26.7 | 02                          | 10.0 | 10    | 20.0 |

**Table-III: Distribution of risk factors among the stroke patients (with X<sup>2</sup> test significance)**

| Risk Factors         |         | CT Scan Diagnosis              |      |                                   |      |       |      | X <sup>2</sup> Test<br>Significance |
|----------------------|---------|--------------------------------|------|-----------------------------------|------|-------|------|-------------------------------------|
|                      |         | Ischemic<br>Stroke<br>(n = 30) |      | Hemorrhagic<br>Stroke<br>(n = 20) |      | Total |      |                                     |
|                      |         | n                              | %    | n                                 | %    | n     | %    |                                     |
| Hypertension         | Present | 19                             | 63.3 | 14                                | 70.0 | 33    | 66.0 | X <sup>2</sup> = 0.238              |
|                      | Absent  | 11                             | 36.7 | 06                                | 30.0 | 17    | 34.0 | P=0.626 <sup>NS</sup>               |
| Diabetes<br>Mellitus | Present | 08                             | 26.7 | 05                                | 25.0 | 13    | 26.0 | X <sup>2</sup> = 0.017              |
|                      | Absent  | 22                             | 73.3 | 15                                | 75.0 | 37    | 74.0 | P=0.895 <sup>NS</sup>               |
| Cigarette<br>Smoking | Present | 05                             | 16.7 | 09                                | 45.0 | 14    | 28.0 | X <sup>2</sup> = 4.778              |
|                      | Absent  | 25                             | 83.3 | 11                                | 55.0 | 36    | 72.0 | P=0.029 <sup>S</sup>                |

\* NS = Not Significant (P > 0.05); S = Significant (P < 0.05)

**Table-IV: Distribution of the fundoscopic findings among the stroke patients (with X<sup>2</sup> test significance)**

| Fundoscopic Findings     | CT Scan Diagnosis |       |             |       | Total |       |
|--------------------------|-------------------|-------|-------------|-------|-------|-------|
|                          | Ischemic          |       | Hemorrhagic |       |       |       |
|                          | n                 | %     | n           | %     | n     | %     |
| Normal                   | 26                | 86.6  | 12          | 60.0  | 38    | 76.0  |
| Hypertensive Retinopathy | 02                | 6.7   | 08          | 40.0  | 10    | 20.0  |
| Diabetic Retinopathy     | 02                | 6.7   | 00          | 0.0   | 02    | 4.0   |
| <b>Total</b>             | 30                | 100.0 | 20          | 100.0 | 50    | 100.0 |

\* X<sup>2</sup> value = 9.123. P = 0.010. Significant (P < 0.05)

**Table-V: Level of consciousness (measured by Glasgow coma scale) among the stroke patients according to CT scan diagnosis (with t-test significance)**

| Glasgow Coma Scale (GCS) |                    | CT Scan Diagnosis |           |        |       | SIGN.*                     |
|--------------------------|--------------------|-------------------|-----------|--------|-------|----------------------------|
|                          |                    | N                 | MEAN ± SD | MEDIAN | RANGE |                            |
|                          |                    |                   |           |        |       |                            |
| Ischemic Stroke          |                    | 30                | 14.50     | 1.04   | 15.00 | t= 4.445<br>P= 0.000<br>HS |
|                          | Hemorrhagic Stroke | 20                | 10.60     | 3.83   | 9.50  |                            |
| TOTAL                    |                    | 50                | 12.94     | 3.17   | 15.00 | 4-15                       |

\* Independent sample t – test. HS = Highly Significant (P < 0.001)

**Table-VI: Biochemical profiles among the stroke patients according to CT scan diagnosis (with t-test significance)**

| Biochemical Profiles          | CT Scan Diagnosis  | N  | MEAN ± SD | MEDIAN | RANGE  | SIGN.*       |
|-------------------------------|--------------------|----|-----------|--------|--------|--------------|
| Random Blood Sugar (mmol/L)   | Ischemic Stroke    | 30 | 8.45      | 4.53   | 7.25   | 4.55 – 28.00 |
|                               | Hemorrhagic Stroke | 20 | 10.61     | 7.46   | 8.19   | 4.50 – 30.68 |
|                               | TOTAL              | 50 | 9.31      | 5.90   | 7.76   | 4.50 – 30.68 |
| Serum LDL Cholesterol (mg/dl) | Ischemic Stroke    | 30 | 125.13    | 27.50  | 120.00 | 86 – 220     |
|                               | Hemorrhagic Stroke | 20 | 122.19    | 39.34  | 120.00 | 57 – 219     |
|                               | TOTAL              | 50 | 123.95    | 32.40  | 120.00 | 57 – 220     |
| Serum Creatinine (mg/dl)      | Ischemic Stroke    | 30 | 1.06      | 0.24   | 1.00   | 0.70 – 1.70  |
|                               | Hemorrhagic Stroke | 20 | 1.38      | 0.81   | 1.04   | 0.72 – 3.70  |
|                               | TOTAL              | 50 | 1.19      | 0.56   | 1.00   | 0.70 – 3.70  |

\* Independent samples t-test. NS = Not Significant (P > 0.05)

**Table-VII: Microalbuminuria among the stroke patients according to CT scan diagnosis (with t-test significance)**

| Urine for Microalbumin (mg/L) |                    | CT Scan Diagnosis |           |        |       | SIGN.*         |
|-------------------------------|--------------------|-------------------|-----------|--------|-------|----------------|
|                               |                    | N                 | MEAN ± SD | MEDIAN | RANGE |                |
|                               |                    |                   |           |        |       |                |
| Ischemic Stroke               |                    | 30                | 71.96     | 75.95  | 32.87 | 14.90 – 260.00 |
|                               | Hemorrhagic Stroke | 20                | 80.70     | 85.12  | 45.00 | 15.30 – 280.00 |
| TOTAL                         |                    | 50                | 75.45     | 79.00  | 37.22 | 14.90 – 280.00 |

\*Independent samples t-test. NS = Not Significant (P > 0.05)

**Table-VIII: Pearson's correlation between urinary microalbumin & GCS, RBS, LDL Cholesterol and Serum Creatinine variables (n = 50)**

| Correlation between                          | Correlation Coefficient (r) | Significance               |
|----------------------------------------------|-----------------------------|----------------------------|
| Urinary Microalbumin & Glasgow Coma Scale    | -0.124                      | P=0.391<br>Not Significant |
| Urinary Microalbumin & Random Blood Sugar    | +0.196                      | P=0.172<br>Not Significant |
| Urinary Microalbumin & Serum LDL Cholesterol | +0.002                      | P=0.992<br>Not Significant |
| Urinary Microalbumin & Serum Creatinine      | +0.268                      | P=0.060<br>Not Significant |

## Discussion:

Strokes have recently emerged as a major health problem affecting the population. Its incidence has increased many folds with the emergence of several risk factors like coronary artery diseases, diabetes mellitus, hypertension, dyslipidemia. Hypertension and amyloid angiopathy are the primary causes while coagulopathy, trauma, intracranial neoplasm; drugs are the secondary causes for intracranial haemorrhage<sup>4</sup>. A large prospective study has reported

that microalbuminuria is a risk factor for stroke in men, and a limited case-control study<sup>7</sup> found that the highest quintile of microalbuminuria values was associated with a 13- fold increased risk for stroke. Although microalbuminuria is more prevalent in diabetes and/or hypertension, 2 classic risk factors associated with intracranial arteriosclerosis, reduced microvascular perfusion, and lacunar infarcts, there is scant data regarding the incidence of microalbuminuria in lacunar stroke. The present study was done in the Medicine and Neurology department of Chittagong medical College Hospital. Among 50 patients of intracerebral hemorrhage we evaluate urinary microalbumin. In the present study, male was more than female as expected, as male got more preference to female in the present socioeconomic and social status of Bangladesh. In a similar study, it was observed that among 46 patient, male patient was 32(69.6%) and female was 14(34.6%)<sup>9</sup>. Different types of occupation were found in the study patients but maximum were doing nonspecific works. Patients from middle class and poor families were more in the present study. This may be due to reason that they cannot afford the costly treatment in private hospital. Sedentary workers and patients from urban community are more common in the present study. Among the study patients, hypertension was found among 50 (71.42%) patients. Present study is comparable to the study done at other part of Bangladesh<sup>10</sup>, where out of 500 stroke cases, 72% patients were known hypertensive. This study was conducted to analyze the relationship between Microalbuminuria and stroke. Present study shows that among 50 study patients, ischaemic stroke was 30 (12.8%) and rest 20 (87.2%) were Hemorrhagic stroke. Mean of urine for Microalbumin level of Ishaemic stroke was and Mean of urine for Microalbumin level of Hemorrhagic stroke was this finding was comparable<sup>11,12</sup>. This is a single-center hospital study and the results may or may not reflect the cross section of the population. For more consistent results large multi-center studies have to planned and executed in order to determine relationship between blood volume and mortality rate. This study limitations include a single early morning spot urine sample was tested for MA for cost effectiveness, while current guidelines require at least two of three specimens fall within the microalbumin range in order to label as MA.

#### Conclusion:

We found high frequency of microalbuminuria in patients with stroke Therefore; microalbuminuria could be is a useful modifiable factor, in addition to conventional risk factors, in identifying those at increased risk of stroke.

**Conflict of Interest:** None.

#### References:

1. American Heart Association. Heart Disease and Stroke Statistics-2004. Update. Dallas, Texas; 2003.
2. Adams H, Adams R, Del Zoppo G and Goldstein LB. Stroke Council of the American Heart Association; American Stroke Association. Guidelines for the early management of patients with ischemic stroke: 2005 guidelines update: a scientific statement from the Stroke Council of the American Heart Association/American Stroke Association. *Stroke*. 2005; 36:916-923.  
<https://doi.org/10.1161/01.STR.0000163257.66207.2d>

PMid:15800252

3. Gorelick PB . Stroke prevention. *Arch. Neuro.*, 1995; 52:347-355.

<https://doi.org/10.1001/archneur.1995.00540280029015>

PMid:7710369

4. Cotran RS, Kumar V, Fausto N, Nelso F, Robbins SL, Abbas AK. Robbins and Cotran pathologic basis of disease. 7th ed. St. Louis, Mo: Elsevier Saunders; 2005.

5. Sacco RL, Benjamin EJ, Broderick JP, Dyken M, Easton JD, Feinberg WM, et al. American Heart Association Prevention Conference. IV. Prevention and Rehabilitation of Stroke. Risk factors. *Stroke*.1997; 28: 1507-17.

<https://doi.org/10.1161/01.STR.28.7.1507>

PMid:9227708

6. Woo J, Lau E, Kay R. A case control study of some hematological and biochemical variables in acute stroke and their prognostic value. *Neuroepidemiol-ogy*. 1990; 9:315-320.

<https://doi.org/10.1159/000110794>

PMid:2096314

7. Mykkanen L, Zaccaro DJ, O'Leary DH, Howard G, Robbins DC, Haffner SM. Microalbuminuria and carotid artery intima-media thickness in nondiabetic and NIDDM subjects: The Insulin Resistance Atherosclerosis Study (IRAS). *Stroke*. 1997; 28:1710-1716.

<https://doi.org/10.1161/01.STR.28.9.1710>

PMid:9303013

8. Tiu SC, Lee SS, Cheng MW. Comparison of six commercial techniques in the measurement of microalbuminuria in diabetic patients. *Diabetes Care*. 1993; 16: 616- 620.

<https://doi.org/10.2337/diacare.16.4.616>

PMid:8462389

9. Ni L, Lu J, Hou LB. Cystatin C, associated with hemorrhagic and ischemic stroke, is a strong predictor of the risk of cardiovascular events and death in Chinese. *Stroke*. 2007;38:3287-3288.

<https://doi.org/10.1161/STROKEAHA.107.489625>

PMid:17947596

10. Shlipak MG, Katz R, Sarnak MJ. Cystatin C and prognosis for cardiovascular and kidney outcomes in elderly persons without chronic kidney disease. *Ann Intern Med*. 2006;145:237-246.

<https://doi.org/10.7326/0003-4819-145-4-200608150-00003>

PMid:16908914

11. Shlipak MG, Sarnak MJ, Katz R. Cystatin C and the risk of death and cardiovascular events among elderly persons. *N Engl J Med*. 2005;352:2049-2060.

<https://doi.org/10.1056/NEJMoa043161>

PMid:15901858

12. Fried LP, Borhani NO, Enright P. The Cardiovascular Health Study: design and rationale. *Ann Epidemiol*. 1991;1:263-276.

[https://doi.org/10.1016/1047-2797\(91\)90005-W](https://doi.org/10.1016/1047-2797(91)90005-W)

PMid:1669507

## Yolk Sac Tumor of Testis Diagnosed 10 years after Orchidopexy in 24-year-old Adult: A Case Report

Ramesh Lamichhane\* <sup>1</sup>, Saroj Chaudhary <sup>2</sup>

### Abstract

**Introduction:** Yolk sac are a rare type of germ cell tumors that occurs most commonly in prepubertal age but are rare in adults. **Case report:** We present a case of a yolk sac tumor in a 25-year-old man with a history of bilateral cryptorchidism diagnosed at the age of 10 for which bilateral orchidopexy was done at the age of 19. **Discussion:** Delayed diagnosis of cryptorchidism are common in developing countries. Most adults with cryptorchidism prefer orchidopexy instead of orchiectomy. Due to a lack of adherence to follow-up, late presentation with complications is common. **Conclusion:** Yolk sac tumor can rarely occur in cryptorchid testis after post-pubertal orchidopexy. As lack of adherence to follow-up is common in developing countries, orchidopexy should be avoided.

**Keywords:** Yolk sac tumor, Germ cell tumor, Malignancy, cryptorchidism, orchidopexy.

**Number of Tables:** 01; **Number of Figures:** 03; **Number of References:** 11; **Number of Correspondences:** 04.

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### Introduction:

Testicular tumor mainly occurs in male between 20 to 40 of age. Previous orchidopexy and history of cryptorchidism (undescended testis) increase the risk of testicular cancer in both testes. Yolk sac tumors are common malignant tumors in pre-pubertal age but are rare in adults. Late diagnosis of cryptorchidism and delayed orchidopexy is common in developing countries<sup>1</sup>. We present a case of yolk sac tumor of testis 10 years after post-pubertal orchidopexy.

### CASE REPORT

A 25-year-old unmarried man presented with complaints of a gradually progressive, painless lump in the groin for 6 months (Figure 1). In addition, the patient also complained lack of sexual desire and impotence. The patients past medical history revealed bilateral cryptorchidism diagnosed at the age 10 which was treated with bilateral orchidopexy at the age of 19. The delay in surgery was attributed to poor socioeconomic conditions, long-distance travel to the medical facility, and poor

understanding of the disease. On examination, the patient had a single, ovoid, firm, non-tender inguinal mass of approximately 9 x 8 cm. Furthermore, the left scrotal sac was empty. However, the right testis was normal in position. Lymph node and per rectal examination was unremarkable. Routine blood and urine investigations including complete blood count, serum creatinine, and urine routine microscopic examination were within normal limits. However, tumor markers i.e. alpha-fetoprotein, and serum beta-HCG were markedly elevated. Lactate dehydrogenase was within the norm l range (Table I). A contrast-enhanced CT scan showed a well-defined mass in the subcutaneous layer of the left inguinal region measuring about 8x6.1x5.3 cm. After infusion of contrast, heterogeneous enhancement of the lesion was seen (Figure 2). A provisional diagnosis of the testicular tumor was made. Surgery involving excision of the left inguinal mass was done (Figure 3). Histopathology of the specimen was sent which confirmed the diagnosis of a yolk sac tumor. His postoperative period was uneventful. His serum tumor markers were repeated after one-week post-operatively which showed a marked decline in beta HCG and persistent elevation of alpha-fetoprotein. (Table I) He was referred to an oncologist and endocrinologist for further management regarding chemotherapy and gonadal hormone supplementation. He was not able to follow up with us as he went to Dhaka for further care.

**Table-I: Serum marker before and after surgery.**

| Serum marker          | Time          |                         | Reference range |
|-----------------------|---------------|-------------------------|-----------------|
|                       | Pre-operative | 1 week Post-operatively |                 |
| Alpha-fetoprotein     | >500          | >500                    | Up to 50 ng/ml  |
| Beta-HCG              | 4696          | 41                      | <5 mIU/ml       |
| Lactate dehydrogenase | 383           | 300                     | 225-450 U/L     |
| Testosterone          | 40.9          | 39                      | 132-813 ng/ml   |



Figure-1: Left inguinal mass.

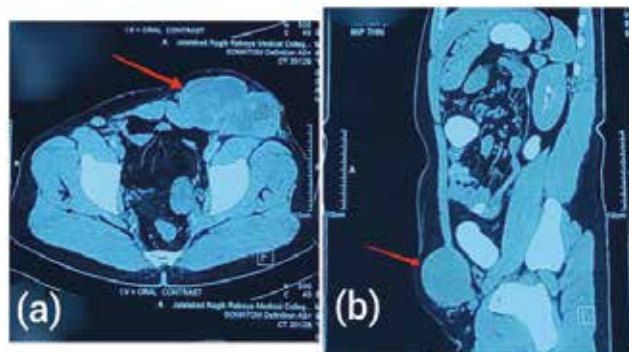


Figure-2: CT scan showing mass with heterogeneous enhancement A) Transverse view B) Coronal view.

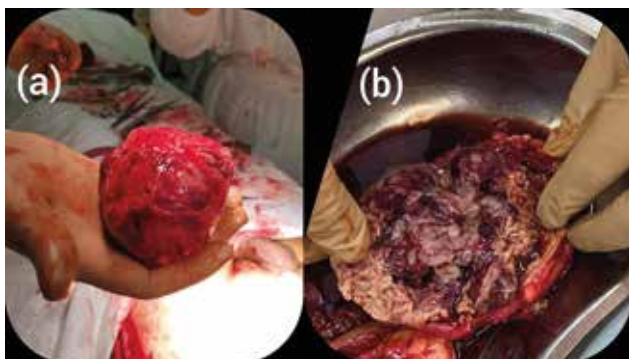


Figure-3: Excised specimen A) Gross appearance B) Cut section.

### Discussion:

Undescended testis occurs in 2-4% of term infants and up to 30% of preterm infants<sup>2,3</sup>. Less than 1% require treatment as in the majority of cases testis descend spontaneously by the first 4 months of life<sup>4</sup>. Majority of cases are diagnosed at birth on physical examination. However, in developing countries, late diagnoses until adulthood are also common<sup>5</sup>. A retrospective study conducted in China showed that only 16.9% of patients with undescended testis received treatment timely<sup>6</sup>. The delay in treatment was associated with low socioeconomic status and the absence of other associated anomalies<sup>6</sup>. Our patients parents were aware of the child's empty scrotum since the age of 10 years. Despite knowing the problem they did not seek medical care until the age of 19 years. In our case, the delay in treatment was attributed to long travel to a medical facility and lower socioeconomic status. In addition, parents were not aware of the disease and its potential complication. Moreover, our patient did not have any associated anomalies which may have contributed to late diagnosis. Studies have shown that normally descended testis can also ascend resulting in a late childhood diagnosis and treatment<sup>7</sup>. In our case the parents were only aware when our patient reached the age of 10 years. Thus, the ascent of the testis might have happened in our case but no prior genital examination was carried out previously. Persistent cases of undescended testis in infants should undergo orchidopexy. Surgery is recommended after 6 months of age and should not be delayed more than 1 year of age<sup>8</sup>. In the case of testicular ascent in childhood, surgery is performed within 6 months of diagnosis. When a later childhood diagnosis is made, orchiectomy is the preferred choice. However, most adult patients want to save testis and favor orchidopexy instead of orchiectomy<sup>9</sup>. Our patient also underwent bilateral orchidopexy at the age of 19. A surgical note at that time mentioned that his left gonadal vessel was too short to bring the testis down to the scrotum. The testis was placed between the external muscular and sub-fatty layer of the abdomen after excising external oblique aponeurosis. The ectopic fixation of the testis outside the scrotal sac further increased the risk of testicular cancer in our case. The undescended testis has an increased risk of subfertility, torsion, and malignancy. The risk of malignancy decreases when orchidopexy is done before puberty<sup>10</sup>. Seminoma, a testicular germ cell tumor occurs most commonly in cryptorchidism<sup>11</sup>. Yolk sac tumors are rare in post-pubertal patients with cryptorchidism. Hemant et.al reported a yolk sac tumor in post-pubertal patients but the testis was intra-abdominal in their case<sup>11</sup>. Our patient histopathological specimen also revealed a yolk sac tumor which is a rare association.

### Conclusion:

Yolk sac tumor can rarely occur in cryptorchid testis after post-pubertal orchidopexy. As lack of adherence to follow-up is common in developing countries, orchidopexy should be avoided.

**Conflict of Interest:** None.

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**References:**

1. Krag Jacobsen G, Barlebo H, Olsen J, Schultz HP, Starklint H, Sogaard H, et al. Testicular germ cell tumours in Denmark 1976-1980. Pathology of 1058 consecutive cases. *Acta Radiol Oncol.* 1984;23(4):239-47.  
DOI:10.3109/02841868409136019  
PMID: 6093440
2. Bergbrant S, Omling E, Björk J, Hagander L. Cryptorchidism in Sweden: A Nationwide Study of Prevalence, Operative Management, and Complications. *J Pediatr.* 2018 Mar;194:197-203.e6.  
DOI: 10.1016/j.jpeds.2017.09.062
3. Barthold JS, González R. The epidemiology of congenital cryptorchidism, testicular ascent and orchiopexy. *J Urol.* 2003 Dec;170(6 Pt 1):2396-401.  
DOI: 10.1097/01.ju.0000095793.04232.d8  
PMID: 14634436
4. Rabinowitz R, Cubillos J. Cryptorchidism (Undescended Testes). <http://www.merckmanuals.com/professional/pediatrics/congenital-renal-and-genitourinary-anomalies/cryptorchidism>. Updated: November 1, 2016. Accessed: February 15, 2017
5. Sinha CK, Vinay S, Kulkarni R, Nour S. Delayed diagnosis for undescended testes. *Indian Pediatr.* 2008 Jun;45(6):503-4.  
PMID: 18599940
6. Zhao TX, Liu B, Wei YX, Wei Y, Tang XL, Shen LJ, et al. Clinical and socioeconomic factors associated with delayed orchidopexy in cryptorchid boys in China: a retrospective study of 2423 cases. *Asian J Androl.* 2019 Jun;21(3):304-8.  
DOI: 10.4103/aja.aja\_106\_18  
PMID: 30632485
7. Hack WWM, Meijer RW, Van Der Voort-Doedens LM, Bos SD, De Kok ME. Previous testicular position in boys referred for an undescended testis: further explanation of the late orchidopexy enigma?: TESTICULAR POSITION and UNDESCENDED TESTIS. *BJU International.* 2003 Jul 23;92(3):293-6.  
DOI: 10.1046/j.1464-410X.2003.04317.x
8. Chan E, Wayne C, Nasr A, FRCSC for Canadian Association of Pediatric Surgeon Evidence- Based Resource. Ideal timing of orchiopexy: a systematic review. *Pediatr Surg Int.* 2014 Jan;30(1):87-97.  
DOI: 10.1007/s00383-013-3429-y  
PMID: 24232174
9. Jeong SC, Lee S, Ku JY, Lee SD. Clinical characteristics and treatment of cryptorchidism in adults: a single center experience. *World J Mens Health.* 2014 Aug;32(2):110-5.  
DOI: 10.5534/wjmh.2014.32.2.110  
PMID: 25237662
10. Wood HM, Elder JS. Cryptorchidism and testicular cancer: separating fact from fiction. *J Urol.* 2009 Feb;181(2):452-61.  
DOI: 10.1016/j.juro.2008.10.074  
PMID: 19084853
11. Janugade H, Monteiro J, Gouda S. Pure yolk sac tumour, post-pubertal type, arising from cryptorchid testes. *BMJ Case Rep.* 2019 Jul 22;12(7):e229541.  
DOI: 10.1136/bcr-2019-229541  
PMID: 31337626

## Intraligamentary Pregnancy- A Rare Obstetric Event

Asma Binte Khair <sup>\*1</sup>, Mahmuda Rahman <sup>2</sup>, Rumana Afroz<sup>3</sup>

### Abstract

**Introduction:** Intraligamentary pregnancy is a rare form of ectopic pregnancy, where the gestation grows within the leaves of the broad ligament. Clinical presentation, diagnosis and outcome are highly variable. **Case report:** Here, we report a case of a 30 years old lady (P2G7), presented at her 13+ weeks of pregnancy with acute abdomen and severe anaemia. USG revealed extrauterine alive pregnancy with huge peritoneal collection. Emergency laparotomy was performed and final diagnosis was made as ruptured intraligamentary pregnancy. Right sided salpingoophorectomy was done. Our main challenge was to control bleeding and to maintain haemostasis at the placental implantation site. **Conclusion:** Although, definite preoperative diagnosis based on clinical sign symptoms and sonographic evaluation is elusive, proper resuscitation and surgical expertise can save a mother's life. Role of MRI and Laparoscopy in selected cases should be in consideration.

**Keywords:** Intraligamentary pregnancy, Acute abdomen, Exploratory laparotomy, Salpingoophorectomy, Haemostasis.

**Number of Figures:** 03; **Number of References:** 12; **Number of Correspondences:** 03

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### Introduction:

Intraligamentary pregnancy, commonly known as Broad ligament pregnancy, has a reported incidence of 1 in 183,900 live births and occurs in 1 in 245 ectopic pregnancies<sup>1</sup>. It is a rare but potentially fatal condition. The clinical presentation of intraligamentary pregnancy is highly variable and can range from asymptomatic early ectopic pregnancy to ruptured ectopic pregnancy in advanced gestation<sup>2</sup>. There is also case report of term delivery of Broad ligament pregnancy<sup>3</sup>. This condition is best diagnosed via ultrasonography and MRI and in most cases diagnosis is confirmed during laparotomy. But high index of clinical suspicion is necessary for preoperative diagnosis. The etiology of intraligamentary pregnancy is unknown and does not have any pattern of genetic

inheritance<sup>4</sup>. The prerequisite for developing intraligamentary pregnancy are: The expanding gestational sac must split the oviduct precisely between the leaves of broad ligament, the amniotic cavity at least should be intact to permit the fetus to continue to grow in the extraperitoneal sac, and this rupture must occur early enough so that the villi are capable of expanding at their areas of nidation. The placenta may erode beyond the tubal confines to invade in adjacent structures<sup>4</sup>. Here, we report a case of intraligamentary pregnancy at 13 th week gestation with typical features of ruptured ectopic pregnancy, extrauterine gestation was diagnosed by ultrasound scan and final diagnosis was confirmed during laparotomy.

### Case Report:

This is a case of 30 years old (P2G7) lady, attended in gynae emergency ward at her 13 + weeks of pregnancy with acute abdomen and severe anaemia. She had early features of circulatory shock and clinically diagnosed as a case of ruptured ectopic pregnancy. An obstetric ultrasound was done in emergency department which revealed an alive ectopic pregnancy near the right cornu of the uterus with huge haemoperitoneum. Uterus was bulky with empty cavity (Figure 1). Emergency laparotomy was arranged along with prompt resuscitation measures. Within three hours of admission, exploratory laparotomy was performed under general anaesthesia. After opening of the abdomen, 300ml of blood and blood clots were removed. On further exploration, Uterus was found 10 weeks size and soft. An intact gestation sac was found measuring about (12x10) cm in the right adnexal region covered with omentum. During dissection, the sac was ruptured and an alive fetus with CRL of 60 cm was extracted (Figure 2). The thin umbilical cord was traced and the placenta was found implanted in the posterior layer of the broad ligament. Placenta was extracted meticulously from its attachment (Figure 3). Consequently, active bleeding started from the placental sinuses. Immediately clamps

were applied and right sided salpingo-oophorectomy was performed. Right ovary was adherent with the placental site, hence could not be saved. We faced difficulty in maintaining haemostasis at the placental attachment site. Several mattress sutures were needed to stop oozing from the posterior layer of the broad ligament. Finally thorough peritoneal lavage was done and an intraperitoneal drain was placed. Two units of whole blood were transfused during the procedure. Reversal from general anaesthesia and postoperative recovery were uneventful. She was discharged from hospital on her fifth postoperative day with appropriate follow up advice.



**Figure 1 :** USG shows extrauterine pregnancy of 13 weeks gestation, near uterine cornu.



**Figure 2:** Extracted fetus with placenta

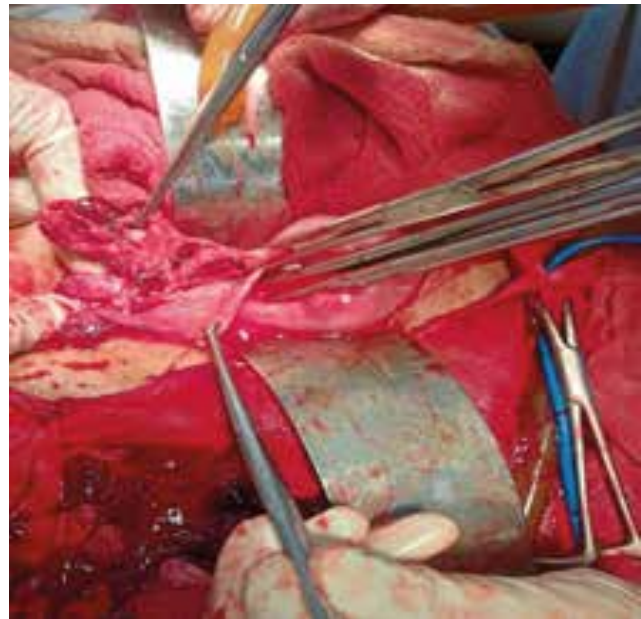


**Figure 3:** Per operative finding after removal of the ectopic gestation sac showing intact fallopian tube and ovary with opened leaves of broad ligament.

#### Discussion:

Abdominal pregnancies account for 1% of all ectopic pregnancies, where maternal mortality has been reported to be as high as 20%<sup>5,6</sup>. Intraligamentary pregnancy is a rare form of abdominal pregnancy. Various risk factors include-Pelvic inflammatory disease, use of IUCD, use of progesterone only pill, a previous history of ectopic pregnancy, abdominal tuberculosis, endometriosis and pelvic adhesive disorder<sup>7</sup>. In our case, we found moderate pelvic adhesion, may be due to previous two C-sections. The clinical presentation of intraligamentary pregnancy varies from mild abdominal discomfort, small amount of vaginal bleeding, placental insufficiency due to abnormal implantation which leads to fetal demise to catastrophic internal haemorrhage manifesting with acute abdomen and shock as in our case. Clinical suspicion as well as radiological tools such as ultrasound scan (especially TVS) and MRI is of much helpful in diagnosis of such cases but final diagnosis is mostly done during laparotomy<sup>3,8,9</sup>. Exploratory laparotomy is the gold standard method in the management of intraligamentary pregnancy<sup>10</sup>. However, in haemodynamically stable patients, removal of small broad ligament pregnancies can be considered laparoscopically<sup>11</sup>. But laparoscopy may have to be converted into laparotomy as done in case report of Siddiqui M et al<sup>12</sup>. Varieties of clinical presentations and outcomes were reviewed in Cheung CS et al study report<sup>2</sup>. There are also reports of advanced pregnancies delivered at 30 weeks<sup>10</sup>. The main challenge is to maintain haemostasis after separation of placenta from peritoneal surface and other structures,<sup>12</sup> which we faced in our case also.

**Conclusion:**

Intraligamentary pregnancy is a rare obstetric event and potentially life threatening condition. But mothers can be saved when early diagnosis and prompt management is undertaken. Ultrasonography is the safest and cheapest tool for diagnosis of extrauterine pregnancy, while MRI provides detailed anatomical information including placental implantation site, thus helps in surgical planning. Laparoscopic approach in stable patients at early gestation also improves the outcome. Furthermore, an experienced surgeon, capable of prompt haemostatic management can reduce maternal morbidity and mortality.

**Conflict of Interest:** None.

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**References:**

1. Chia KV, Fayle RJS, Ferriman E. Intraligamentary pregnancy. *J Obstet Gynaecol.* 1993;13:254.  
<https://doi.org/10.3109/01443619309151853>
2. Cheung CS-y, Cheung VYT. Broad ligament ectopic pregnancy. *CRSLS* e2014.00102.  
<https://doi.org/10.4293/CRSLS.2014.00102>
3. Rudra S, Gupta S, Taneja BK, Gupta R. Full term broad ligament pregnancy through a Caesarean scar. *Obstet Gynecol Sci.* 2013;56(6):404-7.  
<https://doi.org/10.5468/ogs.2013.56.6.404>  
PMid:24396820 PMCID:PMC3859019
4. Sreshtha HK, Gurung G, Koirala S, et al, Intraligamentary pregnancy: A Case Report. *Donald School J Ultrasound Obstet Gynecol* 2021; 15(4):411-413.  
<https://doi.org/10.5005/jp-journals-10009-1830>
5. Ludwig M, Kaisi M, Baeur O, Diedrich K. The forgotten child: a case of heterotopic, intraabdominal and intrauterine pregnancy carried to term. *Hum Reprod.* 1999;14:1372-4.  
<https://doi.org/10.1093/humrep/14.5.1372>  
PMid:10325296
6. Alto W A. Abdominal pregnancy. *Am Fam Physician.* 1990;209-14.
7. Coredo D R, Adra A, Yasin S, O'Sullivan MJ. Intraligamentary pregnancy. *Obstet Gynecol Surv.* 1994;49:206.  
<https://doi.org/10.1097/00006254-199403000-00026>  
PMid:8164915
8. Sharma S, Pathak N, Goraya SPS, Mohan P. Broad ligament ectopic pregnancy. *Srilanka Journal of obstetrics and gynaecology.* 2011;33:60-2.  
<https://doi.org/10.4038/sljog.v33i2.4008>
9. Matovelo D, Ng'walinda N. Hemoperitoneum in advanced abdominal pregnancy with a live baby: a case report. *BMC Research Notes.* 2014;7:106.  
<https://doi.org/10.1186/1756-0500-7-106>  
PMid:24564927 PMCID:PMC3936837
10. Gupta A, Mahajan N, Verma D, Sharma C, Rattan A, Gupta B. Broad ligament pregnancy a diagnostic dilemma: a case report. *Int J Reprod Contracept Obstet Gynecol.* 2016;5:2478-80.  
<https://doi.org/10.18203/2320-1770.ijrcog20162157>
11. Pisarka MD, Casson PR, Moise KJ Jr, Di Maio DJ, Buster JE, Carson SA. Heterotopic abdominal pregnancy treated at laparoscopy. *Fertil Steril.* 1998;70:159-60.  
[https://doi.org/10.1016/S0015-0282\(98\)00104-6](https://doi.org/10.1016/S0015-0282(98)00104-6)  
PMid:9660440
12. Siddiqui M, Ghafoor N, Naznine F, Abdullah RS, Chowdhury TA. *Bangladesh J Obstet Gynaecol.* 2018;33(2):164-66.  
<https://doi.org/10.3329/bjog.v33i2.43574>



















