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ORIGINAL ARTICLE OPEN ACCSESS

Comparison between Sutureless and Glue Free versus Sutured Limbal Conjunctival Autograft in Primary Pterygium Surgery

Md. Mahmud-ul-Huda [1], Sajed Abdul Khaleque *[2]

Abstract

Introduction: *To compare and evaluate the safety and efficacy of two surgical techniques for the management of primary pterygium.* ***Materials & Methods:*** *The study included 176 eyes of 176 patients with primary pterygium. The mean age was 49 ± 12 years (range 24–74 years). Simple excision under local anesthesia was performed followed by closure of the bare sclera by suture less and glue free conjunctival autograft in 76 eyes of 76 patients (group 1), versus the conventional method of a sutured conjunctival autograft in 100 eyes of 100 patients (group 2).* ***Results:*** *The pterygium recurrence rate was 6% for group 1, 8% for group 2. Graft dehiscence occurred in 4 eyes out of 50 (8%) in group 1. Graft retraction occurred in 6 (12%) out of 50 eyes for group 1 versus 6 eyes (6%) in group 2. Pyogenic granuloma occurred in 3 (3%) eyes out of 100 in group 2. No other serious complications were noted. At the 3 week visit the overall patient satisfaction score was statistically significantly higher for group 1 ($P < 0.002$) compared to group 2. At 3 months postoperatively, the gain in uncorrected visual acuity (UCVA) ranged from 0.2 to 0.5 Log MAR in 10 eyes.* ***Conclusion:*** *Sutureless and glue free conjunctival autograft technique is easy, safe, effective, prevents potential adverse reactions encountered with the use of foreign materials. This technique has an acceptable pterygium recurrence rate that is comparable to conventional sutured conjunctival autograft for primary pterygium.*

Keywords: *Pterygium surgery, Sutureless glue free conjunctival autograft, Conjunctival autograft, Amniotic membrane graft.*

Number of Tables: 02; Number of Figures: 06; Number of References: 49; Number of Correspondences: 02

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Introduction

Pterygium is a degenerative ocular surface disorder with wing-shaped fibro-vascular growth of the subconjunctival tissue onto the cornea. Pterygium (derived from pterygion, ancient Greek for wing) is a common ocular disease seen mostly in tropical and subtropical areas between the latitudes 30 north and south of the equator[1,2]. Pterygium is almost always in the palpebral fissure and thought to be caused by increased light exposure, dust, dryness, heat and wind. Although it can be easily excised, it has a high rate of recurrence ranging from 24% to 89% [3]. It is a common ocular surface disease, but also potentially blinding,so different surgical procedures have been used to prevent it.

The pathogenesis of pterygia is still not completely understood. An overall view of the growth process reveals a multiplicity of factors that are correlated and interrelated[4]. Recent evidence implicates anti-apoptotic mechanisms, immunological mechanisms, cytokines, growth factors, extracellular matrix modulators, genetic factors and viral infections, among other possible causative factors [5, 6]. The prevalence rates vary widely (from 2% to 29%),[7] but generally they are higher in the tropics than at temperate latitudes[8,9]. It is accepted that pterygium occurs in an equatorial belt delimited by Latitude 40N and S, associating it with ultra-violet light[9-11]. Prevalence increases geographically towards the equator and is greater in people exposed to outdoor environments[12]. In addition; there are associations with rural regions, increasing age and male gender, which correlate with outdoor work[13].

Early pterygium is usually asymptomatic. Pterygium causes dryness, burning and itching due to irregular wetting of the cornea. Pterygium causes defective vision due to induced astigmatism or direct encroachment onto the visual axis. Lesions larger than 3.5mm onto the cornea are likely to be associated with >1 Diopter astigmatism[14]. In early pterygium patients can be advised to use lubricants and protective eyewear.

Surgical Techniques

Recurrence is the most common complication of pterygium surgery. Several techniques have been advised to reduce the rate of recurrence. These include bare sclera excision, conjunctival and conjunctival limbal auto graft and use of amniotic membrane[15]. In addition several adjunctive therapies included the use

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of Beta irradiation, thiotepa, 5-FU, and mitomycin C has been recommended due to their antifibrotic and anti angiogenic properties. High recurrence rates are weighted against eye threatening postoperative complications. Amniotic membrane transplantation is used for advanced cases with bilateral heads or those who might need glaucoma surgery later[16]. Recently, with the popularity of conjunctival autograft and use of antimetabolites such as mitomycin C and 5-Fluorouracil the incidence of recurrence has been greatly reduced up to 12%[17-19]. The role of carbon dioxide and eximer lasers in pterygium surgery remains uncertain. Additionally, the relative benefits and risks are debatable of physiochemical methods to prevent recurrence. For example possible complications of mitomycin C and beta-irradiation include aseptic necrosis of the sclera and cornea, cataract, persistent epithelial defects and visual loss[20].

Therefore, a simple surgical procedure that can reduce the recurrence rate to an acceptable level with minimal complications and without the use of potentially toxic drugs or radiotherapy would be ideal for the management of pterygium. Recent reports favor the use of fibrin glue above sutures. The use of fibrin glue has been reported to improve comfort, decrease surgical time, reduce complications and recurrence rates[21-24]. Suture-related complications include infection, prolonged operating time, postoperative discomfort, suture abscesses, buttonholes, and pyogenic granuloma which usually require a second surgery for removal and chronic inflammation,[25,26]. Plasma-derived fibrin glue has the potential risk of prion disease transmission and anaphylaxis in susceptible individuals.

The latest approach is fixation of the graft with autologous blood, a technique also known as suture and glue free autologous graft [27]. Patients own blood is used as a bio-adhesive or fixative[29]. Autologous blood is natural, has no extra cost, no associated risk and can overcome post operative irritation, redness, and foreign body sensation. Surgical time is very less when compared to suturing technique[28,29]. Sutureless grafting has been used successfully in gingival grafts,[30] and represents a similar mucosal membrane tissue environment to the conjunctiva of the eye. In this study, we compare and evaluate the safety and efficacy of sutureless glue free limbal conjunctival autograft and conventional sutured autograft for the management of primary pterygium. With this approach, after the pterygium and associated conjunctiva are excised, the surgeon allows a thin film of blood clot to form over the bare area. Any active bleeding is stopped by direct tamponade. Next, a thin, Tenon-free conjunctival auto graft, with or without inclusion of limbal stem cells, is fashioned. After the graft is aligned, it is placed over the blood film in the bare area, and the edges are held with forceps, usually for three to five minutes, to give adequate time for graft fixation to occur.

Materials and Methods

Type of Study was prospective study. The present study was conducted in Department of Ophthalmology, 250 bedded General Hospital Jamalpur. 176 patients of nasal pterygium were included in the group [172 were primary nasal pterygium and 4 were Recurrent pterygium]. 76 patients underwent pterygium excision with suture and glue free autologous graft and 100 patients underwent pterygium excision with suture to secure the graft. Subjects included in the study were from 24 to 70 years of age having pterygium (primary and recurrent) involving any eye. Necessary approval from Institute was obtained beforehand. Written informed consent was taken from each patient. Preoperative ocular examination included slit lamp biomicroscopy, fundus examination, and photographic documentation of the pterygium. Surgeries were done from 15.09.16 to 30.11.16 and 01.11.2017 to 26.08.2018 followed up upto October 2018.

Inclusion criteria were primary nasal pterygium and recurrent pterygium.

Exclusion criteria were temporal pterygium, atrophic pterygium, pseudo pterygium, double head pterygium , ocular surface pathology, patients taking oral nonsteroidal anti-inflammatory drug (NSAID) and anticoagulant, active infection or inflammation, symblepharon, past ocular surgery within last 6 months, trauma, systemic diseases such as diabetes mellitus, collagen vascular disease, pregnancybleeding disorders.

Indications of Surgery

- Pterygium causing foreign body sensation
- Encroachment of the pupillary area threatening the visual axis
- Defective vision from induced astigmatism
- 3 to 4 mm encroachment on the cornea
- Rapid growth with cosmetic concerns
- Diplopia due to interference with ocular movements

Figure-1: A case of pre-operative primary right nasal pterygium.

The patients were randomly assigned into one of two groups: group 1 underwent sutureless and glue free limbal conjunctival autograft (n = 76 eyes) and group 2 underwent free limbal conjunctival autograft with suturing, (n = 100 eyes). The technique used in our study is simple randomization technique[31]. This technique maintains complete randomization of patient assignment to a particular group. The most common and basic method of simple randomization is a coin toss. For example, with the two treatment groups (group 1 versus group 2), each side of the coin determines the assignment of each patient to a group.

Surgical Technique

The goals of pterygium surgery were to remove the pterygium, restore the conjunctival anatomy, leave the cornea as smooth and clear as possible, and prevent recurrence. Simple pterygium excision was performed under peribulbar anesthesia (Xylocaine 2%). All the surgeries were done under a microscope by the same single surgeon using the same technique. Taking all aseptic precautionary, eyelid was then separated by a speculum, and sub-conjunctival and sub-pterygial 0.5 ml lignocaine solution (xylocaine 2%) was injected. Local anesthesia was used to balloon the pterygium separating it from the sclera.Gentle massage over the lesion was applied by cotton tipped applicator for few seconds . The neck of the pterygium was then lifted up with the help of fine toothed forceps, while the head of the pterygium was gently avulsed from the cornea by placing closed tips of a curved corneal scissors or Iris repository underneath the neck of the pterygium mass, keeping the same constant tractional force throughout. Gentle dissection was then carried out in between the conjunctiva and the sclera with the help of crescent knife, to resect at least 4–5 mm the pterygium mass that included both the superior and inferior border. Neither cautery nor saline irrigation was used throughout the surgery, except active bleeding, with bi-polar cautery whenever required to check excess hemorrhage. The size of the bare sclera defect was then measured with Castroviejo calipers. Corneal care was taken by applying wet cotton throughout the procedure. Now, approximately 0.5 ml xylocaine 2% was used to balloon up an supero-temporal conjunctival flap. Corneal scissor was used to make a fine film of 0.5 mm oversized, free conjunctival graft, carefully avoiding inclusion of tenon, or making buttonhole within it.

In group 1, hemostasis was allowed to occur spontaneously without use of cautery to provide autologous fibrin to glue the conjunctival graft. The graft was then laid over the bare sclera ensuring same limbus to limbus orientation and the scleral bed was viewed through the transparent conjunctiva to ensure that residual bleeding did not lift the graft. We waited for 5 to 10 min for hemostasis to occur. In cases, where the surgeon appreciated the lack of adequate amount of blood at the recipient site, episcleral blood vessel was intentionally punctured to create bleeding. The eye was then patched for 24 h to 48 h with Chloramphenecol ointment.

In group 2, the graft was sutured in position with 10/0 nylon. First the two limbal corners were sutured into the episclera and then into the conjunctiva keeping the limbal edge of the graft on gentle stretch then the posterior corners of the graft were sutured to the bulbar conjunctiva and additional sutures were placed to close the wound edges. Antibiotic ointment at the end of the procedure.

Post-operatively a pressure eye patch was applied. The eye was assessed for symptom, graft adherence, or any complication(s) under slit lamp. Postoperatively, patient was put on topical antibiotic and steroid combination for first 2 weeks thereafter tapered over next 4. The patients-were instructed to avoid rubbing their eyes and avoid dust, heat, direct sun exposure. The patients were also advised to wear sun glasses to reduce UVB exposure.

Thereafter, an attempted follow-up of cumulative 6 months (at postoperative day 1, 7, 15, 30, 120, and 180) was done to every patient. At each postoperative visit, thorough slit lamp examination, tonometrywere done, and any recurrence, complication(s), or any complaint were recorded. The primary outcome measure was the recurrence and the secondary measures were complication(s) and surgical time.

The main postoperative outcomes noted were the recurrence rate which was defined as fibrovascular proliferation invading the cornea more than 1.5 mm at the site of previously excised pterygium, graft dehiscence, graft retraction. The secondary outcomes were duration of surgery, postoperative pain, foreign body sensation, photophobia, hyperemia, chemosis, overall satisfaction and the complications as, persistent epithelial defect, dellen, inclusion cyst, pyogenic granuloma, conjunctivaledema, corneo-scleral necrosis, infective scleritis, keratitis and endophthalmitis.

Results

The pterygia were located nasally in all eyes for both groups. Patient age in both groups ranged from 25 to 71 years (mean, years) (Table I). There were 77 males and 99 females enrolled in this study. In 96 eyes, pterygia were present in the right eye and 80 in the left eye. There was no statistically difference in age between groups ($P > 0.05$). The two groups were clinically similar regarding the size of the pterygium.

Table-I: Clinical data.

Age group	No. of patient (176)		Male (77)		Female (99)	
	Group 1	*Group 2*	*Group 1*	*Group 2*	*Group 1*	*Group 2*
<20	0	0	0	0	0	0
212-30	11	10	7	5	4	5
31-40	35	21	17	7	18	14
41-50	29	26	15	8	14	18
51-60	19	16	7	6	12	10
61-70	5	3	3	2	2	1
>71	1	0	0	0	1	0
Total	100	76	49	28	51	48

Figure-2: A case of post-operative sutureless and glue free conjunctival limbal autograft in place.

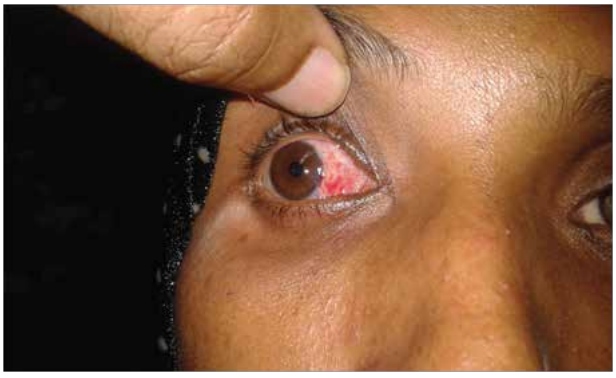

Figure-3: A case of post-operative conventional sutured conjunctival limbal autograft by Nylon 10/0.

Table II presents the main and secondary postoperative outcomes. The recurrence rate was 1.3 % (1 eyes) in group 1. Recurrence in group 1 occurred after 3 months. The recurrence rate was 2 % (2 eyes) in group 2. All cases of recurrence in group 2 occurred after 6 months. Graft dehiscence occurred in 1.3% (1 eyes) in group 1 and there were no cases of graft dehiscence in group 2. It occurred following vigorous rubbing of the eye on the 6th postoperative day. Patient was treated by suturing the same graft with (10/0 nylon sutures).

Table-II: Showing postoperative main and secondary outcomes.

	Group 1 ***N*** **= (76 eyes)**	**Group 2** ***N*** **= (100 eyes)**
Haemorrhage	2 (2.6%)	8 (8%)
Graft retraction	3 (3.9)	0 (0%)
Graft l dehiscence	1 (1.3%)	0 (0%)
Conjunctival edema	5 (6.6%)	4 (4%)
Conjunctival granuloma	0 (0%)	3 (3%)
Dellen	0 (0%)	2 (2%)
Conjunctival cyst	0 (0%)	1 (1%)
Recurrence	1 (1.3%)	2 (2%)
Scleral thinning	0 (0%)	0 (0%)
Scleral necrosis	0 (0%)	0 (0%)
Symblepharon	0 (0%)	0 (0%)
moderate Foreign body sensation	8 (10.5 %)	91 (91%)

Early graft retraction with exposure of scleral bed (Fig-4) toccurred in 3 eyes (3.9 %) in group 1 and in 4 eyes (4%) in group 2 within the first postoperative week due to conjunctival edema and chemosis. All cases were resolved with conservative management

Conjunctival edema (Fig-5) occurred in 5 eyes (6.6%) in group 1 and in 4 eyes (4%) in group 2. Most cases of conjunctival edema resolved gradually within the first post-operative week. Conjunctival granuloma (Fig-6) occurred only in group 2 in three eyes (3%), all of them treated by surgical excision within the first post-operative month. Conjunctival cyst occurred in one eye (1%) in group 2 and dellen occurred in two eye (2%) in group 2. There are no anesthetic complications, graft necrosis, symblepharon, scleral necrosis or thinning, excessive bleeding, globe perforation or injury to medial rectus in all of patient groups.

Figure-4: A case of post-operative graft retraction reported in group 1.

Figure-5: A case of post-operative graft retraction reported in group 1.

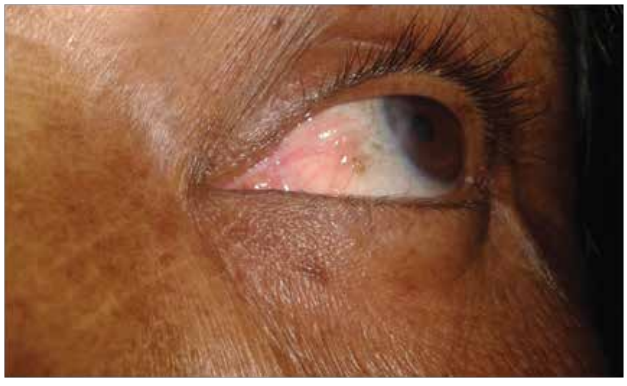

Figure-6: A case of post-operative Stitch granuloma reported in group 2.

Clinically significant difference between groups in the postoperative signs and symptoms on visits day 3, 1 week, 2 weeks and 3 weeks post-operatively. Moderate foreign body sensation was experienced by 8(10.5%) patients of group 1, whereas 91(91%) patients of group 2 had the same.

Discussion

Pterygium surgery should ideally have a low or no recurrence, minimal complications and be cosmetically acceptable. Conjunctiva auto graft using sutures was a standard procedure. The grafts were stable with acceptable cosmetic results. Suture related problems like postoperative inflammation, granuloma formation, pain, foreign body sensation

were present. The presence of sutures may lead to prolonged healing and fibrosis. Surgical techniques for the management of pterygium vary, but high recurrence rates after successful excision remain a challenge. The aim of pterygium surgery is to excise the pterygium and prevent its recurrence. However, there are very few clinical guidelines for optimal treatment that lower recurrence and complication rates. The variety of techniques, range from the bare sclera procedure to more complex approaches, such as amniotic membrane transplantation and lamellar keratoplasty, including conjunctival autograft, and limbal conjunctival transplant, conjunctival flap, conjunctival rotation autograft surgery, cultivated conjunctival transplant (ex-vivo expanded conjunctival epithelial sheet) and use of fibrin glue. Adjunctive therapies include Beta irradiation, Thiotepa, 5-Fluorouracil, Daunorubicin, and mitomycin C (MMC) [32-35].

Bare sclera excision (BSE) has an unacceptably high recurrence rate (40–60%) and has become obsolete. BSE with perioperative MMC, [36-38] preoperative subconjunctival injection, intraoperative application and postoperative drops had yielded better outcomes, but the risk of complications has made this procedure less favorable. BSE with beta irradiation,[39] has resulted in encouraging outcomes (13% recurrence); however it has toxic and serious complications.

Pterygium excision with limbal conjunctival autograft,[40] has been reported to be more effective with low recurrence but it may compromise the corneal stem cell population. Additionally, adjunctive use of amniotic membrane graft results in low recurrence but costly[37,41].

Fibrin glue has been used as an alternative to sutures for securing the conjunctival grafts [23]. A study has reported recurrence rate of 5.3% for glue versus 13.5% for sutures and suggested that immediate adherence of the graft and lack of postoperative inflammation may inhibit fibroblast ingrowth and reduce the recurrence[23]. The main issue in using commercial fibrin glue, despite viral inactivation techniques, is the transmission of infectious agents such as parvovirus B19 (HPV B19) and prions[42]. Furthermore, anaphylactic reaction has been reported after the use of (TISSEEL) fibrin sealant which was due to bovine protein aprotinin[43]. Foroutan et al.[42] prepared autologous fibrin glue, though much safer but it is not yet used widely because of the duration it takes to procure the fibrin and lack of laboratory facilities at all centers. Fibrinogen compounds may be susceptible to inactivation by iodine preparations used for conjunctival disinfection before pterygium surgery[44].

In our study we compared the two techniques of sutureless and glue free conjunctival limbal autograft (group1) with the conventional sutured conjunctival limbal autograft (group2) in primary pterygium surgery.

The recurrence rate (1.3%) in group 1 was comparable to group 2 (2%). Massaoutis et al. [45] stated that the concept of surgical success in pterygium surgery can be defined as the provision of a white cosmetic conjunctiva, with no persistent symptoms and a low recurrence rate (less than 10%). The recurrence rate in our study agrees with The Massaoutis et al.'s criteria. The recurrence rate is also similar to Malik et al.[46] who reported recurrence rate of 2.5% using a similar procedure of sutureless and glue free graft.

Graft dehiscence is a recognized complication of techniques using glue[47,48]. Froutan et al.[42] reported 13.33% rate of graft dehiscence using autologous fibrin and attributed this to a low concentration of thrombin and fibrinogen in autologous glue compared to a commercial preparation. In our study graft dehiscence occurred in 1 eyes (1.3%) in group 1, and did not occur in group 2. The case in group 1, was due to a patient rubbing his eye vigorously. Hence, we instruct patients to use a protective shell and not to rub the eye in the 1st week post-operatively. Additionally, meticulous dissections of thin donor limbal conjunctival autograft free of Tenons capsule are mandatory for successful graft uptake.

Graft retraction was reported by Tan[26] who advocated sub-conjuctival fibrosis and recommended meticulous dissection of sub-epithelial graft tissue. Foroutan et al.[42] reported 20% of cases with graft retraction, in our study graft retraction occurred in 3 eyes out of 76 (3.9%) eyes in group 1 and 4 eyes (4%) in group 2. All the cases of graft retraction were due to conjunctival chemosis and edema and were resolved with conservative treatment. In comparison, Wit et al.[44] reported no graft displacement and postulated that sutureless and glue free graft resulted in even tension across the whole graft interface and no direct tension on the free edges resulting in reduced stimulus for sub-conjunctival scar formation. Wit et al.[44] also proposed that the apposition of the eye lids to the bulbar conjunctiva provides a natural biological dressing, compression, and a smooth frictionless surface.

Pyogenic granuloma occurred in 3 eyes out of 100 (3%) eyes in group 2 and did not occur in group 1, cyst formation occurred in one eye (1%) in group 2 and dellen occurred in two eyes (2%) in group 2. These outcomes indicate that complications related to sutures are more common in group 2 despite using 10/0 nylon which induces minimal reaction and were removed after 2 weeks with some discomfort and foreign body sensation post-operatively.

Conjuctival edema occurred in our study in 5 eyes (6.6%) in group 1 and (4%) in group 2, using interrupted 10/0 nylon suture in group 2 which allows for any fluid build up to escape through the intervening spaces rather than precipitating a minimal reaction. Most of the cases resolved spontaneously with conservative treatment.

The mean operative time in group 1 was 15 (±1) min and 18 (±1) min in group 2. These times are comparable however they are longer than other studies[49,44] using fibrin glue which reported average operative time of 16 min (range 14–16) and 20 min (range 20–29) in suture group and reported 14 (±1.4) min in suture-less and glue free conjunctival autograft. Although our study was conducted over a two-year duration, we believe it was

worthwhile to provide the patients with the benefits of suture-less and glue free conjunctival limbal autograft.

Our results confirmed significantly lower post-operative signs and symptoms including pain, FB sensation, photophobia, hyperemia and chemosis at all visits in the first post-operative month as well as significantly higher overall patient satisfaction in group 1 compared to group 2. None of our patients developed serious complications such as scleral necrosis, sclera thinning, graft necrosis, symblepharon, excessive bleeding, medial rectus muscle injury, or globe perforation.

Conclusion

Pterygium excision and conjunctival auto graft with autologous blood is a viable and better surgical option for management of primary as well as recurrent pterygium. The feasibility of adherence of graft without glue and sutures is promising. The potential risks associated with the use of fibrin glue and suture related problems can be avoided in this technique.This procedure has excellent outcome. It is cost effective, time saving, easy to perform, less patient discomfort, greater patient satisfaction and safe for the patients with good cosmetic output.

Conflict of Interests: None.

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ORIGINAL ARTICLE OPEN ACCSESS

Antibiotic Resistance in Urinary Tract Infection in a Tertiary Care Hospital in Bangladesh-A Follow-up Study

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Abstract

Introduction: *Bacterial resistance to antibiotics is one of the most challenging global health threats. Urinary tract infections (UTIs) are a common infection. Regional surveillance programs are necessary to update knowledge on antimicrobial resistance pattern where empirical antibiotic treatment is the mainstay. The aim of this follow up study is to see the changing trends in bacteriology and antibiotic resistance pattern among urological pathogens in comparison to similar study 5 years back.* ***Materials and Methods:*** *We performed a prospective study in Comilla Medical College Hospital, Bangladesh during the period of July 2015- June 2016. Midstream clean-catch urine samples were collected from 658 suspected UTI patients with age more than 12 years and inoculated in MacConkey& Blood agar media for semi quantitative urine culture and sensitivity test. Antibiotic susceptibility pattern was done by Kirby-Bauer disc diffusion method following clinical laboratory science (CLS) program.* ***Results:*** *Culture positive were in 198 samples among 658 inoculated samples. E. coli was isolated from 171(86%) samples which was the most predominant bacteria followed by Klebsiella and Enterococcus. UTI with E. coli was significantly increased in the year 2016 in comparison to 2011. Meropenem, imipenem, amikacin, tazobactum, gentamycin nitrofurantoin, and mecillinum found resistance against 0% to 12% of the urological pathogens. Bacteria offered high degree of resistance against commonly used antibiotics - amoxycillin, amoxiclav, cephradine and cefixime ranging 60% to 86%. Comparative study of 2016 vs 2011 shows significant increased resistance for ceftriaxone, amoxiclav and reduced resistance for nalidexic acid, mecillinum and cefuroxime.* ***Conclusion:*** *E. coli infection is significantly increaseing in follow up study from 2011 to 2016 with no steady increase in resistance to all antibiotics. Imipenem, meropenem, tazobactum, amikacin and nitrofurantoin still remain more sensitive while comparative study of 2016 vs 2011 shows significant increased resistance for ceftriaxone, and amoxiclave and reduced resistance for nalidexic acid, mecillinum, cefixime and cefuroxime.*

Keywords: *Urinary tract infection, Follow up comparative study, Changing trends, Culture, Sensitivity, Resistance.*

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Introduction

Bacterial infection resistance to antibiotics is one of the most challenging global health threats faced in modern medicine. It has been estimated that by 2050, 10 million lives per year will be at risk from antibiotic-resistant infections [1]. In September 2016, 193 countries agreed to prioritize reducing antimicrobial resistance at the United Nations General Assembly following a worldwide campaign by the UK Government[2]. Urinary tract infection (UTI) is a common bacterial infection globally and is a major public health problem in terms of morbidity and treatment cost which affecting 150 million people each year worldwide[3,4]. It also represent the most common antibiotic-resistant infections in primary care setting[5,6]. It is a leading cause of repeated physician consultations and antibiotic resistance and problem for clinicians in selecting appropriate antibiotic [7, 8].

Diagnosis and treatment of UTI are mostly empirical to initiate empirical treatment with appropriate antibiotic is necessary to have current knowledge regarding causative organisms and their antibiotic resistance pattern [9]. But alarming fact is that a large number of patient do not respond to conventional antimicrobial agents [10].

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Antibiotic use affects bowel flora acquiring drug resistance and may increase risk of urinary autoinoculation with antibiotic-resistant microbes. Antimicrobial resistance is a well known important emerging clinical and public health problem. There are various reports available in last two decades about changing pattern of pathogen and their sensitivity pattern to routinely used antibiotics which makes the situation miserable [10]. An increasing antibiotic resistance among urological pathogens to commonly prescribed drugs has become a global reality. Resistance occurs in intestinal bacteria due to antibiotic therapy for treating infections outside the urinary tract [11]. The irrational use of antibiotics has an influence in the spread of antimicrobial resistance among bacteria [12, 13]. Controlling antimicrobial resistance is a major issue confronting organized health care today. Therefore this is warranted to know information about rapidly changing sensitivity pattern of micro-organisms towards antibiotics in UTI. For updated proper therapeutic interventions, periodic evaluation and regional surveillance programs is necessary with antibiotic resistance data and analysis about antimicrobial resistance to uropathogens.

The present study was undertaken to find the current urological pathogens and their antibiotic resistance pattern in a tertiary hospital in Bangladesh to compare with previous pattern of study in 2011 [14]. It will be helpful for awareness and antibiotic use in UTI in this tertiary level hospital and country level.

Materials and Methods

It was a prospective study conducted during July 2015 to June 2016 on patients attending the outpatient and inpatient departments of in department of medicine, Comilla Medical College to find out the causative agents of UTI and their antibiotic resistance pattern. All the patients included in this study were above 12 years of age, presented with the suspected UTI (dysuria, frequency, fever and pain in lower abdomen). In this study, patients presented with active menstruation, PID, tubo-ovarian disease, appendicitis, colitis, epididymitis and orchitis diagnosed either clinically or by investigations were excluded from this study. Patients on antibiotic was advised to stop antibiotic for 48 hours and were included in this study.

According to protocol, freshly voided midstream clean-catch 10-20 ml urine samples were collected from 658 patients in a sterile screw capped universal container. The specimen was labeled and transported to the microbiology laboratory of Comilla Medical College Hospital for culture within half an hour of collection. A modified semi-quantitative technique using a standard calibrated bacteriological loop of urine was performed to transfer 0.001 ml of sample on blood agar and MacConkey agar media. After allowing the urine to be absorbed into the agar, the plates were then inverted and incubated aerobically at 37°C for 24 hours. The plates were then examined macroscopically for bacterial growth. The colony count was done using semi quantitative method. Number of colonies obtained was multiplied by 1000 to obtain the colony forming units (CFU)/ml[15]. A significant growth is considered if the number of colony is ≥ 105 CFU/ml. Colonial appearance and morphological characters of isolated bacteria was noted and gram staining was done for identification of the isolated organisms. The characteristic bacteria on the culture media were aseptically isolated.

Antimicrobial sensitivity tests were carried out by disc diffusion technique using Muller Hinton Agar. Interpretation of results was expressed in sensitive and resistant depending upon the size of the zone of inhibition. The antibiotics used for susceptibility testing in our study were amoxycillin, amoxyclav, amikacin, cefixime, ceftazidime cefuroxime, cephradineciprofloxacin cotrimoxazole, cefotaxime, ceftriaxone, cephalexin, gentamycin, imipenem, meropenem, mecillinum, nalidexic acid, nitrofurantoin, and tazobactum. All the authors vouch for the completeness and accuracy of data and analyses presented.

Results

Total 658 patients urine samples were collected in 2016 and their baseline characteristics are shown below.

The table I and II, the bacterial growth was positive in 198 patients out of total 658 patients included in the study. Most of the patients were from rural community, married, sexually active, middle class, had fever, abdominal pain, dysuria and comorbid condition as diabetes mellitus, hypertension. 50% patients took antibiotics before included in study.

Table-I: Base line characteristics in patients without growth in urine culture.

	Frequency (n=460)	Percentage
Residence		
• Urban	136	30
• Rural	334	70
Education		
• Educated	303	66
• Not educated	157	34
Marital status		73
• Married	338	27
Unmarried	122	
Sexual activity		62
• Active	285	38
• Not active	175	
Economical status		
• Lower class	49	11
• Middle class	393	85
• Higher class	18	4

Dysuria		
• Present	321	68
• Absent	139	32
Urgency		
• Present	359	78
• Absent	101	22
Fever		
• Present	336	73
• Absent	124	27
Abdominal pain		
• Present	354	77
• Absent	106	23
Treated with antibiotics	221	48
• Yes	239	52
• No		
Co-morbid condition		
• DM	55	12
• HTN	15	3
• ISD	8	2
• Others	34	7

Table-II: Base line characteristics in patients with growth in urine culture.

	Frequency (n=198)	Percentage
Residence		
• Urban	66	33
• Rural	132	67
Education		
• Educated	134	68
• Not educated	64	32
Marital status		
• Married	163	82
• Unmarried	35	18
Sexual activity		
• Active	143	72
• Not active	55	28
Economical status		
• Lower class	10	5
• Middle class	180	91
• Higher class	8	4
Dysuria		
• Present	152	77
• Absent	46	23
Urgency		
• Present	175	88
• Absent	23	12
Fever		
• Present	133	67
• Absent	65	23
Abdominal pain		
• Present	150	76
• Absent	48	24
Treated with antibiotics		
• Yes	94	48
• No	104	52
Co-morbid condition	68	34
• DM	45	23
• HTN	27	14
• IHD	4	2

Among 198 culture positive samples, E. coli was ranked highest 171(86%), simultaneously growth of Klebsiella pneumonia and Enterococcus was found in 17(9.6%) and 10(5%) samples. It was also observed from table III that the maximum numbers of isolates were distributed among the females 123 (62%).

Table-III: Frequency of Isolation of organism in relation to sex of patient and their overall percentage.

SL No.	Bacterial Isolates	Frequency		
		Number (%)	Male (%)	Female (%)
01	E. coli	171 (86)	69 (35)	102 (51)
02	Klebsiella	17 (9.6)	4 (2)	13 (7)
03	Enterococcus	10 (5)	2 (1)	8(4)
	Total	**198**	**75 (38)**	**123 (62)**

UTI with E. coli was found statistically significant increase in the year 2016 with p values <0.01(table - IV).

Table- IV: Comparative study between the common isolated urological pathogenic bacteria in the year 2016 and 2011.

Name of organism	No (%) 2016	No (%) 2011	Chi-Square Value (x^2)	P. value
E. coli	171 (86)	98(75)	3.17	<0.01
Klebsiella	17 (9.6)	14(10.4)	.29	>0.1
Enterococcus	10 (5)	8(6)	.38	>0.1

Pseudomona	0	2(1.5)	.16	>0.1
Proteus	0	2 (1.5)	.16	>0.1
Staph. aureus	0	4 (3)	.47	>0.1
E. coli & Klebsiella	0	3 (2.29)	.35	>0.1

Study shows, meropenem, imipenem, amikacin, tazobactum, gentamycin, and mecillinum, were found to be most effective antibiotic against most of the urological pathogens. In vitro sensitivity of the isolates to these antibiotics was shown to be varied from 88% to100%. Table V also shows high degree of resistance against commonly used antibiotics- amoxycillin, amoxiclav, cephradine and cefixime. In vitro resistance of the isolates to these antibiotics was varied from 60% to 86%.

Table-V: In vitro antibiotics resistance pattern of the bacteria (n=198).

SL No.	Name of antibiotics	Total No Sensitive	Percentage
01	Meropenem	0	0
02	Imipenem	1	0.5
03	Amikacin	2	1
04	Tazobactum	2	1
05	Gentamycin	20	10
06	Nitrofurantoin	23	12
07	Mecillium	24	12
08	Colistin	31	16
09	Ceftazidime	84	47
10		93	47
11	Ciprofloxacin	94	48
12	Ceftriaxone	96	55
13	Nalidexic acid	190	55
14	Cephlalexine	112	57
15	Cefuroxime	114	58
16	Cefotaxime	114	58
17	Cefixime	118	60
18	Cephradine	130	66
19	Amoxiclav	149	76
20	Amoxicillin	170	86

There was statistically significant increase in resistance pattern in year 2016 in comparison to 2011 was detected for ceftriaxone, and amoxiclav with p value <0.001, which is shown in table VI. On the other hand significant reduced resistance was found for nalidexic acid, mecillinum, cefixime and cefuroxime. No statistically significant change in sensitivity pattern was shown for other antibiotics.

Table-VI: Comparative study between 2016 and 2011 of trend of antibiotic registance pattern of uropathogenic bacteria.

Antibiotic	2016 (n=198)	2011 (n=131)	Chi-Square Value (x^2)	P value
Carbapenem				
• Imipenem	1(0.5%)	0(0%)	0.04	0.83^{ns}
• Meropenem	0 (00.0%)	3(2.0%)	2.39	0.12^{ns}
Cephalosporins				
• 1^{st} Generation				
○ Cephradine	130(66.0%)	83(63.0%)	0.18	0.67^{ns}
○ Cephlalexine	112(57.0%)	85(64.9%)	2.27	0.13^{ns}
• 2^{nd} Generation				
○ Cefotaxime	114(58.0%)	80(61.0%)	0.38	0.52^{ns}
○ Ceftazidime	84(42.0%)	-	72.41	$<0.001^{s}$
○ Cefuroxime	84(42.0%)	82(63.0%)	12.83	$<0.001^{s}$
• 3^{rd} generation				
○ Ceftriaxone	102(51.5%)	31(24.0%)	25.39	$<0.001^{s}$
○ Cefixime	80(40.0%)	91(70.0%)	26.37	$<0.001^{s}$
Quinolones				
• Nalidexic acid	89(45.0%)	98(75.0%)	28.65	$<0.001^{s}$
• Ciprofloxacin	104(52.0%)	86(65.5%)	5.6	0.02^{s}
Aminoglycosides				
• Amikacin	2(1.0%)	3(2.3%)	0.22	0.63^{ns}
• Gentamycin	20(10.0%)	18(14.0%)	1.02	0.31^{ns}
Penicillin				
• Amoxiclav	149(76.0%)	31(24.0%)	84.67	$<0.001^{s}$
• Amoxicillin	170	114(87.0%)	0.09	0.76^{ns}
• Mecillinum	24(12.0%)	39(30.0%)	15.86	$<0.001^{s}$
Colistin	31(16.0%)	17(13.0%)	0.45	0.50^{ns}
Nitrofurantoin	23(12.0%)	12(9.0%)	0.50	0.47^{ns}
Tazobactum	2(1.0%)	-	0.18	0.66^{ns}
Cotrimoxazole	93(47%)	81(62.0%)	6.98	0.008^{s}

Discussion

This study demonstrates the distribution and antibiotic resistance pattern of bacteria isolated from patients with suspected UTI from a tertiary care center. In our center only 31% had culture positive in patients with UTI

symptoms which was nearer to our previous study in 2011 where growth was 24%[14]. Study by B H N Yasmeen et al[16] on 2014 in Bangladesh shows 21% urine sample were positive for pathogenic organisms. Higher prevalence of UTI in females (73.57%) than in males (35.14%) which is similar to other reports[17-19]. It was due to anatomical and physical factors[20-22].

E. coli predominance isolated organism (86%) which was significantly higher (p value was <0.01) than our previous studies in 2011 where E. coli was 75%. Possible cause of this predominance of intestinal bacteria was due to antibiotic therapy for treating infections outside the urinary tract which contaminate the urinary tract[6].

Urological pathogens shows very low degree of resistance (0-1%) against meropenem, imipenem, tazobactum and amikacin which was similar to our previous study on 2011[14]. Bacteria shows higher degree of resistance against most of the remaining antibiotics used for sensitivity due to irrational consumption of most of the antibiotics during the past decade in our region[13,23,24]. Resistance to amikacin is only 2% and it is cheap, so it is wise to use it as parental empirical antibiotics in UTI. On the other hand nitrofurantoin offers resistance in 12% cases so it is a good oral antibiotic in UTI. This drug exhibited low resistance rate in the major part of the world (0–5.4%), despite of its use for many years which was because of localized action of this drug only on the urinary tract[25]. Resistance was significantly increased in resistance pattern in year 2016 for ceftriaxone, and amoxiclav possibly because random use of these antibiotics with inadequate dose and duration which is a public health concern in Bangladesh[26]. According to guideline by Infectious Diseases Society of America (IDSA) in the year 2011, an antibiotic is no longer recommended for empirical treatment of acute UTI if there is >20% resistance prevalence to that particular antibiotic[27]. The antibiotics shows resistance more than 20% are according to this guideline of IDSA, most of the antibiotics used in our study should not be used for empirical treatment of acute UTI and our standard treatment guidelines for UTI is not sufficient which requires a large scale study.

There is urgent need of constant monitoring with culture and sensitivity pattern of specific pathogens in different health care center in our country. Community awareness program should be undertaken for adherence to treatment protocol considering bacterial resistance and emerging multidrug resistant strains. It is necessary to conduct a regional research on the culture and sensitivity patterns of the bacteria. All the authors contributed equally in this study.

Conclusion

E. coli infection is significantly increasing in follow up study from 2011 to 2016 with no steady increase in resistance to all antibiotics. Imipenem, meropenem, tazobactum, amikacin and nitrofurantoin still remain more sensitive while comparative study of 2016 vs 2011 shows significant increased resistance for ceftriaxone and amoxiclave and reduced resistance for nalidexic acid, mecillinum, cefixime and cefuroxime.

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ORIGINAL ARTICLE

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Diagnostic Role of Bone Marrow Examination in Detecting Haematological and Nonhaematological Disorders

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Abstract

Introduction: *Bone marrow study has wide application in clinical medicine. It is important test not only for diagnosis of haematological diseases but also for various systemic illnesses. The aim of this study is to determine the indications, the spectrum of haemotological and non haematological disorders diagnosed by using this procedure.* ***Materials & Methods:*** *It was a prospective study comprising 152 patients who underwent bone marrow examination for evaluation of haematological and nonhaematological disorders in the Department of Haematology, Enam Medical College Hospital during the period of 2012 to 2017.* ***Results:*** *In our study male to female ratio was 1.6:1 and common age group was >45years (n-65, 42.76%). Most common indications for bone marrow examination were pancytopenia (26.97%, n-41) and diagnosis of leukaemia/myeloproliferative neoplasm (25.66%, n-38). 90.13% (n-137) marrows were pathological. Non-malignant conditions were 40.79% (n-62) and malignant conditions were 49.43% (n-75). Non malignant haematological condition were 33.55% (n-51), malignant haematological conditions were 47.37% (n-72). Most common nonmalignant haematological conditions were aplastic anaemia (15.13%, n-23) and immune thrombocytopenic purpura (9.87%, n-15). Visceral leishmaniasis was found 3.29% (n-5). Acute myelogenous leukaemia (14.47%, n-22) and multiple myloma (11.18%, n-17) were the most common malignant haematological condition. Secondary deposit was found 1.97% (n-3).* ***Conclusion:*** *Bone marrow examination is a simple invasive procedure for diagnosis of both haematological and nonhaematological diseases when routine investigations failed to reach the final diagnosis.*

Keywords: *Bone marrow examination, Haematological disease, Nonhaematological disease.*

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Introduction

Bone marrow is an extremely cellular connective tissue that fills the medullary cavities of bone. It is composed of haemopoietic cells, marrow adipose tissue and supportive stromal cells. On gross inspection, it may have a red or yellow color. Red marrow is actively engaged in the production of blood cells and represents the active or haemopoietic marrow. Yellow (fatty) marrow is inactive, and its principal cellular components are fat cells. Progressive differentiation and maturation of the primitive stem cells results in specific marrow cell type i.e. Leucocytes, Erythrocytes and Platelets[1]. Haematological and nonhaematological diseases affecting the bone marrow may be primarily or a secondarily spread to the marrow. In both cases the normal marrow cellular architecture is damaged or displaced. The pattern of disorders affecting the marrow is quite different in developing countries than from developed countries [2, 3]. In most of the cases, diagnosis can be arrived at by a detailed history, physical examination and few simple investigations. But in certain cases bone marrow examination is required for the confirmation of diagnosis. Bone marrow aspiration and trephine biopsy are important test not only for haematological diagnosis but also for various systemic illnesses including pyrexia of unknown origin, granulomatous diseases, storage disorders, haemophagocytic syndrome, histiocytosis, leishmaniasis and even resistant cases of malaria can be diagnosed through

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marrow examination [4]. These are simple relatively safe invasive procedure carried out routinely in hospital even in presence of severe thrombocytopenia.

This study was carried out with the aim to explore the role of this invasive procedure in ascertaining the diagnosis of haematological and non haematological diseases in our clinical setup.

Materials and Methods

This prospective study was done in the department of haematology, Enam Medical College Hospital (EMCH) from July 2012 to December 2017. A total of 152 cases were included in this study. Clinical parameters were assessed, peripheral blood smear along with necessary haematological investigations were done. Than Bone marrow aspiration was done thereafter. When aspirated material was inadequate or dry tap, trephine biopsy was done. Data was collected and subsequently analyzed.

Results

In this study a total of 152 bone marrow aspirates (BMA) and/or biopsy were done. The age range of the study subjects were 2 years to 80 years and the mean age of the patients was 40.66 years. Most common age group undergoing BMA was >45 years (Table I).

Table I: Age distribution of the patients.

Age group	No. of patients	Percentage (%)
< 15 years	16	10.53%
15- 30 years	43	28.29%
31- 45 years	28	18.42%
>45 years	65	42.76%

Among them 61.84% (n-94) were male, 38.16% (n-58) were female and male to female ratio was 1.6:1. Most common indications for BMA cytology examination were pancytopenia (26.97%, n-41) and diagnosis of leukaemia/myeloproliferative neoplasm(mpn) (25.66%, n-38). Other indications are summarized in table II.

Table II: Indications for bone marrow examination.

Clinical condition	Number	(%)
Anaemia	14	9.21%
Fever of unknown origin	17	11.18%
Pancytopenia	41	26.97%
Bicytopaenia	9	5.92%
Thrombocytopaenia	11	7.24%
Bodyache,Backache with high ESR	19	12.50%
Leuco-erythroblastic blood picture.	2	1.32%
Diagnosis & management of Leukaemia and mpn	39	25.66%

90.13% (n-137) marrows were pathological and 9.87% (n-15) were normal. Non-malignant conditions were 40.79% (n-62) and malignant conditions were 49.43% (n-75). Non malignant haematological condition were 33.55% (n-51), malignant haematological conditions were 47.37% (n-72).

Most common nonmalignant haematological conditions were aplastic anaemia (15.13%, n-23) and immune thrombocytopenic purpura (9.87%, n-15). Visceral leishmaniasis was found 3.29% (n-5).

Acute myelogenous leukaemia (14.47%, n-22) and multiple myloma (11.18%, n-17) were the most common malignant conditions. Secondary deposit was found 1.97% (n-3). Table III show the different non-malignant and malignant conditions.

Table III: Bone marrow examination findings.

Non Malignant condition		
Megaloblas tic anaemia	4	2.63%
Erythryoid hyperplasia	9	5.92%
Aplastic anaemia	23	15.13%
Immune thrombocytopenia purpura	15	9.87%
Myeloid hyperplasia	4	2.63%
Myelodysplastic syndrome	5	3.29%
Hypersplenism	2	1.32%
Normal reactive marrow	15	9.87%
Visceral leish maniasis	5	3.29%
Total	*82*	*53.95%*
Malignant condition		
Acute lymphoblastic leukaemia (ALL)	12	7.89%
Acute myelogenous leukaemia (AML)	22	14.47%
Chronic lymphocytic leukaemia (CLL)	1	0.66%
Chronic myelogenous leukaemia (CML)	9	5.92%
Multiple myeloma/plasmacytosis	17	11.18%
Myelofibrosis	1	0.66%
Essential thrombocythemia	3	1.97%
Polycythaemia rubra vera	2	1.32%
Bone marrow secondary's	3	1.97%
Total	70	46.05%

Discussion

Bone marrow examination is an important and simple test for diagnosis of both haematological and nonhaematological diseases in all age group of patients. The age range of our study subjects were 2 years to 80 years and the mean ages of the patients were 40.66 years. Mean age found by in Gandapur ASK et al[5], Pudasaini S et al[6], Atla Bl et al[7], Kibria SG et al[8], Mahfuz H, et al.[9] were 40, 37.9, 32.4, 27.05, 28.2 years in their respective studies. The most common age group undergoing BMA was >45years (42.76%) and lowest age group < 15 years (10.53%) in this study. In studies done by Pudasaini S et [6],

Kibria SG et al[8], Mahfuz H, et al.[9] the majority of the patients were between 31 – 45 years (42.1%), 10-19 years (23.16%), 21-40 years (33.8%). In the present study 61.84% (n-94) of the patients were male, 38.16% (n-58) were female and male to female ratio was 1.6:1. Male to female ratio 2:1, 1:0.59, 1: 0.70, 1.2:1 were seen by, Gandapur ASK et al.[5] Kibria SG et al[8], Mahfuz H et al[9]. Ekwere TA et al [10].

In our study most common indications for BMA cytology examination were pancytopenia (26.97%, N-41) and diagnosis of leukaemia/myeloproliferative neoplasm (25.66%, n-38). This is similar to that of the studes done by Pudasaini S et al.[6] Ahmed et al.[11]. However pancytopenia was the third common indication in the studes done by Gandapur ASK, et al. (22.80%)[5], Bashawri LA et al. (11.9%) [12] .

In the present study 90.13% (n-137) of the marrow was pathological and 9.87% (n-15) were normal. Among the pathological condition non-malignant conditions were 40.79% (n-62) and malignant conditions were 49.34% (n-75). Non malignant haematological conditions were 33.55% (n-51), malignant haematological conditions were 47.37% (n-72). In a large study carried out over a period of 25 years by Hyun BH [13], 22% of their patients had nonmalignant haematological problems while 30% had haematological malignancies. In a study by Mahfuz H, et al.[9] in bangladesh 22.4% patients had non malignant haematological conditions and 64.2% had haematological malignancy. These findings do not correlate with our findings because large numbers of cases reviewed in both studies.

Among the non malignant condition, aplastic anaemia was seen in 15.13% (n-23) in our study, when compared to other studies done by, and Pudasaini S et al.[6], Kibria SG et al.[8], Mahfuz H et al.[9], Sreedevi P et al.[14] it was 5.3%, 10.74%, 8%, 9.3%. Variation of these findings due to aplastic anaemia has a pattern of geographic variation opposite to that of leukemia, with higher frequency in the developing world than in the industrialized West [15].

ITP was 9.87% (n-15) in this study. Our result were comparable with study carried out by Gandapur ASK, et al.[5], (8.90%) Atla BL et al.[7] (9.52%), but higher than Kibria SG et al.[8] (6.21%), Mahfuz H et al.[9] (4.8%), Ekwere TA, et al.[10] (6.5%) .

5.92% (n-9) patients showed erythroid hyperplasia in our study. 20.9%, 8.4% 19.6% and 14% cases of erythroid hyperplasia was seen in studies done by Mahfuz H et al.[9], Sreedevi P et al.[10] Jha et al.[16] and Khodke, et al.[17], which were higher than our study. Our study showed megaloblastic anemia was present in 2.63% (n-4) cases. Our finding was lower than other studies done by Pudasaini S et al.[6] (12.3%), Mahfuz H et al.[9] (8%), Ahmed SQ et al.[11] (11%) and Khodke K et al.[17] (6.5%). We avoided bone marrow examination in suspected cases of megaloblastic anaemia because it is not an essential test for diagnosis.

Out of 72 malignant haematological conditions acute leukaemia was 22.37% (n-34). Among the acute leukaemia, acute myeloblastic leukaemia (AML) was 14.47% (n-22) and acute lymphoblastic leukaemia (ALL) was 7.89% (n-12). Other studies also showed that acute leukemia is the commonest hematological malignancy and AML is more common than ALL [6,16,18,19]. In our country Hossain MS, et al.20 showed that AML 28.3% and ALL 14.1%. This finding is higher than our finding because it is a multicenter national level study.

9.87% (n-15) of our patients diagnosed as a case of myeloproliferative neoplasm (MPN). Among them chronic myelogenous leukaemia (CML) 5.92% (n-9), essential thrombocythaemia (ET) 1.97% (n-3), polycythaemia vera 1.32% (n-3), myelofibrosis 0.66% (n-1). Manju, et al.[21] showed 8.57% MPN and 5.71% CML . 10.5% MPN seen by Atla BL et al.[7] and 7.4% CML seen by Mahfuz H, et al.[9] which were near similar to our study.

Multiple myeloma (MM) was 11.18% (n-17) in our study. The finding in the present study were parallels with Ekwere TA, et al. [10] (8.1%), Hossain MS et al.[20] (10.5%) study.

Myelodysplastic syndromes (MDS) were 3.3%, 3%, 4.5% in, Gandapur ASK et al.[5] Mahfuz H et al [9], Hossain MS et al. [20] studies which are similar to our study 3.29% (n-5).

Among the nonhaematological conditions, 3.29% (n-5)% leishmaniasis, 1.23% (n-2) hypersplenism, 1.97 % (n-3) bone marrow secondaries were found in our study. Visceral leishmaniasis were 1.8%, 2.82% in Pudasaini S, et at.[6], Kibria SG et al.[8], studies. Hypersplenism was 0.96% and bone marrow secondaries was 2.6% in Gandapur ASK, et al.[5], study . Bone marrow secondary's was 1.4% also seen by Mahfuz H, et al.[9], study.

Conclusion

Bone marrow study is a time-tested, reproducible procedure used for the evaluation of haematological and nonhaematological conditions. When routine investigations fail to reach the final diagnosis, this can help in the diagnosis of the disease and subsequently can positively modify the outcome of the disease. This study shows that bone marrow examination is a useful diagnostic tool in the diagnosis of various non hematological diseases in addition to hematological disorders and malignancies.

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ORIGINAL ARTICLE OPEN ACCSESS

Medication Adherence Patterns to Anti-diabetic Drugs among Type 2 Diabetic Patients

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Abstract

Introduction: *The aim of the present study was to evaluate the pattern of medication adherence to anti-diabetic drugs among type 2 diabetic patients at two tertiary level hospitals in Mymensingh.* ***Materials and Methods:*** *An observational, cross sectional study was conducted from January 2016 to June 2016 among patients attending at Endocrine Outpatient Department of the Mymensingh Medical College Hospital and Medicine Outpatient Department of the Community Based Medical College Hospital, after obtaining requisite consent from the patients. Once the consultation by the physician was over, the patients were interviewed. Medication adherence was assessed through the specific four questions patient questionnaire, the modified morisky instrument that has high reliability and validity and the patient was considered to be highly adherent if he or she answered in the negative to all four questions (score-0).* ***Results:*** *In a pool of 300 type 2 diabetics, more than half were female (n=223, 74.3%). The mean age of the patients were found to be 50.59 ± 12.57 years. Less than half (37%) of the patients were considered highly adherent, 44% patients were considered moderately adherent and 19% patients were considered poorly adherent to the prescribed anti-diabetic drugs.* ***Conclusion:*** *The participants in the area of study were moderately adherent to their anti-diabetic medications. Measures should be taken to improve patient's adherence to the prescribed treatment.*

Keywords: *Adherence, Anti-diabetic drugs.*

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Introduction

Adherence with medication usage is defined as the proportion of prescribed doses of medication actually taken by a patient over a specified period of time. Compliance a synonymous term which was commonly used in the past implies a passive role and simply following the demands of a prescriber and non compliance has been regarded as associated with deviant or irrational behavior. According to the WHO, non adherence tomedical regimen consist a major clinical problem in the management of patients with chronic illness. Rates of non adherence with any medication treatment may vary from 15% to 93%, with an average estimated rate of 50%[1]. Adherence rates to drug regimen in patients with type 2 diabetes are relatively low and vary widely between populations. Poor adherence is an obstacle in therapeutic control of diabetes. There are many factors that could affect patient adherence to drug therapy[2]. Commonly proposed reasons for non adherence to oral medication regimens include forgetfulness and spontaneous activities due to lack of self discipline, limited intelligence or fearless attitude towards the consequences of diabetes[3]. Expectedly, patient non adherence to prescribed hypoglycemic medications could decrease treatment effectiveness with subsequent manifestation of microvascular and macrovascular complications of diabetes[4]. However, to, date, there is no reliable evidence on the pattern of medication adherence to anti-diabetic dugs among type 2 diabetic patients in Bangladesh. The aim of the present study was to evaluate the pattern of medication adherence to anti-diabetic drugs among type 2 diabetic patients at two tertiary level hospitals in Mymensingh. This study undoubtedly benefits the physicians for successful management of diabetes mellitus in the future.

Materials and Methods

An observational, cross sectional study was conducted from January 2016 to June 2016 among patients

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attending at Endocrine Outpatient Department of the Mymensingh Medical College Hospital and Medicine Outpatient Department of the Community Based Medical College Hospital after obtaining requisite consent from the patients. Total 300 patients were studied during the study period. The interviews were held directly in the corridor just outside the medical Outpatient Department. Prescriptions slips were taken from the patients after taking the written consent and the relevant information was entered into the predesigned proforma to know the pattern of medication adherence to anti-diabetic drugs among type 2 diabetic patients. Medication adherence was assessed through the specific four questions patient questionnaire, the modified morisky instrument that has high reliability and validity and the patient was considered to be high adherent if he or she answered in the negative to all four questions. The patient was considered to be medium adherent if he or she answered in the positive to one or two questions. The patient was considered to be low adherent if he or she answered in the positive to three or four questions. Those four questions were 1) Do you ever forget to take your medicine? 2) Are you careless at times about taking your medicine? 3) If you feel better, do you sometimes stop taking your medicine? 4) Sometimes if you feel worse while taking your medication, do you stop taking them? The study was approved by the institutional ethical committee. Non-Random purposive sampling was employed for collecting data. All filled questionnaires on the pattern of medication adherence to anti-diabetic drugs were entered into the computer for subsequent analysis using SPSS method version 20.1.

Results

This present study was conducted on 300 type 2 diabetic patients to observe the pattern of medication adherence to anti-diabetic drugs among type 2 diabetic patients at outpatient department of two tertiary level hospitals in Mymensingh. The age structures of the patients have been categorized in years into three groups. Overall 77 (25.7%) patients were in ≤ 40 years old while 172 (57.3%) patients were 41-60 years old, 51 (17.0%) patients belong to > 60 years age group. Most of the patients belonged to the middle age group 41-60 years (Table I). Total numbers of patients both male and female were 300. It comprised of 77 (25.7%) male and 223 (74.3%) female in outpatient. Female patients were more than the male patients at the outpatient department (Figure 1). Among 300 cases, when the patients were asked about whether they ever forget to take their medicines, 189 patients (63.3%) answered "yes" and 111 (37%) answered "no". When asked about whether the patients were not careful in taking their medicines 102 patients (34.0%) answered "yes" and 198 patients (66.0%) answered "no". When they felt better whether they stop taking their medicines, 57 patients (19.0%) answered "yes" and 243 (81.0%) answered "no" and when they felt worse while taking medication whether they stop taking them, 51 patients (17.0%) answered "yes" and 249 (83.0%) answered "no"(Table II). Out of 300 patients, 111 (37%) patients answered no to every question and were considered high adherent (score 0). 131 (44%) patients answered yes to one or two questions and were considered medium adherent (score 1-2). Only 58 (19%) patients answered yes to three or four questions and were considered low adherent (score 3-4) (Table III). Forgetfulness (44.4%), Carelessness (23.80%), Financial problem (21.16%), Meal irregular (3. 17%), and hypoglycemia (7.40%) were considered as major reasons for non adherence to medication. Forgetfulness was the central reason for not taking their medications (Table IV).

Table-I: Age distribution of the study population (n=300).

Age group (years)	Frequency (%)
≤ 40 years	77 (25.7)
41-60 years	172 (57.3)
> 60 years	51 (17.0)
Total	300 (100)
Mean ±SD	50.59 (±12.57)

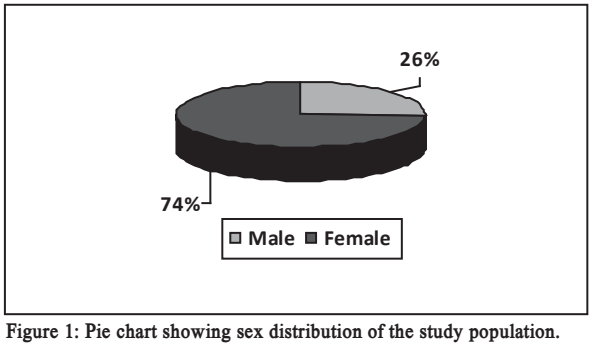

Figure 1: Pie chart showing sex distribution of the study population.

Table-II: Summary of the patient's response to the modified morisky adherence Predictor scale.

Patients response	Frequency of yes (%)	Frequency of no (%)
Do you ever forget to take your medicine?	*189* (*63*)	*111* (*37*)
Do you sometime not being careful in taking your medicine?	*102* (*34*)	*198* (*66*)
If you feel better, do you sometimes stop taking your medicine?	*57* (*19*)	*243* (*81*)
Sometimes if you feel worse when you take your medication, do you stop taking them?	*51* (*17*)	*249* (*83*)

Table-III: Distribution of patients according to pattern of medication adherence to anti-diabetic drugs (n=300).

Adherence pattern (score)	Frequency (%)
High adherence (0)	111 (37)
Medium adherence (1 -2)	131 (43.66)
Low adherence (3 -4)	58 (19.3)
Total	300 (100)

Table-IV: Reasons for non-adherence to anti-diabetic drugs in non compliant patients (n=189).

Reasons	Frequency (%)
Carelessness	45 (23.80)
Forgetfulness	84 (44.44)
Financial problem	40 (21.16)
Meal irregular	6 (3.17)
Hypoglycemia	14 (7.40)

Discussion

Type 2 diabetes is a chronic disease requiring lifelong treatment, although lifestyle modifications play an important role in diabetes management. This study analyzed the pattern of medication adherence to anti-diabetic drugs among type 2 diabetic outpatients. All together a total of 300 prescriptions were collected during the study period. This study showed that diabetes mellitus is more prevalent in female patients than in male patients. This may be assigned to the fact that women are more obese than men. The other reasons might be due to lack of physical activity, life style changes, dietary habit and stress. Similar results were obtained in the study conducted by Alam et al. (2014), Mann et al. (2009) and Abebaw et al. (2016)[5,6,7]. However other studies reported higher prevalence of DM in men. This study also found a higher prevalence of diabetes was among middle aged patients, with a high percentage (57.37%) in the age group of 41-60 years. Mean age 50.59 ± 12.5 years. This result correlates with the study of sajith et al. (2014)[1]. A study from the Nepal reported higher mean age 58.1 ± 11.6 years in type 2 diabetic patients. So this present study does not correlate with the Nepal study. In general elderly patients are at a greater risk of developing type 2 diabetes mellitus. In our study the 4 item modified morisky adherence predictor scale is used to assess medication adherence to anti-diabetic drugs. The assessment of the patient's response to the four item modified morisky adherence predictor scale showed that 37% of the patients had good adherence with prescribed medications, whereas 43.66% had medium adherence and 19.3% had low adherence. Our study findings are quite similar with the findings of a study carried out in India which revealed the following adherence level: good adherence 40%, medium adherence 37.14% and poor adherence 21.90%. In our study, only 37% patients answered no to every question and were considered adherent. The adherence rate in this study is higher than adherence rate of 16.66% reported in Sharma et al. (2014) study[8]. The discrepancy is possibly because of medication adherence measurement method. 44.44% patients used to miss anti-diabetic drugs due to forgetfulness followed by 23.80% patients missing anti-diabetic drugs due to their carelessness. The result is consistent with the finding from the Shrestha et al. (2013) study which had reported that, forgetfulness (42.9%) as the central reason for not taking their medications[3]. Moreover, the present study showed that 21.16% of the patients had not adequate cost of medications in relation to the income. High cost of newer oral hypoglycemic agents hindered optimal adherence to the treatment, so one should ensure that cost effective as well as beneficial oral hypoglycemic agents are prescribed to the patients. Our results are not in agreement with the Heissam, Abuamer, and Dahshan, who reported that about 68.62% of the patients had not adequate cost of medications in relation to the income[2].

Conclusion

Type 2 diabetes mellitus being a chronic disorder requires multiple therapeutic approaches including dietary and lifestyle modifications. It is concluded that the participants in the area of study were moderately adherent to their anti-diabetic medications. Measures should be taken to improve patient's adherence to the prescribed treatment for better management of type 2 diabetes mellitus. Various factors of medication non adherence were identified and evaluated. Therefore, we recommend interventions that will address these factors of non adherence in order to improve adherence the more. Some of such interventions include simplifying drug regimen with decreasing the number of drug taken, encouraging patients to monitor their blood glucose level regularly. So continuous patient education and awareness program are required.

Conflict of Interests: None.

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ORIGINAL ARTICLE OPEN ACCSESS

Vaginal Delivery versus Elective Caesarean Section for Breech Presentation - Experience in Institute of Child and Mother Health (ICMH)

Mahe Jabeen *[1], Sabiha Shimul [2], Ummay Salma [3], Jebunnesa [4]

Abstract

Introduction: *Compared with a fetus with cephalic presentation, a breech fetus faces increased risk during labour and delivery of asphyxia from cord compression and of traumatic injury during delivery of the shoulders and head. Caesarean section avoids most of this risk. The purpose of this study was to evaluate the feasibility of vaginal delivery of uncomplicated singleton breech presentation by evaluating early neonatal morbidity and mortality as well as maternal morbidity following vaginal and caesarean delivery for breech presentation.* ***Materials and Methods:*** *This is a cross sectional comparative study.104 women with singleton breech presentation at term in labour were included consequetively in labour ward of Institute of Child and Mother Health (ICMH). Informed consent was taken from them. Neonatal and maternal outcome were recorded and statistical analysis was done using SPSS version 22.* ***Results:*** *APGAR at 5 min and Neonatal Intensive Care Unite (NICU) admission were not affected by mode of delivery. Long term neonatal outcome is similar in either mode of delivery. Maternal morbidity and duration of hospital stay is increased in caesarean births.* ***Conclusion:*** *Neonatal outcome did not depend on mode of delivery though maternal morbidity and cost of care is increased following Caesarean Section. Proper selection of cases and by improving skill & confidence in new generation obstetrician, vaginal delivery of singleton fetuses in breech presentation at term remains a safe option that can be offered to a woman in a tertiary care centre.*

Keywords: *Vaginal delivery, Caesarian section, Breech presentation.*

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Introduction

Incidence of breech presentation is 3% to 4% in singleton pregnancies at term. Mode of delivery in breech presentation has long been a topic of debate. Many studies including the Term Breech Trial (TBT)[1] have concluded that vaginal breech delivery at term is associated with increased perinatal morbidity and mortality[1-3]. Vaginal breech delivery has also been reported with an increased risk of fetal trauma[1-3]. The TBT by Hannah et al.[1] published in 2000, made many obstetricians believe that neonatal risks associated with term breech births are much higher among planned vaginal deliveries and implied that Caesarean Section (CS) should be systematically planned for all such women. These consequently led American College of Obstetricians & Gynaecologists (ACOG) to officially recommend in 2001 that CS should be performed in the case of a singleton breech at term. This recommendation led to a radical change in practice, with a CS rate as high as 86.9% in the United States in 2002 for breech presentations at term[4]. On the other hand, CS has risks; it is associated with more significant short- and long-term maternal morbidity, as well as a higher rate of complications during subsequent pregnancies than vaginal delivery[2]. Contrary to prevailing practice French obstetricians continued to perform vaginal breech deliveries at term, with reassuring results. Various retrospective observational studies done in Europe and published in the last decade show planned vaginal delivery rates for term breech presentations to be as high as 54%[5-9]. It was concluded in 2000 that "there is insufficient current evidence to allow the systematic performance of a CS in the case of a breech presentation"[10]. Various studies made ACOG to modify the previous recommendations in July 2006 declaring that vaginal delivery of a breech presentation may be acceptable under specific circumstances[11]. The 2006 Royal College of Obstetricians & Gynecologists (RCOG) Green Top Guidelines on breech birth outlines the obstetrical community's responsibility to the individual parturient: "If a unit is unable to offer the choice of a planned vaginal breech birth, women who wish to choose this option should be referred to a unit where this option is available"[12]. Keeping the abo ve background in mind we conducted an observational prospective study without modifying obstetric practices to evaluate neonatal and maternaloutcome following both mode of delivery for breech presentation at term.

Materials and Methods

This cross sectional comparative study conducted over a period of six months at The Department of Obstetrics and Gynaecology of ICMH from January to June 2016.

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104 women who presented to emergency during this period with singleton live fetus in breech presentation and more than 34 weeks of gestation in labour were enrolled in the study. 104 women of singleton breech presentation in term pregnancy were done elective c/s were included as a comparative group.

A thorough feto-maternal assessment including fetal wt. estimation, pelvic assessment and fetal heart rate was done. Women with associated absolute and relative obstetrical indication like contracted pelvis, placenta previa, IUGR, previous caesarean, fetal macrosomia, severe oligohydroamnios were prepared for caesarean while rest of the women, found to be fit for vaginal delivery, were counseled about the risks and benefits of vaginal and caesarean delivery and were planned accordingly after informed consent. Women willing for vaginal delivery were shifted to labor room and admission CTG was done to assess fetal well-being. Women for vaginal births were vigilantly monitored in labor room, partograph was maintained and at any time during labor if there is development of any indication for urgent delivery like cord prolapse, fetal distress, non-progress of labor CS was done after informed consent. Vaginal delivery was conducted by senior resident or senior post graduate in presence of pediatrician. Maternal and neonatal outcome in either mode of delivery was recorded. The variables in neonatal outcome included birth weight, APGAR score at 5 min, admission and duration of stay in neonatal intensive care unit. Maternal outcome was studied in terms of postnatal complications like pain, Post-Partum Haemorrhage (PPH) & duration of hospital stay. Statistical analysis of data was performedusing SPSS version 22.

Results

Total 208 women were enrolled in the study. Out of these 208 women, 30 came in advanced labor and delivered immediately and 53 were prepared for caesarean for associated obstetrical complications. Rest 207 (71.3%) women who were in early labor were carefully assessed and explained about the risks and benefits of either mode of delivery and were planned according to the patient's choice. 170 (82%) out of 207 gave consent for caesarean and only 37 women (18 %) were wiling for vaginal delivery. Hospital being a busy tertiary referral hospital, amidst heavy work load, at times due to unavailability of operation theatre, a large number of females consenting for caesarean delivered vaginally. Total 158 (54.5 %) delivered vaginally and 132 (45.5%) had caesarean section. The demographic characteristics (Table I) of the women in both groups were comparable.

Table-I:Parity distribution.

Parity	Vaginal delivery	Caesarean section
Nullipara	36 (22.78%)	82 (62.12%)
1	28 (17.72%)	29 (21.97%)
2	58 (36.71%)	21 (15.91%)
3	25 (15.82%)	0 (0.0%)
≥4	611 (6.96%)	0 (0.0%)

On analyzing it is observed that variables like extension of operative wound, postpartum haemorrhage were comparable in both vaginal and caesarean delivery groups but postpartum pain and average hospital stay was less following vaginal delivery than CS (4.3 days in caesarean and 2.2 days in vaginal births). The average birth weight in either group was comparable (Caesarean 2.65 kg and vaginal 2.58 kg). There was no intranatal death. There was one early neonatal death in vaginal delivery group and it was due to severe IUGR. Neonatal outcome following either mode of delivery was comparable (P = 0.545).

As shown in Table II, APGAR score at 5 min was similar in both the groups which implies that mode of delivery (P = 0.492) does not influence neonatal outcome. Neonatal nursery (NICU) admission was 19% in vaginal group compared to 17.4% in caesarean group (P = 0.426). Mean duration of NICU admission is 0.73 days in vaginal birth group and 1.02 days in caesarean delivery group (P= 0.359). Thus, NICU admission and stay was not related to mode of delivery but depends on overall status of mother and fetus.

Table-II:Neonatal outcome in the two groups.

Outcome variable	Vaginal delivery (n=104)	Caesarean deliver (n=104)	P value
APGAR sœre At min >7	18(11.4%)	14(10.6%)	0.492
NICU admission	30(19.0%)	23(17.4%)	0.426
NICU stay	0.73 days	1.02 days	0.359

Table-III: Comparison of neonatal outcome with other similar studies.

Criteria	Mode of delivery	Han et al.[14] (n=159)	PREMODA study[6] (n=8075)	Diro et al.[15]	Our study (n=290)
Birth weight (kg)	Vaginal	3.03	3-3.5		2.58
	Caesarean	3.1	3-3.5		2.65
NICU admission	Vaginal	2 (3.9%)	140 (5.6%)	10.8%	19%
	Caesarean	5 (4.6%)	280 (5.04%)	17.4%	17.4%
NICU stay (in days)	Vaginal	2.5	>4 days 0.92%		0.73
	Caesarean	3.5-4.1	>4 days 0.95%		1.02
APGAR at 5 min <7	Vaginal	1 (1.96%)	37 (1.48%)		18 (11.4%)
	Caesarean	1 (0.95%)	26(0.46%)		14 (10.6%)
Neonatal Death	Vaginal	0	0		1
	Caesarean	0	1(0.02%)		0

Discussion

Though recent guidelines[11-13] and few studies[6,7,14,15] advocates vaginal breech delivery in many of the specific circumstances but modern obstetricians are skeptical about vaginal delivery in breech presentation. While comparing our results with similar recent studies (Table III) we found that both perinatal and maternal outcome was similar in both arms of the study. Average birth weight and APGAR at 5 min were similar in both the groups. In our study NICU admissions were higher in both arms of our study but NICU stay was comparatively lower. Higher NICU admissions might be explained by the fact that many of our patients had not received any antenatal supervision or have been referred

from othercentre in labor. In our study maternal outcome was comparable in both the arms but postpartum pain and average hospital stay was more in caesarean delivered women.

The data reflected in our study have shown that with careful selection of patients, incidence of caesarean section can be reduced in breech presentation without increasing perinatal morbidity and mortality. In 2006, the RCOG and ACOG replaced their restrictive 2001 breech guidelines with new versions supportive of selected vaginal breech birth[11,12].

Outcome of our study well supports the Society of Obstetricians and Gynecologists of Canada (SOGC) revised recommendations 2009 [13] which stated "Planned vaginal delivery is reasonable in selected women with a term singleton breech fetus and careful case selection and labor management in a modern obstetrical setting may achieve a level of safety similar to elective Caesarean section".

This prospective study shows that neonatal outcome is good in caesarean delivery, while vaginal birth is an equally safe option for neonates with decreased maternal morbidity. Events in labor and fetal outcome suggest that vaginal delivery of a breech infant, after careful fetomaternal assessment, monitoring of fetal well-being and adequate progress of labor and delivery by an experienced obstetrician, provides comparable fetal outcome by elective caesarean section.

Conclusion

We conclude that in properly selected and managed cases the risk to the fetus is minimal following vaginal delivery, so it deserves consideration. Selection of appropriate candidates requires establishment of and adherence to strict guidelines and good clinical judgment. Caesarean delivery of all nullipara with breech presentations may not eliminate some of the inherent problems in breech per se, such as hip dislocations and depression. It is well established fact that caesarean section is associated with short and long term maternal morbidity as well as higher rate of complications during subsequent pregnancies than vaginal delivery. Thus, vaginal delivery should be attempted in well-selected cases in both nullipara and multipara in tertiary centre. Many newly qualified obstetrician-gynecologists do not have the experience necessary to conduct a breech Trial of Labor, and mentoring by more senior colleagues will be necessary if they are to attain these skills. As precipitous breech births will occur in all settings, theoretical and hands-on breech birth training using models should be part of basic obstetrical and midwifery training. Thus larger prospective studies are required with higher rate of antenatal care and breech diagnosed before onset of labor so that elective management could be planned and then compared so that we can more confidently offer women a choice of vaginal breech delivery.

Conflict of Interests: None.

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ORIGINAL ARTICLE

OPEN ACCSESS

Demographic Characteristics of Diabetic Neuropathy Patients Attended at a Tertiary Care Hospital in Dhaka City

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Abstract

Introduction: *Diabetic neuropathy is one of the early complications of diabetes mellitus patients which is very difficult to face in the daily living activities. The purpose of the present study was to see the demographic characteristics of diabetic neuropathy patients.* ***Metarials & Methods:*** *This descriptive type of cross-sectional study was conducted in the Department of Neurology including Neuropathy Clinic and in collaboration with department of Endocrinology at Banghabandhu Sheikh Mujib Medical University, Dhaka from January 2012 to December 2013 for a period of two (2) years. Adult diabetic patients presented with neuropathic pain with symmetrical involvement of distal limbs from indoor and outpatient department of Neurology including Neuropathy clinic as well as indoor and outpatient department of Endocrinology, BSMMU were enrolled in the study population. Data was collected by face to face interview. Information was collected by taking medical history and clinical examinations and subsequent laboratory investigations.* ***Results:*** *A total number of 102 cases were recruited for this study who were clinically diagnosed as painful diabetic polyneuropathy. Female was predominant than male 55(53.9%) cases and 47(46.1%) cases respectively. The male and female ratio was 1:1.2. Majority were in the age group of more than 55 years which was 55(53.9%) cases. The mean age with SD of the study population was 52.79±9.42 years. Among 102 patients type II DM was predominate than type I patients which were 95(92.2%) cases and 8(7.8%) cases respectively. The mean duration of DM with SD was 6.51±3.6 years. However the mean duration of neuropathic pain was 1.68±1.155 years.* ***Conclusion:*** *In conclusion majority of the diabetic neuropathy patients are female suffering from type II DM in the middle age.*

Keywords: *Diabetic Neuropathy, Demographic Characteristics, Type II DM.*

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Introduction

Painful diabetic polyneuropathy is a common manifestation of diabetes mellitus [1]. Painful diabetic polyneuropathy significantly affect on the quality of life, sleep, mood, mobility, ability to motor activities and social behaviors of patients [2]. High prevalence of diabetes and consequently painful neuropathy limits the daily activities of the patients [3].

Diabetic neuropathy is one of the most underestimated, very common and early among the complications of diabetes mellitus (DM) [4]. The most common type of neuropathy in DM is diabetic peripheral neuropathy (DPN), with up to 50% of patients experiencing some degree of painful symptoms and 10% to 20% having symptoms severe enough to warrant treatment [5]. A classic population-based study found some degree of neuropathy in 66.0% of patients with DM. Among those 54.0% with type 1 and 45.0% with type 2 DM had DPN. This study has also shown that 15% of DPN in type 1 and 13% in type 2 DM are symptomatic [6]. Prevalence of neuropathic symptoms increases with the duration of diabetes and quality of glycemic control[7]. Although 7.5% diabetics, at the time of diagnosis, can have neuropathy, the incidence increases to about 50% after 20 to 25 years of diabetic life[3]. Up to 25% of individuals with

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diabetes develop painful diabetic neuropathy, more than 14 million people in the United States with diabetes mellitus, nearly a quarter, suffer from painful diabetic neuropathy[5]. In this context this present study was undertaken to see the demographic characteristics of diabetic neuropathy patients.

Materials and Methods

This was a descriptive type of cross-sectional study conducted from January 2012 to December 2013 for a period of two (2) years.This study was carried out in the Department of Neurology including Neuropathy Clinic andin collaboration with Department of Endocrinology at Banghabandhu Sheikh Mujib Medical University, Dhaka. Adult diabetic patients presented with neuropathic pain with symmetrical involvement of distal limbs from indoor and outpatient department of Neurology including Neuropathy clinic as well as indoor and outpatient department of Endocrinology, BSMMU were enrolled in the study population. Patients with the age group of below 18 and above 65 years, having the history of drug hypersensitivity reaction, impaired hepatic and renal function, pregnant women and in lactation were excluded from this study. All respondents were selected purposively and conveniently-from theaforementioned study places. Data collection sheet was used to collect patient's information. Data was collected by face to face interview. Information was collected by taking medical history and clinical examinations and subsequent laboratory investigations. Data was analyzed by computer with the help of SPSS version 21.0 software package. All data was recorded systematically in a preformed data collection sheet and expressed the quantitative variables as mean±SD. It was analyzed for categorical variables by using chi-squared test and for continuous variable t-test used. For all statistical tests, we considered p value <0.05 as statistically significant. Prior to the commencement of this study, the research protocol was approved by the Institutional Review Board (IRB) of BSMMU, Dhaka.

Results

A total number of 102 cases were recruited for this study who were clinically diagnosed as painful diabetic polyneuropathy. In this study female was predominant than male which was 55(53.9%) cases and 47(46.1%) cases respectively. The male and female ratio was 1:1.2 (Table I).

Table-I: Distribution of the Respondents by Gender (n=102).

Gender	Frequency	Percentage
Female	55	53.9
Male	47	46.1
Total	**102**	**100.0**

*A*mong 102 patients majority were in the age group of more than 55 years which was 55(53.9%) cases followed by 45 to 54 years, 35 to 44 years and 35 to 44 years which were 30(29.4%) cases, 12(11.8%) cases and 5(4.9%) cases respectively. The mean age with SD of the study population was 52.79±9.42 years with the age range of minimum 25 years and the maximum was 65 years (Table II).

Table-II: Distribution of the Respondents by Age Groups (n=102).

Age Group	Frequency	Percentage
25 to 34 Years	5	4.9
35 to 44 Years	12	11.8
45 to 54 Years	30	29.4
More than 55Years	55	53.9
Total	**102**	**100.0**
Mean (±SD)	52.79±9.42 (Range 25-65)	

Among 102 patients type II DM was predominate than type I patients which were 95(92.2%) cases and 8(7.8%) cases respectively. The ratio of type I and type II DM was 1:11.7 (Table III).

Table-III: Distribution of the Respondents by Type of DM (n=102).

Type of DM	Frequency	Percentage
Type I	8	7.8
Type II	94	92.2
Total	**102**	**100.0**

The mean duration of DM with SD was 6.51±3.6 years. However the mean duration of neuropathic pain was 1.68±1.155 years (Table IV).

Table-IV: Mean Duration of DM and Neuropathic Pain among the Study Population.

Variables	Mean±SD
Duration of DM (yrs)	6.51±3.6
Duration of Neuropathic Pain (yrs)	1.68±1.155

Discussion

Painful diabetic polyneuropathy significantly affect on the quality of life, sleep, mood, mobility, ability to motor activities and social behaviors of patients[8]. High prevalence of diabetes and consequently painful neuropathy limits the daily activities of the patients. This cross-sectional study was conducted in the departments of neurology including neuropathy clinic as well as Department of Endocrinology, BSMMU, Dhaka. A total number of 102 diabetic neuropathy patients have been recruited for this study who are clinically diagnosed as painful diabetic polyneuropathy. In this study female was predominant than male which was 55 (53.9%) cases and 47(46.1%) cases respectively. The male and female ratio was 1:1.2. Thus it is very clear that diabetic neuropathy is more commonly occur in the female than male. Similarly Galer et al[7] have found 50% male and their findings are comparable with the findings of the present study. In the PHN group female patients

dominate over male patients which reflect the gender distribution in this age in the general population. In DPN males are relatively more frequently affected[4].

Among 102 patients majority were in the age group of more than 55 years which was 55(53.9%) cases followed by 45 to 54 years, 35 to 44 years and 35 to 44 years which were 30(29.4%) cases, 12(11.8%) cases and 5(4.9%) cases respectively. The mean age with SD of the study population was 52.79±9.42 years with the age range of minimum 25 years and the maximum was 65 years. Interestingly, age has no influence on sensory symptoms in both neuropathic entities. The fact that younger diabetic patients have slightly more intense neuropathic pain was unexpected. Again, the explanation might be the selection bias in specialized pain centers. Many younger patients with mild pain have been missed.

Painful diabetes neuropathy is common in type II diabetes mellitus. In this study among 102 patients type II DM was predominate than type I patients which were 95(92.2%) cases and 8(7.8%) cases respectively. The ratio of type I and type II DM was 1:11.7. In a study conducted by Zeigler et al[8] pain in the feet and legs occurred in 11.6% of insulin dependent diabetics and 32.1% of noninsulin dependent diabetics.

The typical DPN is a chronic, symmetrical, length-dependent sensorimotor polyneuropathy (DSPN) and is thought to be the most common variety[9]. It develops on or with a background of long standing hyperglycemia, associated metabolic derangements increased polyol flux, accumulation of advanced glycation end products, oxidative stress, and lipid alterations among other metabolic abnormalities and cardiovascular risk factors[10-11]. Alterations of microvessels, similar to those observed in diabetic retinopathy and nephropathy, appear to be associated with the pathologic alterations of nerves[12]. Total hyperglycemic exposure is perhaps the most important risk covariate[13]. This variety has been shown to be stabilized, perhaps even improved, by rigorous glycemic control. This polyneuropathy has been shown to be statistically associated with retinopathy and nephropathy[14]. Autonomic dysfunction and neuropathic pain may develop over time. The atypical DPNs are different from DSPN in several important features, i.e., onset, course, manifestations, associations, and perhaps putative mechanisms[15]. They appear to be intercurrent varieties, developing at any time during the course of a patient's diabetes[16]. Onset of symptoms may be acute, subacute, or chronic, but the course is usually monophasic or fluctuating over time. Pain and autonomic symptoms are typical features[17] and altered immunity has been suggested. Studies have suggested that impaired fasting glucose or impaired glucose tolerance (IGT) is more common in chronic idiopathic axonal polyneuropathy[18].

Conclusion

Diabetic neuropathy is a permanent irreversible debilitating but preventable microvascular complication. It produce a significant devastating effect on quality of life. Prevalence higher with increasing age and duration of diabetic life. Strict glycemic control improve quality of life.

Conflict of Interests: None.

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ORIGINAL ARTICLE OPEN ACCSESS

Risk Factors Analysis for Abnormal Semen Characteristics in Sub-Fertile Male

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Abstract

Introduction: *This study aimed to identify the risk factors for abnormal semen parameters in male partner of sub-fertile couples.* ***Materials & Methods:*** *This was a prospective study of 100 diagnosed infertile & sub-fertile couples in the age group between 23-58 yrs old male were from 1st March 2013 to 28th Feb 2014 treated in Dhaka Combined Military Hospital (CMH). On the basis of sperm count the cases were grouped as follows. normozoospermia, oligozoospermia & azoospermia. Semen analysis was done in all the cases, The results were described with arithmetic mean and standard deviation. Male partners with normal semen parameters was undertaken among the sub-fertile couples attending the General Outpatient Department (GOPD) of CMH Dhaka. The history was taken from selected individual and it includes personal, socio-economics, occupational, medical, surgical history and drug intake to find out risk factors for abnormal semen parameters.* ***Results:*** *In Normozoospermia mean and SD of sperm count, sperm abnormally, sperm motillity were 65.98±5.05, 24.44±1.57 and 45.5±2.94 respectively. In 0ligozoospermia the mean and SD of sperm count, sperm abnormality, sperm mtility were 7.74±1.23, 41.1±3.78, 14.54±2.77 respectively. In azoospermia the mean and SD of sperm count, sperm abnormality, sperm motility were absent.* ***Conclusion:*** *Here data statistically showed person with normozoospermia having good sperm morphology & motility than oligozoospermia and azoospermic subjects thereby causing male infertility which was responsible for hindrance in achieving pregnancy clinically. Using tight undergarment or working in hot atmosphere depresses spermatogenesis. Mumps orchitis permanently damage spermatogenesis. Bacterial or viral infection depresses the sperm count. Diabetes, malnutrition, heavy smoking reduces spermatogenesis. β-blocker, antihypertensive were likely to hinder spermatogenesis. The efferent ducts might be obstructed by infection like tubercular, gonococcal or by surgical trauma.*

Keywords: *Sub- Fertility, Sperm Count.*

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Introduction

Sub- fertility, previously known as infertility, is defined as the inability of a couple to achieve conception after one year of unprotected coitus[1]. Sub-fertility causes great distress to many couples & causing increasing number of them to seek specialist fertility care. It is a cause of violence against women. In general population, conception is expected to occur in 84% of women with in 12 months and 92% within 24 months[2]. Sub-fertile couples pass through a painful life with psychological stress and a social disgrace in our country. It is estimated that the infertility affects 15% of couples. About 5% of male sub fertility is correctable. Male sub-fertility has been neglected more than female sub fertility worldwide, especially in developing countries including Bangladesh and is often to refer patients for specialist opinion. According to a study by Chain in Singapore in 2000, smoking, density of sperm, viability of sperm, were found to be significant predictor for sub-fertility among men[3].

However, very little studies have been done to identify the original causes of male infertility and in several reports it was found that the major part of male infertility is unexplained [4].

Materials and Methods

This is a prospective study carried out with infertile and sub fertile couples treated in Dhaka CMH in the period from 01 March 2013 to 28th Feb 2014. Semen specimens were obtained from 100 consecutive male patients between 23 and 58 yrs of age. These patients attended clinical pathology laboratory, Armed Forces Institute of pathology (AFIP) for fertility evacuation. All subjects or patients were asked to produce a first semen sample after a sexual abstinence of 3 days, as because increase in abstinence with individual days significantly affects semen volume, sperm count, sperm

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motility and vitality. In particular, sperm motility (percent of sperm movement) peaked after one day of abstinence in men with infertility problems. A new study shows that sperm from men with low sperm counts reached their peak condition after one day of abstinence[5].

Data were collected through interview of couples who did not have child for last one year or longer even though they have had frequent unprotected sexual intercourse or couples had a child but now they are unable to procreate due to some unknown reason using structured questionnaire. Sampled size was 200 (100 infertile & sub fertile couple and 100 control subjects).

Data were processed and analyzed using Computer based SPSS (statistical package for social science) soft-ware for windows, version 16. Data presented on categorical scale will compared between groups with the help of Chi-square (X^2) Test. Quantitative data were compared between groups using Student's t-Test, multivariate logistic regression analysis and fisher's exact test, as applicable. P value of less than 0.05 will be considered as significant.

Results

Table I shows that, in both case and control groups most of the respondents were in the 23-50 to 40 years' age group; out of the 100 respondents each in case and control group, 66% of cases and 72% of controls were in the age group. Mean ± SD of age was calculated to be, (35.60±3.049) for cases and for controls (36.88±2.387). The p-value was 0.5976 for t-test between the means and 0.565525 for chi-square among the age groups, which means there was no statistically deference in age distribution between the cases and controls.

Occupation status of the respondents more than half (54.0%) of the cases were in service or office jobs, while controls counted 46 (46.0%). There was no statistically significant difference in distribution of occupation among the groups (p-value=0.5627).

Diabetes Mellitus [odds ratio= 2.35; 95%CI = 0.4382 to 4.6668] and history of mumps [OR = 3.69; 95%CI = 0.7469 to 18.2113] were prevailing among cases.

Table-I: Distribution of the participants by their demographic variables (n=100).

Age years	Case (percent)	Control (percent)		
			t-test	p-value
<23	8.0	5.0	0.5727	0.5976
23-50	66.0	72.0		
>50	26.0	23.0		
Total	100.0	100.0		
Mean± SD	35.60±3.049	36.88±2.387		
X^2=1.14; p-value=0.565525				

Occupation			**X^2**	**p-value**
Service/jobs	54.0	46.0	2.047	0.5627
Business	33.0	36.0		
Daily labourer	8.0	13.0		
Agriculture	5.0	6.0		
Total	100.0	100.0		

Table II Shows that, there was statistically no difference between two group in duration of infertility (P=0.4754 for t-test and 0.68045 for chi-square). Both groups had a similar type of distribution of duration of infertility.

Table-II: Distribution of the respondents by their duration of trial for a baby.

Duration of infertility	**Case Percent**	**Control Percent**	**t-test**	**p-value**
<2 years	11.0	9.0	0.7166	0.4754
2-5 years	43.0	49.0		
>5 years	46.0	42.0		
Total	100.0	100.0		
Mean±SD	5.35±0.943	5.21±0.943		

X^2=0.77; p-value=0.68045

Table III shows that the incidence of STI was higher among the cases [odds ratio=3.13; 95% CI = 0.6158 to 15.8863]. Urethral discharge was the most occurring STI in both cases and controls.

Table-III: Distribution of the patients by their history of STs (n=100).

H/O diseases	Case	Control
Yes	6.0	2.0
No	94.0	98.0
Agents		
Syphilis	1.0	0.0
Urethral discharge	4.0	2.0
Others	1.0	0.0
Total	6.0	2.0

Table IV Shows that, There was none with a history of taking ά-Methyldopa as anti-hypertensive. there was slightly higher number of respondents among the cases taking H_2 Blocker [OR=1.102; 95%CI=0.5981 to 2.0305]; but there was no strong positive association.

Table-IV: Distribution of the patients by their history of taking medications.

ά -Methyldopa	Case	Control
	Percent	Percent
No	100.0	100.0
H_2 Blocker		
Yes	30.0	28.0
No	70.0	72.0
Total	100.0	100.0

Table V Shows that, the % of smoking among the cases was higher [OR = 1.71; 95% CI = 0.9713 to 3.0257]. The cases exceeded the controls in both duration of smoking and number of sticks per day. The difference of both duration (p=0.0366 for t= test and 0.0446 for chi-square) of smoking and amount of sticks smoked daily (p=0.024 for t= test and 0.000167 for chi-square) was statistically significant.

Table-V: Distribution of the respondents according to their smoking parameters.

Duration	Case	Control	t-test	p-value
1-5 years	14.0	19.0	2.6797	0.0366
6-15 years	23.0	13.0		
>15 years	11.0	3.0		
Mean±SD	10.49±1.783	7.5±1.342		
X^2 = 6.22; p-value = 0.0446				
Number of sticks per day				
5-10	10.0	23.0		
10-20	21.0	8.0		
>20	17.0	4.0		
Total	48.0	35.0 35.0		
Mean±SD	16.98±3.336	9.24±1.792	3.5402	0.024
X^2 = 17.39; p- value =0.000167				

Table VI Shows results of semen analysis in different groups of patients. These patients are classified into three groups like Normozoospermia, Azoospermia, Oligozoospermia.

Table-VI: Semen analysis parameters in different groups of patients.

Patients	N (n=59)	A (n=22)	O (n=19)
Age (years)	33.5±5.8 (56%)	31±6.9 (141%)	39±6.6 (205%)
Volume (ml)	3.36±16 (6%)	2.36±24 (11%)	2.5±.17 (13%)
Sexual Abstunecnce (days)	4±1 (7%)	4±2 (18%)	4±1 (21%)
Semen pH	7.90±21 (13%)	7.92±.24 (36%)	8.11±.38 (43%)
Sperm count (10million/ml)	65.98±5.05 (112%)	Nil (0%)	7.74±1.23 (41%)
Sperm abnormality	24.44±1.57 (41%)	Nil (0%)	41.10±3.78 (216%)
Sperm motility	45.5±2.94 (77%)	Nil (0%)	14.54±2.77 (76%)

N= Normozoospermia, A= Azoospermia, O= Oligozoospermia, n= Number of subjects.

Discussion

Combined military hospital (CMH), Dhaka is a renowned tertiary hospital in Bangladesh where this study were undertaken. Here 100 semen samples of male partners of sub fertile couples (normospermic as controls and 100 samples from male partners with abnormal semen) were analyzed in this particular study with the view to find out the risk factors of semen parameters.

During study most of the samples (case and control group) were collected from the age group between 25 years to 45 years. Among them 66% were case and 72% were control. Mean ± SD of age was calculated to be, (35.60 ± 3.049) for cases and for controls (36.88 ± 2.387). The p-value was 0.565525 for chi-square, which means there was no statistical difference in age distribution between the groups. A similar study was under taken in Eastern Nigeria, 1,110 Igbo males attending infertility clinic, where the age group selected was between 30-50 years[6].

About three-fourth of the participants in both cases (74.0%) and controls (72.0%) were Muslims. More than half (54.0%) of the cases were in service or office jobs, while controls counted (46.0%). There was no statistically significant difference in distribution of occupation among the groups (p-value = .5627). In both the cases and controls, respondents were basically from middle and lower social-economic classes. Chi-square calculates, p-value = 0.8923; which explains that there was no significant statistical difference in the social-economic classes.

There was statistically no difference between two groups in duration of infertility (p=0.4754 for t-test and 0.68045 for chi-square). Both groups had a similar type of distribution of duration of infertility. Out of the 200 respondents only 7 (3.5%) had previous marriage. Inability to re-produce was the cause of discontinuation of previous marriage. 96% cases and 97% controls were struggling to get a baby being persistent with the same partner. About two-fifth of the couples in both groups (42% case and 38% controls) had intercourse for 3 to 5 times per week. On an average both group had intercourse for about 3 times per week. There was no statistical significant difference in frequency of intercourse among the groups (p-value = 0.625 for t-test and 0.767206 for chi-square).

Diabetes Mellitus [odds ratio = 2.35; 95% CI = 0.4382 to 4.6668] was found statistically significant as a cause of semen abnormality and according to Delfing in 2007, Diabetes Mellitus has a negative impact in terms of sperm quality[7]. Therefore it is shown that both the studies have complemented / corroborated each other. Though, Vignon et al. (1991) demonstrated Diabetes causes higher sperm concentration and abnormal morphology with no difference in motility, many of these diabetic men had fathered children and the authors concluded that Diabetes Mellitus in itself was not a cause o f sub-fertility[8].

History of mumps [OR = 3.69; 95% CI =0.7469 to 18.2113] were found to be prevailing among the cases. The incidence of STIs was higher among the cases [odds ratio = 3.13; 95% CI = 0.6158 to 15.8863]. Urethral discharge was the commonest occurring STI in both cases and controls.

A prospective case control study, conducted in Mongolia during the year 1993-2002, showed adjusted odds ratios of 3.4 for mumps orchitis and 2.3 for other orchitis. Gonorrhea was found, in that study as well, the most commonly reported STI. However as a predictor of azoospermia STIs had very high OR, being 5.6 in patients with Gonorrhoea and 7.6 in patients with other STIs[9].

There was none with a history of taking α-Methyldopa as anti-hypertensive. There was slightly higher number of respondents among the cases taking H_2 blocker [OR = 1.102; 95%CI = 0.5981 to 2.0305]; but there was no strong positive association. But according to Peter N. Kolettis in 2003, use of the drug, H_2 blocker-cimetidine can impair fertility[10]. When inquired about alcohol consumption, nobody admitted of being alcoholic and nobody had past pelvic surgery history.

The percentage of smoker among the cases was higher [OR = 1.71; 95% CI = .9713 to 3.0257]. The cases exceeded the controls in both duration of smoking and number of sticks smoked per day. The difference of both duration (p=0.0366 for t-test and 0.0446 for chi-square) of smoking and amount of sticks smoked daily (p=0.024 for t-test and 0.000167 for chi-square) was statistically significant. According to a study done by Chia in Singapore in 2000, smoking, density of sperm and the viability of sperm were found to be significant risk factors for infertility among men[3]. In a study in Turkey, cigarette smoking found to be negatively correlated with progressive motility of sperm (r= -0.1464, p=0.042)[11]. A study was performed on 395 outdoor patient under infertility department of the BIRDEM, the outcome of this study showed that sperm concentration is not very much affected by smoking but the quality of sperm (sperm motility specially rapid liner movement) is grossly affected by smoking and that in turn influences the fertility status [12].

All the specimens were collected at laboratory by masturbation; so, there was a minimal delay between collection and examination. The percentages of spillage were negligible. Highest number of controls was oligospermic (42.0%); followed by, azoospermia (18.0%), asthenozoospermia (16.0%), teratozoospermia (4.0%). The study, conducted by the University College Hospital, Ibadan, Nigeria, revealed 27.3% of 824 subjects had abnormal semen analysis and among them asthenozoospermia was the commonest (27.8%) of the disorders and 6.7% subjects had azoospermia. The most common multiple factors abnormality in the study population was astheno/ Oligozoospermia (25.5%) while three factor defect –Oligo / Astheno. Teratozoospermia was noticed in 13.1% of the subjects[13]. Another study in Nigeria, 74% of subfertile men were normozoospermic, while 16.19%, 5.57% and 4.07% were azoospermic, necrozoospermic and asthenozoospermic respectively[14]. In Islamabad, a study showed, the Mean of sperm concentration was 0 mil/ml in azoospermic, 6.7±1.7 mil/ml in oligospermic, 45.8±8 mil/ml in asthenozoospermic and 86.8±7.5 mil/ml in normozoospermic[7].

Conclusion

In Conclusion, from the study under taken in CMH for a period of one year the following conclusions were obtained: Abnormal characteristics of semen parameters found among the cases were: oligospermia (42.0%), azoospermia (18.0%), asthenozoospermia (16.0%), teratozoospermia (13.0%), oligi-teratozoospermia (7.0%) and oligo-astheno-teratozoospermia (4.0%). No aspermia was found. Majority of the male in both groups were between 25 to 40 years of age group (66% case and 72% control). About three-fourth of the participants in both groups respondents were basically from middle and lower socio-economic classes. Statistically there was no difference between two groups in duration of infertility (P=0.475 and 0.68045). Out of total 200 respondents only 7 (3.5%) had previous marriage. On an average both group had intercourse for about 3 times per week and there was no statistical significant difference in frequency of intercourse among the groups (p-value=0.625).

Diabetes mellitus [odds ratio=2.35; 95% CI=0.4382 to 4.6668], history of mumps [OR= 3.69; 95% CI=0.7469 to 18.2113, history of STI [odds ratio=3.13; 95% CI= 0.6158 to 15.8863] may had strong association with abnormal semen parameters. Intake of H_2 blocker [OR= 1.102; 95%CI=0.5981 to 2.0305] was not found to be significantly associated with the semen abnormality. But smoking of cigarettes [OR= 1.71; 95% CI=0.9713 to 3.0257] for longer duration (p=0.47) and smoking higher number of sticks per day (p=0.39) was statistically significantly associated with abnormal parameters.

Conflict of Interests: None.

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ORIGINAL ARTICLE OPEN ACCSESS

Plasma Fibrinogen and Fibrin Degradation Product (FDP) in Preeclampsia

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Abstract

Introduction: *Hypercoagulable state is seen in preeclampsia which acts as a risk factor for thromboembolism & DIC. Altered coagulation indices (serum Fibrinogen & FDP) have been reported in patients with preeclampsia and have been suggested as a sensitive marker for detection of bleeding complications. This study was carried out to compare the coagulation indices in preeclamptic women.* ***Materials & Methods:*** *This cross sectional study was conducted in the Department of Physiology, Dhaka Medical College (DMC), Dhaka from January to December 2014. Total 100 women aged 18 – 40 years were selected from the department of Obstetrics & Gynaecology of DMCH, Dhaka for this study. Among them 50 were preeclamptic and age matched 50 healthy nonpregnant women were considered as control group. Fibrinogen & Fibrin Degradation Product (FDP) were analyzed on automated coagulation analyzer.* ***Result:*** *In this study, serum Fibrinogen & FDP were significantly higher in preeclamptic than those of healthy women. Moreover, 100% & 64% preeclamptic patient had raised serum Fibrinogen & FDP respectively.* ***Conclusion:*** *From this study it can be concluded that serum Fibrinogen & FDP are directly related with preeclampsia.*

Keywords: *Preeclampsia, Plasma fibrinogen, Fibrin degradation product.*

Number of Tables: 03; Number of References: 16; Number of Correspondences: 05

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Introduction

Preeclampsia is a pregnancy specific, idiopathic multisystem disorder characterized by the development of hypertension and proteinuria after the 20 weeks of gestation[1,2]. It may present itself as a primary disorder or may complicate pre-existing pathology like chronic hypertension or chronic nephritis[3].

Preeclampsia can be categorized clinically as (1) mild preeclampsia (blood pressure >140/90mm Hg and proteinuria upto 1+) and (2) severe preeclampsia (blood pressure >160/110mm Hg with proteinuria > 1+)[4]. According to the time of onset, preeclampsia can also be categorized as (1)early onset preeclampsia (before 34 wks gestation) and (2) late onset preeclampsia (after 34 wks gestation)[5].

Preeclampsia creates a functional derangement of multiple organ system. Complications of preeclampsia include eclampsia, placental abruption, ascities, hepatic infarction and rupture, intra-abdominal bleeding, pulmonary edema and acute renal failure. Twenty percent (20%) of women with severe preeclampsia develops HELLP syndrome (hemolysis, elevated liver enzymes, low platelets) and the same percentage (20%) among HELLP syndrome develops disseminated intravascular coagulation (DIC). Complications affecting the developing fetus include intrauterine growth retardation, prematurity, oligohydramnios, bronchopulmonary dysplasia and increased risk of perinatal death[2]. During normal pregnancy profound changes occur in the coagulation and fibrinolytic system of the mother causing a hypercoagulable state. In preeclampsia there is a distinct possibility of accentuation of this hypercoagulable state of pregnancy[4].

Numerous studies observed coagulation abnormalities in preeclampsia. The level of anticoagulants such as antithrombin III, protein C and protein S are decreased in these groups. The clotting factors such as factor VIII and von Willebrand factors are elevated in preeclampsia. There is also increase in plasminogen activator inhibitor type 1(PAI-1) in preeclampsia. So preeclampsia is a highly thrombotic and procoagulant state[1].

Fibrinogen is the primary blood clotting factor. Fibrin clot is formed from fibrinogen. Fibrinogen plays a vital role in the process of inflammation, atherogenesis and thrombogenesis. Fibrinogen is a cofactor in platelet activation and may directly contribute to platelet plaque

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formation. This higher serum fibrinogen level may increases the blood viscosity, platelet aggregation and causes thrombus formation[7,8].

Fibrin degradation products are component of the blood produced by clot degeneration. These are produced by the action of plasmin on deposited fibrin.

An excess of FDP indicates the increased intravascular coagulation and increase in fibrinolytic activity in severe preeclampsia[9].

Several studies showed increased serum fibrinogen and FDP in patients with severe preeclampsia9,10. But some studies found low serum fibrinogen level in severe preeclampsia[6, 11,12].

From the above studies, it has been observed that the result is conflicting. Several studies have done abroad to observe the fibrinogen and FDP levels in these groups but their exact relationship with preeclampsia still debatable. As, there is less published data available regarding this topic in our country, the relationship among these parameters in the Bangladeshi preeclamptic is not precisely known. Furthermore, we need a data from which we can compare these parameters in our population.

Materials and Methods

This cross sectional analytic study was conducted in the Department of Physiology, Dhaka Medical College, Dhaka, during the period from January 2014 to December 2014. Protocol of this study was approved by Ethical Review Committee of Dhaka Medical College, Dhaka. For this study, 50 diagnosed preeclamptic women aged 18 to 40 years were selected as group B.Age matched 50 healthy nonpregnant women were considered as control group (group-A) for comparison. The subjects were selected from department of Obstetrics and Gynaecology, Dhaka Medical College Hospital and from personal contact in different areas of Dhaka city by simple random sampling. After selection the nature, purpose, benefit and risks of the study were explained in details. Informed written consent was taken from the participants. Before taking blood detailed family and medical history were taken and recorded in a prefixed data schedule. Plasma fibrinogen and fibrin degradation product (FDP) were estimated on automated coagulation analyzer, Sysmex CA – 500 series.Plasma fibrinogen was estimated by using the Dade ® Fibrinogen determination reagent. Plasma fibrinogen was estimated by using the latex particles coated with monoclonal antibodies to FDP. In addition BMI was calculated and blood pressure was measured. Presence of proteinuria was determined by conventional heat coagulation test[13]. Then interpretation of the heat coagulation test was done according to presence of turbidity in the urine as nil/trace (0), 1+, 2+, 3+ and 4+ [13,14]. For statisticalanalysis one-way ANOVA test, Bonferroni test and Pearson's correlation co-efficient (r) test were performed by using SPSS version 22.

Results

In this study, the plasma fibrinogen level was significantly ($p<0.001$) higher in preeclampsia in comparison to control group. Again, the plasma fibrin degradation product (FDP) was significantly ($p<0.001$) higher in preeclampsia in comparison to control group.

Table-I: General characteristics of the subjects in different groups (n=100).

Parameters	Healthy nonpregnant (n=50)	Preeclampsia (n=50)
Age (years)	28.24±4.63	26.86±5.33
BMI (kg/m^2)	26.17±2.58	27.72±3.5
SBP (mmHg)	112.2±7.1	159.8±19.2*
DBP (mmHg)	73.0±6.1	110.0±9.9*
Urinary protein level (gm/L)	-	1.34±1.72*

Results are expressed as Mean ±SD.Figures in parentheses indicate range.One-way ANOVA test was performed to compare among groups. n = Number of subjects.*$p<0.001$, compared to control.BMI= Body mass index; SBP= Systolic blood pressure; DBP= Diastolic blood pressure.

The mean systolic(159.8±19.2mmHg)anddiastolic (110.0±9.9mmHg)blood pressure were significantly higher in preeclampsiacompared to healthy non pregnant women(SBP112.2±7.12 mmHg, DBP 73.0±6.1mmHg) difference was significant. Again, the mean urinary protein level was significantly higher 1.34±1.72 gm/L in preeclampsia compared tohealthy non pregnant women.

Table-II: Fibrinogen and FDP of the subjects in different groups (n=50).

Groups	N	Fibrinogen(mg/dl)	FDP (µg/ml)
A	50	312.4±102.5	4.85±2.64
B_2	50	665.2±99.1*	14.1±118*

Results are expressed as Mean ±SD. Figures in parentheses indicate range. One-way ANOVA test was performed to compare among four groups. Bonferroni test was performed to compare between groups. n = Number of subjects;* $p < 0.05$.

The mean serum fibrinogen (665.2±99.1mg/dl) and FDP(14.1±118 µg/ml)level were significantly higher in preeclampsia thanhealthy non pregnant women.

Table-III: Distribution of the subjects by Fibrinogen and FDP in study groups.

Parameters		B_2 n(%)
Fibrinogen	< 400 mg/dl	0 (0.0%)
	> 400 mg/dl	50 (100%)
FDP	< 5µg/ml	18 (36%)
	> 5 µg/ml	32 (64%)

Results are expressed as frequency and percentage. n = Number of subjects

Group A : Healthy adult non pregnant women (Control group)

Group B_2 : Women with preeclampsia (Study group)

Moreover in this study, elevated plasma fibrinogen (>400mg/dL) and plasma fibrin degradation product (FDP) (>5 µg/ml) were found in 100% and 64% of preeclamptic women respectively.

Discussion

In the present study, mean plasma fibrinogen level was higher inpreeclamptic women than healthy nonpregnant female.This finding was in agreement with those of different researchers of different countries[9, 10]. But some investigators did not find significant difference of plasma fibrinogen level between preeclamptic women and healthy non pregnant female[6, 11].

In this study plasma fibrin degradation product (FDP) was higher in preeclamptic women than healthy non pregnant female. This result is similar to other authors[6,9-12,15].

But some investigators did not find significant difference of plasma fibrin degradation product (FDP) level between preeclamptic women and healthy non pregnant female[16].

Literature review suggested that raised plasma fibrinogen and FDP in preeclampsia were due to the exaggerated systemic inflammatory response and fibrinolytic activity[9].

In the present study, raised plasma fibrinogen and FDP in preeclampsia than control women is attributed to these facts.

Conclusion

From the result of this study, it may be concluded that increased plasma fibrinogen and FDP level may act as a future risk of developing thromboembolic disorder and disseminated intravascular coagulation in preeclampsia. Therefore, estimation of these parameters in preeclampsia may provide information for further medical care and will minimize the further complications thereby reducing both maternal and fetal mortality and morbidity.

Conflict of Interests: None.

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ORIGINAL ARTICLE

OPEN ACCSESS

Volume Preload versus Ephedrine Infusion for Prevention of Hypotension Due to Spinal Anesthesia for Cesarean Section

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Abstract

Introduction: *Spinal anesthesia is used for 95% of planned cesarean sections in Bangladesh. It provides a fast and profound sensory and motor block. However, hypotension is a very common complication of spinal anesthesia during cesarean section, causing significant maternal and fetal morbidity and mortality. It could be associated with severe nausea, vomiting and even unconsciousness and pulmonary aspiration in the mother and for the baby hypoxia, acidosis and neurological injuries may result.* ***Materials and Methods:*** *This prospective randomized comparative study was conducted in the Department of Anesthesiology at Institute of Child and Mother Health (ICMH) from July 2017 to December 2017, on 110 adult pregnant women who underwent caesarean delivery. All study patients were randomly allocated into two groups. Group I (F group) patients received volume preloading with 15 ml/kg Ringer lactate solution before induction of spinal anesthesia and group II (E group) patients received IV ephedrine (5 mg in 1st minute after spinal anesthesia, 5 mg in 2nd minute and thereafter 1 mg in every minute for 15 minutes).* ***Results:*** *A statistically significant difference in the incidence of hypotension between group F (48%) and group E (24%) was found (p = 0.03). Regarding side effects, statistically significant (p = 0.23) incidence of nausea and vomiting was found in group F (20%) in comparison to group E (12%).* ***Conclusion:*** *We conclude that prophylactic IV ephedrine infusion is more effective than fluid preload to prevent spinal anesthesia-induced hypotension during caesarean section without causing significant tachycardia or hypertension.*

Keywords: *Cesarean section, Ephedrine, Hypotension, Spinal anesthesia.*

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Introduction

Anesthesia for caesarean delivery is generally chosen considering safety of both the mother and the fetus. Regional anesthesia is commonly used for almost 95% of planned cesarean deliveries[1]. Spinal anesthesia has several advantages as it provides fast, profound sensory and motor block[2], adequate muscle relaxation[3], better airway control with reduced risk of airway obstruction or aspiration of gastric contents. Postoperative deep vein thrombosis and pulmonary emboli are less common following spinal anesthesia[4], due to earlier ambulation and discharge. However, the most common complication of spinal anesthesia during cesarean section is hypotension[5] which can cause significant maternal and fetal morbidity and mortality[6]. Other serious maternal complications include nausea, vomiting, unconsciousness and pulmonary aspiration and hypoxia, acidosis and neurological injuries for the baby[7]. Hypotension occurs due to sympathetic nervous system blockade, leading to diminished systemic vascular resistance and peripheral pooling of blood which reduces cardiac output[8]. The incidence of hypotension is higher in cesarean sections due to significant cardiovascular changes of the parturient, compression of inferior venacava by gravid uterus and development of collateral venous circulation in the epidural space, leading to a decrease in the amount of cerebrospinal fluid (CSF) in the lumbosacral area and higher cephalic spread of local anesthetics[9]. Different techniques have been employed to reduce the incidence and severity of hypotension induced by spinal anesthesia including routine use of lateral uterine displacement[10],

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infusion of up to 2 liters of IV fluid for intravascular volume expansion[11] or use of vasopressor (ephedrine) may be an effective alternative for hypotension prevention[12]. Ephedrine is a sympathomimetic agent, non-catecholamine-mediated, which directly stimulates alpha and beta adrenergic receptors and producing its hypertensive effects through releasing nor-epinephrine from autonomic nerve endings[12]. On the other hand, IV infusion of Ringer lactate solution may reduce the risk of hypotension but does not eliminate it[11]. The primary aim of this study was to compare the efficacy of ephedrine infusion versus crystalloid preloading in reducing the incidence of hypotension during spinal anesthesia for cesarean section. The secondary aim was to detect complications including nausea & vomiting, chest symptoms and number of ephedrine boluses to treat hypotension.

Materials and Methods

This prospective randomized comparative study was conducted in Department of Anaesthesiology at Institute of Child and Mother Health (ICMH) from July 2017 to December 2017. One hundred and ten adult pregnant women scheduled for caesarean delivery were enrolled. Inclusion criteria were set as age between 20-40 years, with Body Mass Index (BMI) between 25 and 40 and American Society of Anesthesiologist (ASA) physical status class I or class II. Patients who refused spinal anesthesia, with history of allergic reactions to local anesthetics and opioids, patients with coagulopathy due to any cause, patients with severe cardiac, respiratory, hepatic or renal disease and pre-eclamptic and eclamptic patients were excluded from this study. All study patients were assessed by detailed history taking, physical examination and routine preoperative investigations (e.g. CBC, PT, PTT, INR, liver function tests, kidney function tests and fasting blood sugar) for evaluation of the patient medical status. No pre-medication was given. Upon arrival on operating room, baseline systolic blood pressure, heart rate and arterial oxygen saturation were recorded. Patients were randomly divided into two equal groups of 55 patients each. Group F: Those who received crystalloid preloading 15 ml/kg (Ringer lactate solution) before the procedure. Group E: Those who received prophylactic 25 mg ephedrine intravenously (before hypotension occurrence) in 50 ml normal saline as follow: 5 mg at 1st and 2nd minute and then infusion of 1 mg/min over 15 minutes after block. After performing spinal anesthesia, heart rate and systolic blood pressure were recorded noninvasively at 1 min and then every 3 minutes for the first 30 minutes and then every 5 minutes for another 30 minutes and lastly at 90 minutes. O_2 saturation was monitored by pulse oximetry at every 30 minutes. An infusion of Ringer lactate solution at a rate of 2 ml/kg/hr was given during the whole surgical procedure. Hypotension of both groups was identified by 20% decrease in SBP from the baseline and treated immediately by 5 mg bolus IV ephedrine at every 3 minutes until SBP returned to normal value. Occurrences of nausea, vomiting and chest symptoms (dyspnoea and tachypnoea) were also recorded. Postoperatively heart rate, systolic blood pressure and oxygen saturation were recorded after 30 minutes in both study groups. Data were presented as mean ± standard deviation or frequencies and percentages as appropriate. Comparisons were performed using student t-test, Chi-square test or analysis of variance (ANOVA) according to the type of variance. Data were analyzed using SPSS version 20. p value ≤ 0.05 was considered statistically significant.

Results

No statistically significant differences were found in age, BMI and parity of both study groups (Table I). Systolic blood pressure was significantly higher in E group in comparison to F group except at 4 min and 22 minutes (Table II). Though heart rate was found higher in E group but was not statistically significant ($p > 0.05$) (Figure-1). Incidence of hypotension was significantly higher ($p = 0.03$) in F group than E group. Oxygen saturation changes throughout study time did not show any statistically significant differences between the two groups (Table III). Nausea and vomiting was higher in F group compared to E group, but it was not statistically significant and no chest symptoms were found in both groups (Table IV). Significantly lower number of ephedrine boluses were required to correct hypotension in ephedrine group than fluid group ($p = 0.046$) (Table III).

Table-I: Demographic variables of study patients.

Demographic variables	F group Mean (± SD)	E group Mean (± SD)	p value
Age	28.7 ± 0.65	26.8 ± 1.1	0.21
BMI	35.2 ± 1.7	35.3 ± 1.7	0.40
Parity	2.2 ± 0.47	2.3 ± 0.49	0.44

Table-II: Systolic blood pressure (SBP) (in mm Hg) of study population.

Systolic blood pressure	F group Mean (± SD)	E group Mean (± SD)	p value
Baseline	122.6 ± 7.8	119 ± 9.9	0.09
1 min	116.3 ± 12.3	116.4 ± 12.3	0.48
4 min	103.9 ± 8.8	110.2 ± 15.5	0.04
7 min	110.6 ± 12.8	111.7 ± 13.7	0.4
10 min	111.7 ± 10.1	112.4 ± 13.2	0.4
13 min	108.7 ± 6.6	110.4 ± 12.0	0.3
16 min	111.4 ± 10.2	115.6 ± 10.9	0.08
19 min	111.9 ± 10.9	113.7 ± 13.5	0.3
22 min	112.1 ± 11.8	117.8 ± 10.8	0.04
25 min	113.3 ± 8.6	116.4 ± 9.7	0.1
28 min	113.3 ± 12.5	117.5 ± 11.9	0.08
31 min	114.3 ± 8.3	118.1 ± 9.7	0.0
36 min	112.4 ± 9.7	116 ± 9	0.0
41 min	115.1 ± 6.1	116.2 ± 6.0	0.3
46 min	113.4 ± 6.8	116.4 ± 9.8	0.1
51 min	117.0 ± 5.4	118 ± 6.7	0.3
56 min	119.1 ± 9	119.7 ± 6.2	0.4
61 min	122.5 ± 6.2	122.9 ± 5.2	0.4
90 min	120.5 ± 6.5	121.4 ± 7.59	0.3

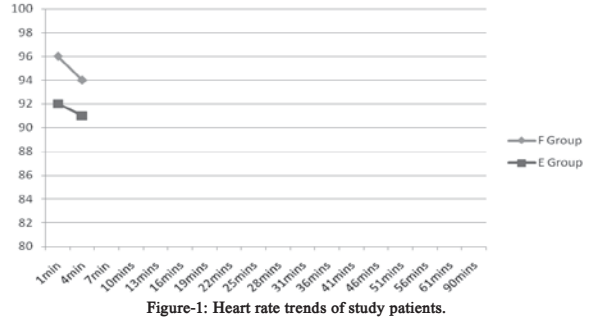

Figure-1: Heart rate trends of study patients.

Table-III: Oxygen saturation of study population.

O_2 saturation	F group	E group	p value
Baseline	98.5 ± 0.8	98.3 ± 0.7	0.23
30 minutes	99.7 ± 0.5	99.8 ± 0.4	0.26
60 minutes	99.8 ± 0.4	99.8± 0.4	0.5
90 minutes	98.9 ± 0.5	98.7 ± 0.6	0.11

Table-IV: Distribution of complications of study patients.

Complications	F group	E group	p value
Hypotension	12 (48%)	6 (24%)	0.03
Nausea & vomiting	5 (20%)	3 (12%)	0.23
Chest symptoms	0 (0%)	0 (0%)	0
Number of ephedrine boluses to treat hypotension	0.6 ± 0.8	0.3 ± 0.54	0.046

Discussion

The goal of this study was to compare the efficacy of ephedrine infusion versus crystalloid preloading in reducing the incidence of hypotension in spinal anesthesia for cesarean section. Nausea & vomiting, chest symptoms and number of ephedrine boluses to treat hypotension were also recorded. The effect of an IV bolus of ephedrine on arterial pressure is transient and lasts for only 10-15 minutes[12]. This study found that the incidence of hypotension was significantly lower in E group when compared to F group (Table II). Gajraj et al. similarly found that hypotension incidence was significantly higher in the crystalloid group compared to the infusion group[13]. Rout et al.[14] (1992) concluded that prophylactic IV ephedrine administered either by infusion or multiple bolus injections has been considered the gold standard for preventing and treating hypotension. But Thiangtham et al. found no statistically significant difference in the incidence of hypotension between the two groups[15]. Though this study found higher heart rate in E group but was not statistically significant ($p > 0.05$) (Figure 1). This could be explained both by the effect of rescue ephedrine and by baroreceptor-mediated reflex increase in heart rate in patients who became hypotensive. Bhovi et al. found similar finding in his study [16]. Kol I.O. et al.[17] found lower incidences of nausea and vomiting in the ephedrine group compared to the fluid group and this was consistent with our findings (Table IV). This study showed significantly lower number of ephedrine boluses were required to correct hypotension in ephedrine group than fluid group (Table III). Thiangtham et al. showed similar results[15].

Conclusion

We conclude that prophylactic IV ephedrine infusion is more effective than fluid preload to prevent spinal anesthesia-induced hypotension during caesarean section without causing significant tachycardia or hypertension.

Conflict of Interests: None.

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Scar Endometriosis: Experience of a Surgeon

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Abstract

Introduction: *Cesarean section is a common obstetric surgery worldwide. As incision wound in such a surgery is exposed abundantly to endometrial tissue, incision scar endometriosis can occur. This study reports a surgeon's experience in managing such an uncommon entity. The aim of this study was to identify risk factors for developing SCE and show the clinical spectrum of presentation. This study also shows our experience in surgical management of surgical scar endometriosis. Extra pelvic endometriosis is defined as the presence and growth of functional endometrial tissue outside the pelvis. Cesarean scar endometriosis (CSE) is a rare form of extra pelvic endometriosis that is usually confused with other surgical problems leading to delay in diagnosis.* ***Materials and Methods:*** *We reviewed the case records of patients who were diagnosed as CSE in the surgery department of BIRDEM GENERAL HOSPITAL-2 from September 2013 till September 2018.* ***Results:*** *We found 8 patients of scar endometriosis in 5 years making it one of the rare conditions. The age of the patients range 23–39 years and interval from symptoms to treatment varied from 16 months to 64 months. Five patients had presented to surgery department and 3 were referred from obstetric department. Cyclic pain and swelling in scar area were the most common presenting symptoms. All patients underwent excision of the mass with no recurrence of symptoms at a follow up ranging from 9 to 60 months.* ***Conclusion:*** *Increasing awareness of this condition among doctors can help in early diagnosis and treatment with gratifying results. Precaution during obstetrical surgery to avoid undue contamination of the wound can reduce incidence of scar endometriosis.*

Keywords: *Cesarean section, Scar endometriosis, Excision.*

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Introduction

Scar endometriosis is a variant of extra pelvic endometriosis. Extra pelvic endometriosis is defined as the presence and growth of functional endometrial tissue outside the pelvis[1,2]. Extra pelvic endometriosis is a rare condition[3]. Various sites of endometriosis reported outside pelvis are abdominal organs, lungs and pleura[4,5]. It can also arise from scar tissue especially after cesarean section. The term cesarean scar endometriosis (CSE) is an unusual manifestation of extra pelvic endometriosis. Scar endometriosis can easily be confused with abscess, lipoma, hematoma, sebaceous cyst, stitch granuloma, incisional hernia or tumors resulting in delay in diagnosis[6]. One of the most accepted theory about development of CSE is iatrogenic implantation. Here endometrial tissue is directly inoculated into the abdominal fascia or subcutaneous tissue and is subsequently stimulated by estrogen to produce endometriomas. The various clinical symptoms of CSE are due to proliferation of these cells under the influence of female hormones. Although CSE may present with various complaints, the most common clinical symptoms and signs are swelling, tenderness, cyclic pain and cyclic enlargement of swelling.

Materials and Methods

This was a observational, retrospective study performed at the surgery unit of BIRDEM GENERAL HOSPITAL-2. Data was collected from the recorded case history of 8 patients who underwent surgical management for CSE in our surgery unit from September 2013 till September 2018. It consisted of reviewing and analyzing data from the medical records of patients diagnosed with surgical scar endometriosis prior to their surgery. All patients had history of one or more cesarean sections, and their cesarean sections were performed in different hospitals. After the clinical assessment, the diagnosis was confirmed by ultrasonography and FNAC from swelling. In all cases, surgical excision was performed and the definitive diagnosis was confirmed by histopathological examination. All patients were operated under spinal anesthesia. Age, symptoms, size of tumor, interval between cesarean section and the onset of symptoms, and operative findings, were evaluated. Demographic features and operative findings of the cases are demonstrated in Table I.

Results

This study includes 8 patients who underwent surgical treatment for CSE. Fig.1 shows excised endometrial tissue from one such patient. Three patients were referred from gynecologists and 5 patients visited surgery outpatient department with complaints of swelling with pain on or near previous cesarean scar. According to medical records, Pfannenstiel incision had been performed for cesarean section in all patients. Two patients also underwent tubal ligation during cesarean section. Their age ranged from 23 to 39 years. The common complaint of the patients was a palpable

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subcutaneous mass under the incision scar. Four patients suffered from cyclical pain. Continuous pain was seen in three patients, and 1 patient complained of enlargement of the nodule during the menstrual period but experienced no pain. The time interval between cesarean section and the onset of symptoms ranged from 16 to 64 months. The preoperative diagnosis was confirmed by history, examination, ultrasonography and FNAC from lump. All of the patients were treated surgically by removal of the lump. In 1 case the lesion extended into the muscle layer. Anatomical repair of fascia and muscle was done after wide excision of lump in this case. The diameter of the endometriotic lesions ranged from 1.5 cm to 5 cm in size.

Table-I: Demographic features and operative findings:

Case	Age in years	Complaint	Previous Surgery	Asymptomatic Period (Months)	Size of Lesion	Diagnosis
01	29	Pain & Swelling	LUCS	36	2×1 cm	FNAC, USG
02	32	Swelling	LUCS	16	1.5×1 cm	Histopathology
03	23	Swelling & cyclic pain	LUCS	18	2×2 cm	FNAC, USG
04	34	Swelling & cyclic pain	LUCS	48	3×2 cm	FNAC, USG
05	27	Swelling & cyclic pain	LUCS	60	3×3 cm	FNAC, USG
06	37	Pain & Swelling	LUCS ē Tubal ligation	48	4×4 cm	FNAC, USG
07	39	Pain & Swelling	LUCS ē Tubal ligation	64	5×3 cm	FNAC, USG
08	29	Swelling & cyclic pain	LUCS	30	2×1 cm	FNAC, USG

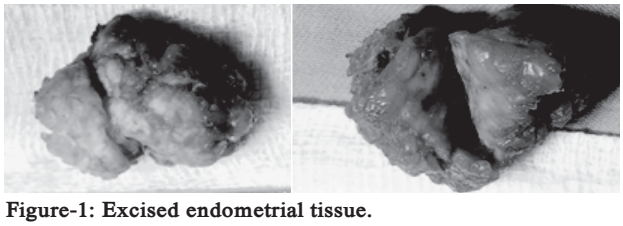

Figure-1: Excised endometrial tissue.

Discussion

Endometriosis in cesarean scar is a rare entity. There is only a few publications written on CSE; of them most are case reports. It is difficult to perform well-controlled studies of such rare problems. The common presentation of CSE includes a palpable subcutaneous nodule, with cyclic, noncyclic, or constant pain and aggravation of complaints during menstruation. Nodule under a cesarean section scar and cyclic aggravation of symptoms points to the diagnosis as CSE.

A case control study performed by De Oliveira et al. tried to identify the risk factors for development of scar endometriosis. According to this study, early hysterotomy in pregnancy especially before 22nd weeks of gestation is the main risk factor[7]. Early cesarean section causes more CSE, as early decidua seems to have more pluripotential capabilities and can result in enhanced cellular replication producing endometriosis[8]. The most important risk factor for developing scar endometriosis is a history of cesarean section[9]. Wang et al. in another study identified the cause of development of CSE. First of all, obstetric surgery exposes a large amount of endometrial cells to the wound, and these cells can be entrapped in the wound[10]. Amniotic fluid and more blood loss in case of obstetric surgery provide a relatively rich nutritional environment for the growth of endometrial tissue in the wound[10].

In this study, the time interval between cesarean section and the onset of symptoms ranged from 16 to 64 months. The late onset of symptoms after surgery is the probable cause of misdiagnosis[11]. General surgeons infrequently manage such cases of scar endometriosis[12]. Preoperative diagnoses of surgical scar endometriosis is often difficult[9]. Proper history and physical examination can point towards accurate diagnosis.

Scar endometriosis usually develops in the superficial layers of anterior abdominal wall, and nodule is easily palpable. Ultrasonography supports the clinical findings. Ultrasound is accessible, reliable, and cost-effective procedure. Fine-needle aspiration cytology (FNAC) confirms diagnosis preoperatively. Imaging like computed tomography, and magnetic resonance imaging can be performed[12,13]. Such imagings are nonspecific but useful for differential diagnoses and detecting the relationship between the mass and the other tissues. So imaging can be used to plan the extent of operative resection. Recognizing the typical clinical symptoms is the key for diagnostic accuracy.

The presence of hormone-sensitive tissue under the skin explains the symptoms reported by our patients, including cyclic pain, and swelling. Pain, either cyclic or noncyclic remained the major symptom, reported by more than 80% of patients in the cohort study of Zhang and Liu in China, Uçar et al. in Turkey, and Vellido-Cotelo et al. in Spain[14,15,16]. A nodule was present during examination of more than 90% of patients in these studies. With regard to imaging, ultrasound is the most accessible, reliable, and cost-effective technique for the diagnosis of CSE according to Hensen et al[17].

Ultrasonography along with clinical examination allows to differentiate from incisional hernia, hematoma, abscess, cyst, or lipoma in most cases. In the study of Zhang and Liu, it also revealed deep infiltrations in 26% of patients, in which cases USG helped guide the surgical excision[14]. We encountered only 1 case out of 8 in which the lesion extended upto the muscle layer. Computed Tomography or Magnetic Resonance Imaging can be used in case of diagnostic doubt but they are rarely needed. Uçar et al. found no evidence of pelvic endometriosis associated for the 12 cases of CSE examined in their study[15]. Vellido-Cotelo et al. highlighted that there seem to be no linkages between pelvic and scar endometriosis development. In their study, 14% of patients had associated pelvic endometriosis, which corresponds to the incidence in the general population[16]. We found no associated pelvic endometriosis in our series of 8 patients.

Based on their clinical experience of fine needle aspiration cytology (FNAC) for 9 cases of CSE, Medeiros et al. reported that FNAC is a quick, cost-effective, and accurate diagnostic tool to include in patients' management[18]. In the study of Vellido-Cotelo et al., 52% had a FNAC diagnosis before surgery and one of the patients was diagnosed with cancer by this method, which subsequently led to a different therapeutic management[16]. All 8 patients in our series

had FNAC that suggested SCE. However, the use FNAC technique is controversial.Because some authors argue that there remains a risk of producing new endometriotic implants at the puncture site[19].

In this case series, we did not find any evidence of pelvic endometriosis. Iatrogenic mechanical transplantations on incision scars during the operations are the most accepted pathogenesis. Aggressive behavior of endometriosis itself might also be a possible risk factor[10].

Mostly, the reported cases have mentioned that the contamination have occurred during surgery and possible contact with endometrial tissue including episiotomy, hysterectomy, ectopic pregnancy, laparoscopy, tubal ligation, and cesarean section[20,21]. So it is important to take precautions during obstretical surgeries to avoid transplantation of endometrial cells. To minimize endometriotic contamination, some authors recommend careful isolation of the incision and lavage with saline before the closure of the wall[22]. Some authors also suggested if parietal and visceral peritoneum are not closed meticulously during closure of cesarean section, it may markedly increase the postoperative occurrence of CSE[23]. Replacing instruments and needles with a new one when suturing other abdominal layers is another suggestion by authors to avoid CSE[24]. Time of cesarean section is another risk factor of CSE according to some authors. Wicherek et al. stated that cesarean section performed before spontaneous onset of labor may increase the risk of occurrence of scar endometriosis[25].

Similarly in this study, all 8 patients had elective cesarean section without the presence of regular uterine contractions.

In the same way as in the literature reviewed, we recommend that surgical removal of the nodule should be the treatment of choice. Surgical resection reduces local recurrence and treatment failure. In our series of 8 patients we have followed up the cases from 09 to 60 months with no recurrence of symptoms. The excision may be technically difficult, depending on the size of the mass and if the lesion extends to deeper tissues, such as aponeurosis, muscle or, more rarely, peritoneum. Among the cases in the present study, only one case required dissection upto the muscle layer and anatomical repair was done to cover the defect after excision of the nodule.

Conclusion

Scar endometriosis is a rare entity. Cesarean section is a risk factor for appearance CSE. To prevent iatrogenic implantation of endometriotic tissue in the surgical wound additional attention should be given during surgeries that expose the endometrium. Typical history and proper examination leading to clinical suspicion supported by USG and FNAC will reduce diagnostic delay and allow appropriate management. Excision is the treatment of choice with good results. Precaution during obstretic surgery, and meticulous closure of wound can avoid such complications as scar endometriosis.

Conflict of Interests: None.

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REVIEW ARTICLE OPEN ACCSESS

Transition from Millennium Development Goals (MDGs) to Sustainable Development Goals (SDGs): Blueprint of Bangladesh for Implementing the Sustainable Development Goals (SDGs) 2030

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Abstract

Introduction: *The Sustainable Development Goals 2030, titled "Transforming Our World: The 2030 Agenda for Sustainable Development" with 17 goals and 169 targets (including 43 means of implementation) were adopted at the United Nations in September 2015. The Seventh Five Year Plan of Bangladesh (SFYP), "Accelerating Growth, Empowering Every Citizen" for the years 2016-2020, produced by General Economics Division, Planning Commission, can be regarded as the blue print for the early critical phase of Sustainable Development Goals (SDG) implementation.* ***Materials & Methods:*** *This Review Article was prepared based on updated International Newsletter, Journal and Data from Bangladesh Government Planning Commission.* ***Discussion:*** *Challenges of Sustainable Development Goals (SDGs) and 7th Plan include resource mobilization, tapping population momentum, managing unplanned urbanization, natural disasters and climate change, utilization of resources, skill development and quality education, improving competitiveness, governance, taming inequality and regional disparity. Bangladesh prepared its own post-2015 Development Agenda and contributed to the international discourse through UN.* ***Conclusion:*** *The General Economics Division (GED) of the Planning Commission, based on a consultative process initiated in 2013, goals and targets were developed in the context of Bangladesh. Through this process, 11 goals along with 58 targets with corresponding 241 measurable indicators were proposed. Civil society in Bangladesh also produced what is described as "a people-centred, equitable, inclusive, and sustainable Post-2015 Development Agenda." It came up with 13 Goals,50 Targets and 199 Indicators.*

Keywords: *MDGs, SDGs, Sustainable Development Goals for 2030, 7th Five Year Plan of Bangladesh, Civil society SDG Agenda, Sustainable Development Goals and targets.*

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Introduction

Social achievement of Bangladesh has superseded the economic one. It is achieved by defying various odds ranging from frequent devastating disaster to managing highly dense population, and emerging from a birth of mythical phoenix to a development puzzle. Peers including the Economist (2012) and Sen (2013) have expressed similar views. Economic development and human development does not always go hand in hand. Achievements in some goals/targets in MDGs particularly in reducing under five mortality rate, women empowerment, and poverty reduction boosted the confidence of policy makers to effectively implement sustainable development agenda. For the first time in the history of country, Bangladesh economy crossed over 7% growth rate in 2016.

The growth rate of 7.28 % that was registered in the fiscal year 2016-17 meant that Bangladesh economy has stepped into an elite group of developing countries that have been experiencing higher rate of growth. The per capita income has been increased from US$ 1465 to US$ 1610 [1].

Poverty reduction rates are 1.8%, 1.7% and 1.2% in 2000-2005, 2005-2010 and 2010-2016 respectively. HIES 2016 Report stated that Head Count poverty rates are 24.30% and 12.90% for upper and lower poverty line though GINI coefficient slightly deteriorated from 0.45 to 0.48. The progress on the food security have not only contributed to revitalize rural economy but also helped reduce inequality.

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Underweight children under-five years of age have come down to 32.6% (2014) from 66% (1990). The level of stunting has declined consistently from 50.6% (2004) to 36.1% (2014). Likewise wasting declined marginally to 14.3% (2014) from 14.5% (2004). Life expectancy at birth is 71.60 years (2016), expected schooling years is 10.20 years.

Under EPI (Expanded Program on Immunization), 82.5 % children were fully vaccinated which was only 2% in 1985.

From 1982 to 2015, the under-five mortality rate declined from 212 to 36 deaths /1000 live births. Total fertility rate is now 2.10% only (2015). Since 1990, the primary school enrolment has increased 1.6 times. In the Global Gender Gap index 2017, Bangladesh ranked 47 out of 144 countries (WEF, 2017).

The main development strategy of the government is to accelerate GDP growth by higher investment and manufacturing sector growth. However, the growth is targeted to be pro poor and employment generation so that poverty rate can be sufficiently reduced as 2.6 million persons aged 15 or above are still unemployed.

Bangladesh is one of the most climate vulnerable countries, which affects the livelihoods of people.

One of the great concerns in export is the concentration of few items which make the export vulnerable to change in global political and economic situation. Skill development is one of the priority areas, improving which will not only Given the fact that implementation of SDGs heavily relies on building strong institutions and ensuring accountable governance, making this happen will be the ultimate challenge for Bangladesh.

Domestic investment only cannot fulfill the required investment gap to reach 8% growth by 2020. The government initiative will be needed to establish 100 economic zones. The government will have to focus more on capacity building of institutions. In the globalized world, we have to look for building strong partnership and open door for new friendship with all [1 - 5].

Materials & Methods

This article is based on a review of related literature, newspaper articles and online searches using Pubmed, Google and Banglajol. Combinations of key words related to each of the subject areas were used. Websites of relevant institutions, government and nongovernmental organizations were also searched. The literature thus obtained was categorized and reviewed carefully.

MDGs

The Millennium Development Goals (MDGs) are eight goals with measurable targets and clear deadlines for improving the lives of the world's poorest people. To meet these goals and eradicate poverty, leaders of 189 countries signed the historic millennium declaration at the United Nations Millennium Summit in 2000.

MDGs: Progress of Bangladesh at a glance

MDG 1: Eradicate Extreme Poverty and Hunger

MDG 2: Achieve Universal Primary Education

MDG 3: Promoting Gender Equity and Empowering Women

MDG 4: Reduce Child Mortality

MDG 5: Improve Maternal Health

MDG 6: Combat HIV/AIDS, Malaria and other Diseases

MDG 7: Ensuring Environmental Sustainability

MDG 8: Developing a Global Partnership for Development [6, 7, 8]

Bangladesh MDGs Achievement:

1. Reducing Extreme Poverty

2. Reducing prevalence of underweight children under 5 years

3. Reducing under-five child mortality

4. Increasing enrolment in primary schools

5. Increased ratio of girls to boys in primary and secondary education

6. Improved maternal health [9, 10]

SDGs and SFYP

SDG titled “Transforming Our World: The 2030 Agenda for Sustainable Development” has been now formally adopted at United Nations in September 2015, including the overarching education goal SDG 4 (“Ensure inclusive and equitable education and promote lifelong learning opportunities for all”)[11].

Sustainable Development Goals and targets

Goal 1. End poverty in all its forms everywhere

1.1 by 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day

1.2 by 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions

1.3 implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable

1.4 by 2030 ensure that all men and women, particularly the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership, and control over land and other forms of property, inheritance,

natural resources, appropriate new technology, and financial services including microfinance

1.5 by 2030 build the resilience of the poor and those in vulnerable situations, and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

1.a. ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation to provide adequate and predictable means for developing countries, in particular LDCs, to implement programmes and policies to end poverty in all its dimensions

1.b create sound policy frameworks, at national, regional and international levels, based on pro-poor and gender-sensitive development strategies to support accelerated investments in poverty eradication actions [11]

Goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

2.1 by 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round

2.2 by 2030 end all forms of malnutrition, including achieving by 2025 the internationally agreed targets on stunting and wasting in children under five years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons.

2.3 by 2030 double the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and non-farm employment.

2.4 by 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality.

2.5 by 2020 maintain genetic diversity of seeds, cultivated plants, farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge as internationally agreed.

2.a. increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development, and plant and livestock gene banks to enhance agricultural productive capacity in developing countries, in particular in least developed countries

2.b. correct and prevent trade restrictions and distortions in world agricultural markets including by the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round

2.c. adopt measures to ensure the proper functioning of food commodity markets and their derivatives, and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility [12]

Goal 3. Ensure healthy lives and promote well-being for all at all ages

3.1 by 2030 reduce the global maternal mortality ratio to less than 70 per 100,000 live births

3.2 by 2030 end preventable deaths of newborns and under-five children

3.3 by 2030 end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases

3.4 by 2030 reduce by one-third pre-mature mortality from non-communicable diseases (NCDs) through prevention and treatment, and promote mental health and wellbeing

3.5 strengthen prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

3.6 by 2020 halve global deaths and injuries from road traffic accidents

3.7 by 2030 ensure universal access to sexual and reproductive health care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes

3.8 achieve universal health coverage (UHC), including financial risk protection, access to quality essential health care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all

3.9 by 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination

3.a strengthen implementation of the Framework Convention on Tobacco Control in all countries as appropriate

3.b support research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access toaffordable essential medicines and vaccines, in accordance with the Doha Declaration which affirms the right of developing countries to use to the full

the provisions in the TRIPS agreement regarding flexibilities to protect public health and, in particular, provide access to medicines for all

3.c increase substantially health financing and the recruitment, development and training and retention of the health workforce in developing countries, especially in LDCs and SIDS

3.d strengthen the capacity of all countries, particularly developing countries, for early warning, risk reduction, and management of national and global health risks [12]

Goal 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all

4.1 by 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

4.2 by 2030 ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

4.3 by 2030 ensure equal access for all women and men to affordable quality technical, vocational and tertiary education, including university

4.4 by 2030, increase by x% the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

4.5 by 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situationstt

4.6 by 2030 ensure that all youth and at least x% of adults, both men and women, achieve literacy and numeracy

4.7 by 2030 ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of cultures contribution to sustainable development

4.a build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

4.b by 2020 expand by x% globally the number of scholarships for developing countries in particular LDCs, SIDS and African countries to enrol in higher education, including vocational training, ICT, technical, engineering and scientific programmes in developed countries and other developing countries

4.c by 2030 increase by x% the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially LDCs and SIDS [13]

Goal 5. Achieve gender equality and empower all women and girls

5.1 end all forms of discrimination against all women and girls everywhere

5.2 eliminate all forms of violence against all women and girls in public and private spheres, including trafficking and sexual and other types of exploitation

5.3 eliminate all harmful practices, such as child, early and forced marriage and female genital mutilations

5.4 recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies, and the promotion of shared responsibility within the household and the family as nationally appropriate

5.5 ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life

5.6 ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the ICPD and the Beijing Platform for Action and the outcome documents of their review conferences

5.a undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources in accordance with national laws

5.b enhance the use of enabling technologies, in particular ICT, to promote women's empowerment

5.c adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels [14]

Goal 6. Ensure availability and sustainable management of water and sanitation for all

6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally

6.4 by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity

6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

6.6 by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.a by 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.b support and strengthen the participation of local communities for improving water and sanitation management [14]

Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all

7.1 by 2030 ensure universal access to affordable, reliable, and modern energy services

7.2 increase substantially the share of renewable energy in the global energy mix by 2030

7.3 double the global rate of improvement in energy efficiency by 2030

7.a by 2030 enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies

7.b by 2030 expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, particularly LDCs and SIDS [14]

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

8.1 sustain per capita economic growth in accordance with national circumstances, and in particular at least 7% per annum GDP growth in the least-developed countries

8.2 achieve higher levels of productivity of economies through diversification, technological upgrading and innovation, including through a focus on high value added and labour-intensive sectors

8.3 promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage formalization and growth of micro-, small- and medium-sized enterprises including through access to financial services

8.4 improve progressively through 2030 global resource efficiency in consumption and production, and endeavour to decouple economic growth from environmental degradation in accordance with the 10-year framework of programmes on sustainable consumption and production with developed countries taking the lead

8.5 by 2030 achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

8.6 by 2020 substantially reduce the proportion of youth not in employment, education or training

8.7 take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour, eradicate forced labour, and by 2025 end child labour in all its forms including recruitment and use of child soldiers

8.8 protect labour rights and promote safe and secure working environments of all workers, including migrant workers, particularly women migrants, and those in precarious employment

8.9 by 2030 devise and implement policies to promote sustainable tourism which creates jobs, promotes local culture and products

8.10 strengthen the capacity of domestic financial institutions to encourage and to expand access to banking, insurance and financial services for all

8.a increase Aid for Trade support for developing countries, particularly LDCs, including through the Enhanced Integrated Framework for LDCs

8.b by 2020 develop and operationalize a global strategy for youth employment and implement the ILO Global Jobs Pact [14]

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1 develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

9.2 promote inclusive and sustainable industrialization, and by 2030 raise significantly industry's share of employment and GDP in line with national circumstances, and double its share in LDCs

9.3 increase the access of small-scale industrial and other enterprises, particularly in developing countries, to financial services including affordable credit and their integration into value chains and markets

9.4 by 2030 upgrade infrastructure and retrofit industries to make them sustainable, with increased resource use efficiency and greater adoption of clean and

environmentally sound technologies and industrial processes, all countries taking action in accordance with their respective capabilities

9.5 enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, particularly developing countries, including by 2030 encouraging innovation and increasing the number of R&D workers per one million people by x% and public and private R&D spending

9.a facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, LDCs, LLDCs and SIDS

9.b support domestic technology development, research and innovation in developing countries including by ensuring a conducive policy environment for inter alia industrial diversification and value addition to commodities

9.c significantly increase access to ICT and strive to provide universal and affordable access to internet in LDCs by 2020 [14]

Goal 10. Reduce inequality within and among countries

10.1 by 2030 progressively achieve and sustain income growth of the bottom 40% of the population at a rate higher than the national average

10.2 by 2030 empower and promote the social, economic and political inclusion of all irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status

10.3 ensure equal opportunity and reduce inequalities of outcome, including through eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and actions in this regard

10.4 adopt policies especially fiscal, wage, and social protection policies and progressively achieve greater equality

10.5 improve regulation and monitoring of global financial markets and institutions and strengthen implementation of such regulations

10.6 ensure enhanced representation and voice of developing countries in decision making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions

10.7 facilitate orderly, safe, regular and responsible migration and mobility of people, including through implementation of planned and well-managed migration policies

10.a implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with WTO agreements

10.b encourage ODA and financial flows, including foreign direct investment, to states where the need is greatest, in particular LDCs, African countries, SIDS, and LLDCs, in accordance with their national plans and programmes

10.c by 2030, reduce to less than 3% the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5%

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.1 by 2030, ensure access for all to adequate, safe and affordable housing and basic services, and upgrade slums

11.2 by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

11.3 by 2030 enhance inclusive and sustainable urbanization and capacities for participatory, integrated and sustainable human settlement planning and management in all countries

11.4 strengthen efforts to protect and safeguard the world's cultural and natural heritage

11.5 by 2030 significantly reduce the number of deaths and the number of affected people and decrease by y% the economic losses relative to GDP caused by disasters, including water-related disasters, with the focus on protecting the poor and people in vulnerable situations

11.6 by 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality, municipal and other waste management

11.7 by 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities

11.a support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

11.b by 2020, increase by x% the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, develop and implement in line with the forthcoming Hyogo Framework holistic disaster risk management at all levels

11.c support least developed countries, including through financial and technical assistance, for sustainable and resilient buildings utilizing local materials [15]

Goal 12. Ensure sustainable consumption and production patterns

12.1 implement the 10-Year Framework of Programmes on sustainable consumption and production (10YFP), all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

12.2 by 2030 achieve sustainable management and efficient use of natural resources

12.3 by 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses

12.4 by 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment

12.5 by 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse

12.6 encourage companies, especially large and trans-national companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

12.7 promote public procurement practices that are sustainable in accordance with national policies and priorities

12.8 by 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

12.a support developing countries to strengthen their scientific and technological capacities to move towards more sustainable patterns of consumption and production

12.b develop and implement tools to monitor sustainable development impacts for sustainable tourism which creates jobs, promotes local culture and products

12.c rationalize inefficient fossil fuel subsidies that encourage wasteful consumption by removing marketdistortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities [16]

Goal 13. Take urgent action to combat climate change and its impacts *

*Acknowledging that the UNFCCC is the primary international, intergovernmental forum for negotiating the global response to climate change

13.1 strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries

13.2 integrate climate change measures into national policies, strategies, and planning

13.3 improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning

13.a implement the commitment undertaken by developed country Parties to the UNFCCC to a goal of mobilizing jointly USD100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

13.b Promote mechanisms for raising capacities for effective climate change related planning and management, in LDCs, including focusing on women, youth, local and marginalized communities [16]

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1 by 2025, prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution

14.2 by 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration, to achieve healthy and productive oceans

14.3 minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

14.4 by 2020, effectively regulate harvesting, and end overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices and implement science-based management plans, to restore fish stocks in the shortest time feasible at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

14.5 by 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on best available scientific information

14.6 by 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, and eliminate subsidies that contribute to IUU fishing, and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the WTO fisheries subsidies negotiation *

14.7 by 2030 increase the economic benefits to SIDS and LDCs from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

14.a increase scientific knowledge, develop research capacities and transfer marine technology taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular SIDS and LDCs

14.b provide access of small-scale artisanal fishers to marine resources and markets

14.c ensure the full implementation of international law, as reflected in UNCLOS for states parties to it, including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties [16]

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

15.1 by 2020 ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

15.2 by 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and increase afforestation and reforestation by x% globally

15.3 by 2020, combat desertification, and restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation neutral world

15.4 by 2030 ensure the conservation of mountain ecosystems, including their biodiversity, to enhance their capacity to provide benefits which are essential for sustainable development

15.5 take urgent and significant action to reduce degradation of natural habitat, halt the loss of biodiversity, and by 2020 protect and prevent the extinction of threatened species

15.c enhance global support to efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities [16]

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

16.1 significantly reduce all forms of violence and related death rates everywhere

16.2 end abuse, exploitation, trafficking and all forms of violence and torture against children

16.3 promote the rule of law at the national and international levels, and ensure equal access to justice for all

16.4 by 2030 significantly reduce illicit financial and arms flows, strengthen recovery and return of stolen assets, and combat all forms of organized crime

16.5 substantially reduce corruption and bribery in all its forms

16.6 develop effective, accountable and transparent institutions at all levels

16.7 ensure responsive, inclusive, participatory and representative decision-making at all levels

16.8 broaden and strengthen the participation of developing countries in the institutions of global governance

16.9 by 2030 provide legal identity for all including birth registration

16.10 ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

16.a strengthen relevant national institutions, including through international cooperation, for building capacities at all levels, in particular in developing countries, for preventing violence and combating terrorism and crime

16.b promote and enforce non-discriminatory laws and policies for sustainable development [16]

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

Finance

17.1 strengthen domestic resource mobilization, including through international support to developing countries to improve domestic capacity for tax and other revenue collection

17.2 developed countries to implement fully their ODA commitments, including to provide 0.7% of GNI in ODA to developing countries of which 0.15-0.20% to least-developed countries

17.3 mobilize additional financial resources for developing countries from multiple sources

17.4 assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries (HIPC) to reduce debt distress

17.5 adopt and implement investment promotion regimes for LDCs

Technology

17.6 enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation, and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, particularly at UN level, and through a global technology facilitation mechanism when agreed

17.7 promote development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

17.8 fully operationalize the Technology Bank and STI (Science, Technology and Innovation) capacity building mechanism for LDCs by 2017, and enhance the use of enabling technologies in particular ICT [17]

Capacity building

17.9 enhance international support for implementing effective and targeted capacity building in developing countries to support national plans to implement all sustainable development goals, including through North-South, South-South, and triangular cooperation Trade

17.10 promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the WTO including through the conclusion of negotiations within its Doha Development Agenda

17.11 increase significantly the exports of developing countries, in particular with a view to doubling the LDC share of global exports by 2020

17.12 realize timely implementation of duty-free, quota-free market access on a lasting basis for all least developed countries consistent with WTO decisions, including through ensuring that preferential rules of origin applicable to imports from LDCs are transparent and simple, and contribute to facilitating market access [17]

Systemic issues

Policy and institutional coherence

17.13 enhance global macroeconomic stability including through policy coordination and policy coherence

17.14 enhance policy coherence for sustainable development

17.15 respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development [17]

Multi-stakeholder partnerships

17.16 enhance the global partnership for sustainable development complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technologies and financial resources to support the achievement of sustainable development goals in all countries, particularly developing countries

17.17 encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships [17]

Data, monitoring and accountability

17.18 by 2020, enhance capacity building support to developing countries, including for LDCs and SIDS, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

17.19 by 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement GDP, and support statistical capacity building in developing countries [17].

MDG: GOAL WISE ACHIEVEMENT

GOAL 1 : Bangladesh has made commendable progress in respect of eradication of poverty and hunger. It has sustained a GDP growth rate in excess of 6 percent in recent years that has played a positive role in eradicating poverty. The robust growth has been accompanied by corresponding improvements in several social indicators such as increased life expectancy and lower fertility rate despite having one of the world's highest population densities (Table I).

Table-I: Eradicate Extreme Poverty and Hunger.

Target	Indicator	Benchmark (Year)	Current progress (Reference)	Target (Year)
Reduce by half the proportion of people who suffer from hunger	Prevalence of underweight among children <5years of age (%)	66.0 (1990)	36.4 (BDHS 2011)* 35.0 (UESDS 2013)	33.0 (2015)
	Population below minimum level of dietary energy consumption (%)	28.0 (1990)	17.0 (WB 2011)*	14.0 (2015)

GOAL 2 : Achieve Universal Primary Education

Significant progress has been made in increasing equitable access in education (NER: 98.7 percent; girls: 99.4 percent, boys: 97.2 percent), reduction of dropouts, improvement in completion of the cycle, and implementation of a number of quality enhancement measures in primary education. Bangladesh has already achieved gender parity in primary and secondary enrolment.

GOAL 3 : Promote Gender Equality and Empower Women

Bangladesh has already achieved this goal i.e. gender parity in primary and secondary education at the national level. This positive development has occurred due to some specific public interventions focusing on girl students, such as stipends and exemption of tuition fees for girls in rural areas, and the stipend scheme for girls at the secondary level. Bangladesh has made significant progress in promoting the objectives of ensuring gender equality and empowerment of women.

GOAL 4 : Bangladesh is on track in meeting the target of this goal measured in three different indicators like under-five mortality rate, infant mortality rate and immunization against measles (Table II).

Table-II: Reduce Child Mortality.

Target	Indicator	Benchmark (Year)	Current progress (Reference)	Target (Year)
Reduce by two-thirds the mortality rate among under-five children	Death rate among under-five children/1,000 live births	144.0 (1990) 144.0 (1990)	41.0 (UN 2013)** 44.0 (SVRS 2011) 53.0 (BDHS 2011)	48.0 (2015)
	Infant mortality rate/1,000 live births	94.0 (1990)	33.0 (UN 2013)* 35.0 (SVRS 2011) 43.0 (BDHS 2011)	31.3 (2015)
	1-year old children immunized against measles (%)	52.0 (1991)	85.5% (BECES 2012)* 87.5 (BDHS 2011)	100.0 (2015)

GOAL 5 : According to Bangladesh Maternal Mortality Survey (BMMS), maternal mortality declined from 322 in 2001 to 194 in 2010, a 40 percent decline in nine years. The average rate of decline from the base year has been about 3.3 percent per year, compared with the average annual rate of reduction of 3.0 percent required for achieving the MDG in 2015 (Table III).

Table-III: Improve Maternal Health.

Target	Indicator	Benchmark (Year)	Current progress (Reference)	Target (Year)
Reduce by three-quarters the maternal mortality ratio	Maternal mortality ratio/100,000 livebirths	574.0 (1990)	170.00 (UN 2013)*	143.5 (2015)
	Births attended by skilled health personnel (%)	7.0 (1990)	26.5 (BMMS 2010) 43.5 (MICS 2012-2013)	50.0 (2015)
Ensure, by 2015, universal access to reproductive healthcare	Contraceptive prevalence rate (%)	39.9 (1991)	61.2 (BDHS 2011)* 61.8 (MICS 2012-2013)	72.0 (2016)
	Births rate among adolescent mothers/1,000 women	39.9 (1991)	105.0 (BMMS 2010) 83.0 (MICS 2012-2013)	77.0 (1990-91)
	Antenatal care coverage (at least one visit by skilled health professional) (%)	27.5 (1993)	54.6 (BDHS 2011) 58.7 (MICS 2012-2013)	100.0 (2015)
	Antenatal care coverage (at least four visits) (%)	05.5 (1993)	25.5 (BDHS 2011) 24.7 (MICS 2012-2013)	100.0 (2015)
	Unmet need for family planning (%)	19.4 (1993)	13.5 (BDHS 2011) 13.9 (MICS 2012-2013)	7.6 (2016)

GOAL 6 : Bangladesh has performed well in halting communicable diseases under this goal. Available data show that the prevalence of HIV/AIDS in Bangladesh currently is less than 0.1 percent and thus is still below an epidemic level (Table IV).

Table-IV: Combat HIV/AIDS, Malaria and Other Diseases.

Target	Indicator	Benchmark (Year)	Current progress (Reference)	Target (Year)
Healt and begin to rebersc the spread of HIV/AIDS	HIV prevalence among population aged 15-24 years (%)	0.005 (1990)	0.7% (NASP 2011)*	Halt (2015)
Ensure, by 2010, universal success to treatment for HIV/ AIDS for all those who need	Population with advanced HIV infection with access to ARV drugs (%)	-	45.0 (UNGASS 2012)	100.0 (2015)
Halt and begin to reverse the incidence of malaria and other major diseases	Malarial preva-lence/100,000 population	58.5 (2008)	18.4 (DGHS 2012)** Estimated based on reported malaria cases	29.3 (2015)
	Malarial death rate/100,000 population	0.106 (2008)	0.007 (DGHS 2012)** Estimated based on reported malaria cases	0.053 (2015)
	Under-five children sleeping under insecti-cide-treated bednets in endemic areas (%)	81.0 (2008)	94.4 (DGHS 2012)**	90.0 (2015)
	Under-five children with fever treated with appropriate antimalarial drugs (%)	60.0 (2008)	89.0 (DGHS 2011)*	90.0 (2015)
	TB (all forms) prevalence rate/100,000 population	639.0 (1990)	411.0 (DGHS 2011)*	320.0 (2015)
	TB death rate/100,000 population	76.0 (1990)	45.0 (DGHS 2011)*	38.0 (2015)
	New smear+ve TB case notification rate under DOTS (%)	21.0 (1994)	68.0 (DGHS 2013)**	>70.0 (2015)
	TB cure rate (%) with DOTS	73.0 (1994)	92.0 (NTP 2012)**	>85.0 (2015)

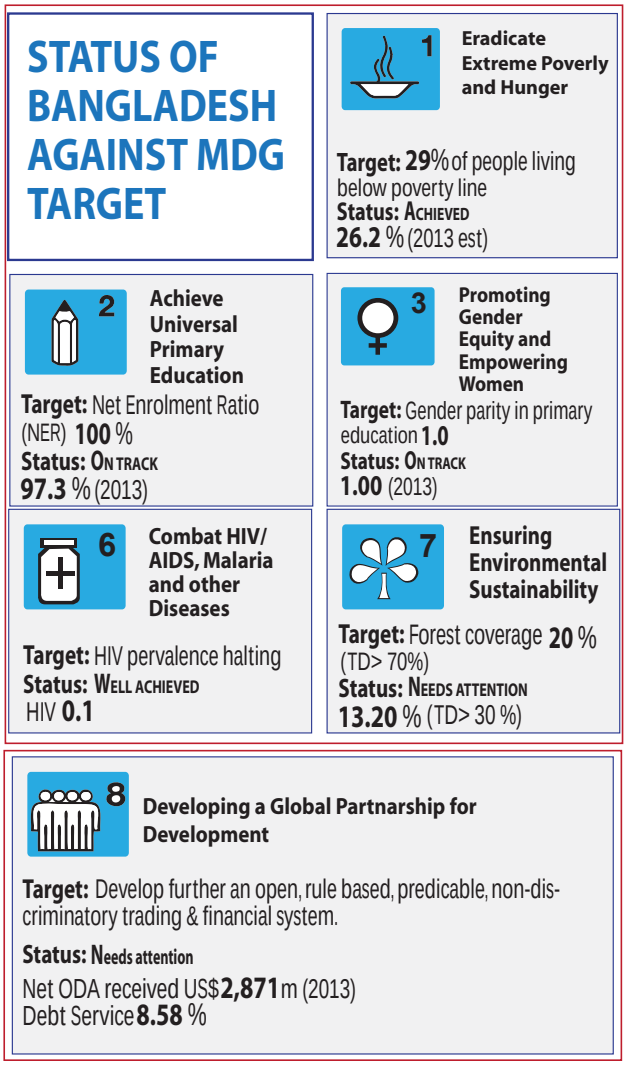
GOAL 7 : At present there is only 13.20 percent of land in Bangladesh having tree cover with density of 30 percent and above and the area having tree cover is much lower than the target set for 2015. Since 1991, there has been a steady increase in CO2 emission in Bangladesh because of increasing development interventions and activities. In 2012, the emission was 0.32 tonne per capita (Table V).

Table-V: Ensure Environmental Sustainabilityses.

Target	Indicator	Benchmark (Year)	Current progress (Reference)	Terget (Year)
Reduce by half the percentage of people without sustainable access to safe drinking-water and basic sanitation (%)	Population using improved drinking-water sources (%)	78.0 (1990)	98.2 (SVRS 2011)* 97.9 (MICS 2012-2013)*	100.0 (2015)
	Population using improved sanitation facility (%)	39.2 (2006)	55.9 (MICS 2012-2013)* 63.6 (SVRS 2011)	100.0 (2015)

GOAL 8 : Develop a Global Partnership for Development

During the last two decades and more, Bangladesh, on an average, got US$ 1,672 million ODA per year. The disbursed ODA as a proportion of Bangladesh's GDP has declined from 5.59 percent in FY 90-91 to 1.87 percent in FY 12-13, implying yearly average of 2.62 percent. During the same period, per capita ODA disbursement saw fluctuating figures ranging from US$ 18.29 to US$ 7.64; meaning yearly average of US$ 12.68. From FY 90-91 to FY12-13, on an average, each year Bangladesh got US$ 633 million as grants and US$ 1,045 million as loans [18, 19].



Challenges

- Limited land for food production
- High population density
- Growing population
- Just 1 in 6 women employed in non-agricultural sector
- Protein and micronutrient deficiencies cause mateernal and child malnutrition

Major misses

- Literacy
- Employment
- Environment

Bangladesh's implementation of the 2030 Agenda

Bangladesh's journey towards the implementation of SDGs started by integrating Sustainable Development Goals (SDGs) into the 7th Five Year Plan (20162020). In this sense, Bangladesh can be called the early starter in implementation of SDGs. To spearhead the process, SDGs Implementation and Monitoring Committee has been formed at the Prime Minister's Office to facilitate the implementation of SDGs Action Plan. The General Economics Division (GED) of the Planning Commission serves as the focal point of the government for formulating SDGs implementation strategy and action plan for Poverty eradication [20].

Whole of Society Approach in engaging all Stakeholders

Unlike the MDGs, SDGs are much broader all-encompassing development agenda. Therefore, it would be difficult for the public sector alone to achieve its objectives. In recognition of this fact, the government of Bangladesh has adopted a "whole of society" approach for implementation and attainment of the SDGs. As part of this, several consultations were held on stakeholders' engagement on the SDGs implementation involving the Parliamentarians, NGOs, CSOs, Business community, Development Partners, Ethnic Minorities, professional, groups, labour associations, women network and media [20].

Mapping of Targets in the Implementation of SDGs Aligning with 7th FYP (2016-2020)

Bangladesh has successfully completed the "Mapping of Ministries/Divisions by Targets in the Implementation of SDGs Aligning with 7th FYP (2016-2020)", a first formal document towards implementation of the SDGs in Bangladesh and media [21].

Date Gap Analysis for SDGs: Bangladesh Perspective

The govrtnment underlook a comprehensive study of data gap analysis for SDGs monitoring in Bangladesh. The study report titled "Data Gap Analysis for Sustainable Development Goals (SDGs): Bangladesh Perspective", found that Bangladesh was facing a "considerable" data gap for monitoring the SDGs as data of less than one-third of the indicators are readily available while two thirds are either partially available or not available at all. Out of total 241 indicators (for some with repeated use) to monitor against the 169 targets, data of only 70 indicators are readily available while data on 108 indicators are partially available and 63 indicators related data are not available at all [21].

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SDGs Financing Strategy: Bangladesh Perspective

The General Economics Division (GED), Planning Commission has also conducted an important study on "SDGs Financing Strategy: Bangladesh Perspective" to assess the resources need to implement.

SDGs and map out financial strategy that would require for successful implementation of the SDGs in Bangladesh. The study provides a well-defined framework that outlines the goal and target-wise additional estimated cost at 2015-16 constant price. The 7th FYP extended growth scenario (7 percent plus) projects that the GDP growth rate would be at 9 per cent by FY 2030.

The report estimates that an additional amount, over the current provision of investment related to SDGs by public sectors and external sources, would be USD 928.48 billion at 2015-16 constant prices. This amount would be required for SDGs implementation over the period of FY 2017-FY 2030, which is 19.75 per cent of the accumulated GDP under 7th FYP extended growth scenario. The annual average cost of SDGs would be USD 66.32 billion (at constant prices) for this period [20].

National Action Plan to Achieve SDGs in Bangladesh

The government prepared a "National Action Plan for SDGs Implementation" in accordance with 7th FYP objectives and shared with all relevant ministries for preparation of their respective implementation plan for achieving the SDGs targets [20].

National Monitoring and Evaluation Framework for SDGs in Bangladesh

The government has finalized a Monitoring and Evaluation Framework for SDGs implementation. This framework will have a web-based data repository system to facilitate data collection, analysis, progress tracking and reporting [20, 21].

Challenges Ahead

Resource Mobilization

Traditional sources of funding are insufficient to implement the SDGs. The government needs to find innovative ways of financing both from the public and the private sectors, development partners and ensure effective and efficient ways for utilization. Moreover, the implementation of the 7th plan requires total investment of 34.4 percent of GDP by 2020, of which private sector is expected to provide 26.6 percent of GDP. According to Bangladesh Delta Plan, the investment only for climate change, environment and water related projects account for 1.8 percent of GDP by 2020. The resource gap is yet huge; public spending is only 0.8 percent of GDP on water sector projects, which has been highly inadequate [21].

Population momentum

Bangladesh population has been growing rapidly, going from just over 108 million in 1990 to 160 million in 2016. Population has been projected to grow to over 200 million by 2050. A large population together with high population growth require a faster growth of the agricultural production to ensure food and nutritional security. The growth rate of crop sector has been declining. The increase in agricultural production will inevitably put significant pressure on the environment and put pressure on resource availability for human development [21].

Unplanned urbanization

Bangladesh has been experiencing a rapid increase in the urban population, in 1990, 20 percent of the population lived in urban areas, this has increased to 35 percent in 2016 and it is expected to overtake the share of rural population approximately in 2040. The rapid migration to urban areas and the inadequate infrastructure and accessto open space to meet the growing demand is a serious problem for the country [21].

Natural disasters and climate change

Bangladesh experiences frequent natural disasters, these can lead to deaths, damage of the infrastructure and economic assets, and have a negative impact on the livelihood of people, particularly ones living in poverty. Bangladesh is considered one of the most climate vulnerable countries, 5th of the most hazard prone countries of the world. Climate change will intensify the natural hazards the country already faces [21].

Utilization of resources

Availability of resources does not necessarily guarantee the success in SDGs. Efficient and effective use of resources can be more instrumental than just having adequate resources. In this connection, it is important to assess what resources are needed, how resources are used and for whom the resources should be used [21].

Skill development and quality education

Around 13 million 15-29 aged young population is not in education, employment and training according to LFS 2015-16, which suggests that a large number of young population remain unutilized. If they can be trained up and provided with education and employment, the scenario will be totally different. This will have a long term consequences in per capita income, growth, poverty and health outcome. Further, improving quality of education in recent times poses a big concern [21].

Competitiveness

Despite, Bangladesh for the first time has been placed in the top 100 (99 out of 137 countries) in 2017 in theWorld Economic Forum's Global Competitiveness Report, yet corruption is still the major obstacle for doing business in Bangladesh. Bangladesh has to keep up the momentum of on-going reforms to make smoother business climate reducing the transaction cost substantially. The realization of One-stop Service Act-2017 will be a landmark step in attracting investment from abroad [22].

Governance challenges

There is no alternative to improve governance in order for growth to be more sustainable and pro poor. Yet Bangladesh has made notable progress in governance indicators, there are scope for much improvement. Governance issue is particularly critical in the use of public resources, service delivery of institutions, transports, law enforcement, judiciary, land administration, tax and customs, as they are deemed corrupted service providers in Bangladesh. Digitalization can be an effective tool to address these governance challenges [22].

Taming inequality and regional disparity

The declining share of bottom 5 percent income (the share of national income was 0.78 percent in 2010 and 0.23 percent in 2016) and increasing share of top 5 percent income means that unless inequality issues are rightly addressed, the country will have to face the bitter experience of social unrest, marginalization to a greater degree in the forthcoming days. Further poverty is severely intense in some districts and the disparity is widespread. Kurigram has population with 70.8 percent under upper poverty line, followed by Dinajpur with 64.3 percent and Bandarban with 63.2 percent respectively while the incident of poverty in Narayanganj is just 2.6 percent. National average of below poverty is 22.37 percent in 2017 as projected in 7th FYP [22, 23, 24].

Blueprint of Bangladesh Implementing of SDG 2030

Investment in human development

Bangladesh witnessed that investment in girl's education, immunization, primary education, family planning and basic health services in the 1980s and 1990s yielded positive outcome recognized in MDG era. The government has to continue its effort in human development particularly in basic health services, ensure quality education; training and skill development as the optimal goal of development of creating knowledge based society[24].

Overcoming infrastructure gap

Bangladesh has to pay attention in overcoming the infrastructure, transport and communication gap to harness growth and deliver what an upper middle income country look like. Fast track projects are such kind of efforts which deserve to be continued.

Quality education and investment in research

The next big concern of Bangladesh will be to ensure quality education. LFS 2015-16 suggests unemployment rate is the highest for those with tertiary education, which is staggeringly 9 percent. We have very low budgetary support for research that is well below 1 percent of GDP. In order to be an upper middle income country, the government will have to increase allocation for research, innovation and technology, along with being supportive to private sector [24].

Adoption of Innovation, digitalization and one stop service

The world is moving very fast in adopting new technologies in the finest era of human civilization. It is important for Bangladesh to cope with the competitiveness it is likely to face in trade and other sector by adopting of newer technologies that may reduce the global challenges following graduation from LDCs. Introducing one stop service for business investments will be a breakthrough in the area of competitiveness. Our development partners should come forward to help Bangladesh in transfer of technologies in the spirit of Goal 17 of the SDGs [24].

Building strong institutions and improving governance

Institutions can play the most vital role in shaping the democratic value, ensuring accountability, justice, and fairness. Weak institutions can be treated nothing more than a burden in any state. The government needs to continue its efforts in building strong institutions manning with highly skilled personalities.

Female labour force participation

It is undeniable that the country saw a rise in female participation in the labour force over the last decade, yet the participation rate is just 36 percent well below the global average of 49 percent. It is understandable that how female participation even with the global average can be a formidable force of growth, poverty reduction, empowerment and inclusiveness. Female participation will need to be encouraged through incentive policy like maternal leave with payment, compliant workplace, and day care facility. The increasing share of female students in vocational and technical education with stipend should be a priority [24].

Diversification of export

The export basket of Bangladesh is concentrated to a number of items, which should draw substantial attention to the policy makers. The diversification issue has been roared long ago but few have come up with solutions. It is also a matter of time on how diversification of and within products evolved over time. The government has been providing incentives to infant industries over a long period. The business community must understand that incentives from the government can not be for good. They also have to look for improving their own competitiveness [24].

Inequality issues

Despite progress in reducing poverty head count rates, around 39 million people still live in poverty and approximately 21 million live in extreme poverty ($1.90 a day). Some of the factors that correlate with poverty are limited access to financial resources, human resources and natural and health shocks. Income Gini Coefficient

reflecting inequality is considered high (0.48). Inequality has to be brought down to attain SDG-10. That is, average income growth of lower 40 percent of population must be higher than the average income increase of overall population. Further, inequality should not be limited to just income poverty. The time for Bangladesh has come to introduce multidimensional poverty addressing non-monetary aspects of poverty in measuring inequality [24].

North-South, South-South, triangular cooperation

There is a growing evidence of partnership that can propel shared prosperity. Apart from benefiting from regional building blocks, the government must continue to seek G2G initiatives from new destination. The G2G initiative is likely to gear up establishing targeted economic zones. The Policy for Implementing PPP Projects through Government to Government (G2G) Partnership, 2017 is an on time effort made by the government. The government will need to promote Business to Business initiative in terms of manpower recruits [25].

Conclusion

The potential gain from an action plan based on key SDGs policy strategies that built upon the co-creation of new knowledge among countries, Govt. & Non Govt. institutions & indeed for most countries achieving the goals may well depend on it.SDGs demand concerted and collective efforts with strong political commitment at all levels. Bangladesh has incorporated priorities of SDGs in all her development policies. The Government has adopted an inclusive approach to development so that the poorest and the most vulnerable section of the country can be integrated into its national development efforts. As the country moves ahead, challenges in several areas, including in resource mobilization and data management, will have to be addressed. Bangladesh is confident to set the example of a leading SDGs achiever.

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CASE REPORT OPEN ACCSESS

Term Broad Ligament Pregnancy with a Healthy Newborn

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Abstract

Introduction: *Broad ligament pregnancy also known as inter ligamentous pregnancy is a rare type of ectopic pregnancy. It is one type of secondary abdominal pregnancy. Although ultrasonography is usually helpful in making the diagnosis but it is mostly established during laparotomy. Very few successful live births have been reported in this condition, where such pregnancies reached term and with live birth of a baby.* ***Case Report:*** *A case of 30 year old 2nd gravida of 38 weeks gestation with lower abdominal pain for 20 hours was admitted into Sher-E-Bangla Medical College Hospital, Barishal; Bangladesh. She was suggested for caesarean section as the ultrasonogram revealed transverse lie with complete placenta praevia. Intraoperative diagnosis of right sided broad ligament pregnancy was made and an incision was given on the anterior leaf of the broad ligament and a male live fetus was extracted. Post operative period was uneventful. Both mother and baby were discharged on seventh postoperative day in good health condition.* ***Discussion:*** *Broad ligament pregnancy usually results from rupture of tubal pregnancy through the tubal serosa and the mesosalpinx, with secondary implantation of trophoblast between the leaves of broad ligament. Incidence of broad ligament pregnancy is reported as 1 in 300 ectopic pregnancies. The prognosis is poor with the risk of dying from an abdominal pregnancy is 7.7 times higher than from other forms of ectopic pregnancy and often results from a delay in diagnosis. Trans-vaginal rather than transabdominal ultrasonography is superior in the evaluation of ectopic pregnancy. If there is no intrauterine pregnancy on ultrasonography and the ectopic sac is beside the lower part of the uterus a strong suspicion of broad ligament ectopic should be considered. Very rarely such pregnancy may reach up to term. Bleeding from placental implantation site is the most life-threatening complication during laparotomy.* ***Conclusion:*** *Abdominal pregnancy with resultant healthy newborn is very rare. High level of suspicion, careful clinical and ultrasound examinations are the routine means of diagnosis. Bleeding is the single most important life-threatening complication for the mother. Early diagnosis and proper management are vital in order to decrease maternal morbidity.*

Keywords: *Broad ligament pregnancy, Ectopic pregnancy, Laparotomy, Salpingo-oophorectomy, Ultrasonography.*

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Introduction

Ectopic pregnancy represents about 1 and 2% of that of live births in developed countries, though it is as high as 4% in pregnancies involving assisted reproductive technology with 93 to 97% occurring in the fallopian tube[1, 2]. Abdominal pregnancies represent just about 1% of ectopic pregnancies and the maternal mortality rate has been reported to be as high as 20% [3, 4]. The incidence of abdominal pregnancy differs in various publications and ranges between 1:10000 pregnancies and 1:30,000 pregnancies, and being most prevalent in developing countries with limited resources and limited diagnostic facilities[5]. *Albucasis* (936–1013), the Arab Muslim physician is credited with first recognizing abdominal pregnancy which was apparently unknown to Greek and Roman physicians and was not mentioned in the writings of *Hippocrates; Jacopo Berengario da Carpi* (1460–1530) the Italian physician is credited with the first detailed anatomical description of abdominal pregnancy[6]. It may occur in any part of the abdomen but is common in pouch of Douglas and is rare in broad ligament[7]. Ectopic pregnancy in the broad ligament is a retroperitoneal abdominal pregnancy, in which the foetus or gestational sac develop within the leaves of the broad ligament[8]. It usually results from fallopian tube rupture nearingmesosalpinx and then the pregnancy continuing within the leaves of broad ligaments. It has vivid presentations, may present as lower abdominal

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pain, an abnormal lie, placental insufficiency, foetal death or acute abdomen due to rupture of gestational sac with haemorrhage into the peritoneal cavity. In literature a few cases have been reported where such pregnancies reached term and even with live birth of a baby [9, 10, 11, 12].

Here a case of advanced broad ligament pregnancy has been described where clinical as well ultrasonography did not help to diagnose it and was only detect it intra-operatively.

Case Report

A case of 30 year old 2nd gravida, para 0+1 of 38 weeks gestation with lower abdominal pain for 20 hours was admitted into Sher-E-Bangla Medical College Hospital, Barishal; Bangladesh. Her early pregnancy was uneventful but she had irregular menstrual cycles prior to her pregnancy and was not sure of her last date of menstruation. The ultrasound examination had not been performed in the first trimester. On examination, her vital signs were stable and tenderness was present in the right iliac fossa and right lumbar region. The height of the uterus corresponded to 36 weeks gestation. Amniotic fluid was seemed to be normal and foetal heart sound was 136 beats / min. An ultrasound was performed, which confirmed a live term foetus of 38 weeks, in transverse lie with complete placenta praevia. Caesarean section was planned in view of the transverse lie with placenta praevia.

With all aseptic precaution abdomen was opened with *Pfannenstiel* incision. At a glance the lower uterine segment was not detected. After careful examination a diagnosis of right sided broad ligament pregnancy was made and an incision was given on the anterior leaf of the broad ligament and a male live fetus was extracted. Placenta was found on the posterior leaf of the broad ligament and; the fallopian tube and ovary were densely adhering with the placental membranes. The placenta was removed without any undue haemorrhage and right sided salpingo-oophorectomy was done to remove the adherent fallopian tube and ovary. Uterus was lying medial to the sac and was around twelve weeks in size. A unit of compatible blood was transfused intraoperatively. Post operative period was uneventful. Both mother and baby were discharged on seventh postoperative day in good health condition.

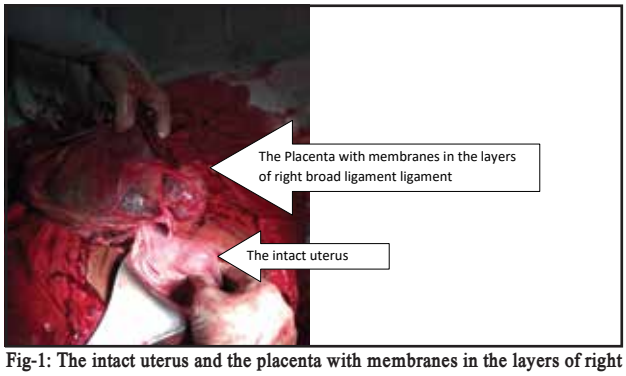

Fig-1: The intact uterus and the placenta with membranes in the layers of right broad ligament of this patient. (Photo Credit- Dr. Sultana Jahan).

Fig-2: Healthy mother and her healthy baby after 7 days. (Photo Credit- Dr. Sultana Jahan).

Discussion

Broad ligament pregnancy is an extremely rare form of ectopic abdominal pregnancy. Incidence is reported as 1 in 300 ectopic pregnancies[13]. A broad ligament pregnancy usually results from trophoblastic penetration of tubal pregnancy through the tubal serosa and into the mesosalpinx, with secondary implantation between the leaves of broad ligament. Rare types of secondary abdominal pregnancies can occur after spontaneous separation of an old caesarean section scar, after uterine perforation during a therapeutic or elective abortion, and after subtotal or total hysterectomy[14]. The prognosis is poor, with an estimated maternal mortality rate of 5.1 per 1,000 cases[15]. The risk of dying from an abdominal pregnancy is 7.7 times higher than from other forms of ectopic pregnancy[16]. The high rate of morbidity and mortality from abdominal pregnancy often results from a delay in diagnosis.

Pelvic inflammatory disease, use of intrauterine devices, use of progesterone only pills, a previous history of ectopic pregnancy, abdominal tuberculosis and endometriosis are the various risk factors involved[17].

Presentation of abdominal pregnancy can be varied from mild abdominal discomfort, small amount of vaginal bleeding, placental insufficiency leading to fetal demise to catastrophic internal haemorrhage, manifesting with acute abdomen and shock. Careful clinical examination and observation may help in diagnosing the pregnancy.

Diagnosis of advanced abdominal pregnancy requires a high index of suspicion. History and physical examination are often inconclusive. In spite of considerable improvement in technical abilities, absolute diagnosis by ultrasound is missed in half of the cases[18, 19]. The following features should alert the sonographer: abnormal relationship among the fetus, placenta, amniotic fluid and uterus, fetal skull or small parts overlying the maternal spine on lateral projection, fetal malpresentation especially transverse lie[20]. Case reports by *Sharma* and *Rudra* had correctly diagnosed the abdominal pregnancy by ultrasound[21]. But in this case diagnosis was missed by ultrasounds rather it was diagnosed intra-operatively. Other cases have also been reported in the literature in which diagnosis of abdominal pregnancy was made intraoperatively[22]. Trans-vaginal ultrasonography is superior in the evaluation of ectopic pregnancy since it allows a better view of the adnexa and uterine cavity. If there is no intrauterine pregnancy on ultrasonography and the ectopic sac is beside the lower part of the uterus a strong suspicion of broad ligament ectopic should be considered. MRI is the better diagnostic tool as it also guides regarding the extent of peritoneal involvement and surgical planning.

Exploratory laparotomy is the gold standard in the management of broad ligament pregnancy. However in haemodynamically stable patients, removal of small broad ligament pregnancies can be considered laparoscopically[23]. Very rarely such pregnancy may reach up to term and delivered by laparotomy along with excision of placenta which may be adherent to surrounding structures like intestines mesentery etc. posing difficulty in achieving haemostasis[21].

Bleeding from placental implantation site is the most life-threatening complication during laparotomy. The decision to remove the placenta or not can be a determining factor for the survival or otherwise of the woman and this decision is subject to the surgeon's expertise and the particular case in question. It is generally recommended to leave the placenta in situ and make a follow up with human chorionic gonadotropin levels[24]. In this case there was significant bleeding from some detached portions of the placenta that prompted removal of these portions to secure haemostasis. The patient was transfused with one unit of blood during the operation. For the newborn, it is very important to rule out congenital malformations. There are reports of foetal malformations as high as 40% associated with abdominal pregnancies and only 50% of these babies survive up to one week post delivery[25, 26]. In this case the new born baby was normal in morphological appearances and reflexes on examination.

Conclusion

Diagnosis of abdominal pregnancy can be missed during antenatal care but high index of suspicion in cases of abnormal lie, displaced cervix and failed induction of labor can help in diagnosis of abdominal pregnancy. Expertly performed and interpreted ultrasonography may be the definitive diagnostic technique. Early diagnosis is the only key to reduce high incidence of maternal mortality.

Conflict of Interests: None.

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