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A higher proportion of hypertensive patients remain with un-controlled BP. Massive public awareness campaign targeting modifiable risk factors is essential in controlling hypertension in Bangladesh, especially focusing on physical exercise and control of diabetes

See Original Article Page 9

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Contents

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Abū Bakr Muhammad ibn Zakariyyā al-Rāzī (854–925 CE)

Abū Bakr Muhammad ibn Zakariyyā al-Rāzī (854–925 CE), was a Persian polymath, physician, alchemist philosopher, and important figure in the history of medicine. He has been described as the father of pediatrics and a pioneer of obstetrics and ophthalmology. He was the first to recognize the reaction of the eye's pupil to light. He was among the first to use humoral theory to distinguish one contagious disease from another, and wrote a pioneering book about smallpox and measles providing clinical characterization of the diseases. He also discovered numerous compounds and chemicals including alcohol and sulfuric acid.

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Gut Microbiome-A Missing Link in the Gut-Brain Axis

M. Manzurul Haque[a]

The coordinated interactions between the gut and brain through gut-associated immune system, enteric nervous system (ENS), and gut-based endocrine system is now scientifically established so strongly that ENS is accepted as a separate entity and designated as gut brain or second brain, independent from the Central Nervous System (CNS)[1].The Gut-Brain axis (GBA) is a two way link between the enteric nervous system (ENS) and the central nervous system (CNS).The bidirectional communication network of GBA includes the central nervous system (CNS), both brain and spinal cord, the autonomic nervous system (ANS), the enteric nervous system (ENS) and the hypothalamo-pituitary- adrenal (HPA) axis.

However a missing link is being sighted with the advents in genome sequencing and metabolomics of gut microbiome. The discovery of gut microbiome has added a component to the complex multidirectional signaling between the gut, its microbiome, and the brain. The initial reports ofthe emerging links between gut microbiome and GBA are regarded as a paradigm shift in neuroscience with possible implications for not only conceptualization and understanding the pathophysiology of stress-related psychiatric disorders, but also their treatment.[2]

The GBA involves a complex crosstalk between neuro-immuno-endocrine mediators which monitor and integrate the emotional and cognitive centers of the brain through a complex interaction between the the Vagus nerve, Endocrine system (hypothalamic-pituitary-adrenal axis),Immune activation system, Intestinal permeability, Enteric reflex, and Entero-endocrine signaling and so on.

The human body is a small universe with a super complex ecosystem containing trillions of bacteria and other microorganisms. There is a symbiotic relationship between the human organisms and the microbiome which are reciprocally dependent on each other for survival.

In preclinical experimental set up models including germ-free animal, colonization with synthetic or human microbiota, probiotic and prebiotic administration, manipulation with antibiotics, fecal microbial transplantation, etc. have been used to study the influence of gut microbiome on the Gut-Brain axis (GBA).

In clinical practice, gut dysbiosis is associated with neuropsychiatric disorders and functional gastrointestinal disorders.In Fecal microbiota transplantation (FMT) experiments, the transplanted microbiota has been shown to transfer behavioral or disease features to the recipient animal.[3]

The bottom-up interaction of the brain by the microbiome occurs primarily through neuroimmune and neuroendocrine mechanisms involving the vagus nerve. This interaction is mediated by tryptophan metabolites, several short-chain fatty acids (SCFAs) and secondary bile acids derived from the microbial population via enterochromaffin cells (ECCs), enteroendocrine cells (EECs), and the mucosal immune cells. Signals from the Brain to the Gut Microbiota is regulated through the autonomic nervous system

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(ANS) by influencing regional functions including, secretion of gastric acid, mucus, bicarbonate, gut peptides, antimicrobial peptides, regional motility, intestinalpermeability and mucosal immune response. These ANS-induced changes in gut physiology will in turn influence the microbial habitat, thereby modulating microbiota composition and activity.[4]

Scientific information from preclinical and clinical studies related to Microbiome-Gut-brain Axis (MGBA)have shown remarkable potential for addressing not only functional gastrointestinal disorders but a wide range of psychiatric and neurologic disorders, including Parkinson's disease, autism spectrum disorders, anxiety, and depression and so on.

Different targeted approaches are under investigation or in use to address these functional, psychiatric and neurological disorders.[5]Amongst these approaches the following are to be mentioned.

- Use of antibiotic or vaccine to eliminate selected group of offending microorganisms.
- Use of probiotics, prebiotics, psychobiotics and diets to encourage the expansion of beneficial bacteria.
- Faecal microbiota transplantation (FMT) to restore necessary bacterial communities.
- Bacteriophage therapy, targeting bacterial genes to suitably modify the microbiome.
- Combination of these approaches to manipulate the whole microbiome when necessary.

Recent studies suggest that the development and function of brain are related to composition and diversity of the gut microbiota and may influence neuropsychiatric health of the host. However many issues are still to be addressed for therapeutic intervention. Nevertheless controlled manipulations of gut microbiome is a promising domain of research that may answer to some chronic functional, neuropsychiatric and degenerative disorders.

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Electronic stethoscope for early screening of congenital heart disease.

Abdullah Shahriar[a], Muhammad Ataul Haqq[b], Md Riadul Islam[c], M Mahadi Hasan[c], M Raihan[c]

Abstract

Background: Prevalence of congenital heart disease is measured universally by means of colour doppler echocardiography method. We still depend on stethoscope based cardiac murmur auscultation method for screening purpose. Using electronic stethoscope could be the potential to eliminate waiting time, travel and reduce cost associated with the assessment of cardiac murmurs in children. **Objective:** This study was aimed to evaluate its clinical correlation. **Methods:** This was a cross sectional study performed in the Department of Paediatric Cardiology, National Institute of Cardiovascular Diseases (NICVD) during the period July 2018 to December 2018. Following standard protocol of the Department of Paediatric Cardiology, NICVD, using electronic stethoscope auscultation done by paediatric cardiologist and heart sounds recorded for analysis. Echocardiography was also performed by paediatric cardiologist and diagnosis was compared with the analysis of heart sounds recorded by electronic stethoscope. **Results:** Out of 60 participants, normal heart sound was found in 17(28%) case and innocent murmur was found in 7 (12%) case. The pathological heart sound and murmur found in 36 participants. **Conclusion:** Electronic stethoscope may record and transmit heart sound efficiently for analysis and diagnosis of innocent or pathological murmur. It may also help to diagnose congenital heart disease (CHD). It has the potential for saving time and reducing inconvenience and cost which may incur if the patients are referred to a paediatric cardiologist without any judgment.

Key Words: Electronic Wireless Stethoscope, Congenital Heart Disease, murmur.

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Introduction

Congenital heart disease (CHD) is the most common cause of major congenital anomalies, representing a major global health problem. Twenty eight percent of all major congenital anomalies consist of heart defect[1]. Despite remarkable progress in clinical care for affected individuals, CHD remains the leading cause of infant mortality among birth defects[2]. Those who survive infancy, there is a high rate of comorbidities, both cardiac and extra cardiac, and expected lifespan is still limited[3].

UK database suggests around 1 in 4 cases of congenital heart disease in Great Britain are diagnosed later in childhood and net incidence in the UK is 6.9/1000 live birth. Most cases of CHD die in early infancy and some conditions do not manifest in the first few years of life, this emphasizing the need to establish diagnosis by any means[5]. People in the remote area suffer extremely due to lack of paediatric cardiologist and effective means. Some study suggested that a majority of CHD in children may remain undetected unless specific efforts are made

to diagnose them[2,3].

Evaluation of a heart murmur represents one of the most common reasons for referral to a paediatric cardiologist[4]. Studies have shown that following clinical examination by a paediatric cardiologist, the diagnosis of a murmur as innocent or pathological, is correct with a specificity of 95% and a sensitivity of 96%[5,6]. Further procedures, such as chest radiography, electrocardiography and echocardiography, are thus unlikely to alter a clinical diagnosis of an innocent murmur made by a paediatric cardiologist, based on auscultation[7]. Parents and referring physicians often expect a number of investigations to alleviate their concern, or to confirm or refute their suspicions[4,8,9]. Expensive investigations are therefore sometimes performed without any evident medical reason[10,11].

Canadian survey found that 96% of the children referred to tertiary hospitals had an innocent murmur and most cases diagnosed by clinical examination only[12].

Using electronic stethoscope could be the potential to eliminate waiting time, travel and reduce cost associated with the assessment of cardiac murmurs in children, specially with innocent murmurs. This study was aimed to evaluate its clinical correlation.

Methods

This was a cross sectional study performed in the Department of Paediatric Cardiology, National Institute of Cardiovascular Diseases (NICVD) during the period July 2018 to December 2018. Irrespective of sex, 60 patients from 01 month to 15 yrs of age were included. The attending parent or guardian of every participating child was informed of the purpose and procedure of the study and informed consent was taken in the prescribed format. For each child, detailed history was taken from the child/attendant, clinical examinations done and findings recorded in the prescribed data sheet.

Following standard protocol of the Department of Paediatric Cardiology, NICVD, without using any sedative, using the locally built electronic stethoscope (by research partner from the Department of Computer Science and Engineering, North Western University, Bangladesh) auscultation done by paediatric cardiologist and heart sounds recorded for analysis. Echocardiography using 'GE Vivid – S60' Cardiovascular Ultrasound System (echocardiography machine) was also performed by paediatric cardiologist and diagnosis was compared with the analysis of heart sounds recorded by electronic stethoscope. For every patient, heart sounds were recorded over the listening areas: aortic area (2nd right intercostal space), pulmonic area (2nd Lleft intercostal space), Tricuspid area (4th left intercostal space) and the mitral area (apex). For every participant phonocardiogram (PCG) was analysed.

Technologically, every heart sound recording and analysis was done in six steps. At first heart sound of children was recorded using electronic stethoscope. Then it was preprocessed for analysis by preprocessing steps. That preprocessed data

was de-noised. After de-noising, that data was processed using Mel-frequency Cepstral Coefficients (MFCCs- an algorhythm for sound processing Audio digital signal) signal processing algorithm. Then feature is extracted from proceeding data. Finally, SVM classification technique is applied to the extracted data to classify heart sound.

Heart sound recording and analysis

Heart sound recording done as shown in Fig 1.

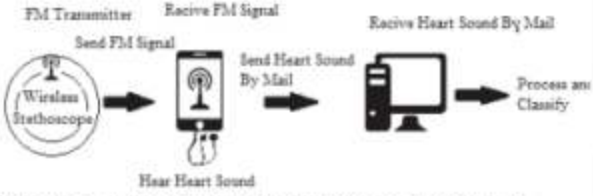

Figure 1. Flowchart of heart sound recording

At first, heart sound recorded using the electronic stethoscope (Fig 2a, 2b & 3). That device amplified the heart sound and transmitted the sound using the device's FM transmitter. Then a smartphone was used to record the heart sound by receiving the sound through FM module. Finally, recorded sound was sent to a PC and analysed.

Electronic Stethoscope

The electronic stethoscope was locally built by the research partners from the Department of Computer Science and Engineering, North Western University, Bangladesh. To build electronic stethoscope, with the chest piece of standard clinical stethoscope, along with the required hardware, Condenser microphone, Microphone amplifier (MAX4466), FM transmitter were used. After assembling the portions, the prototype of the electronic stethoscope was like Fig. 2a & 2b.

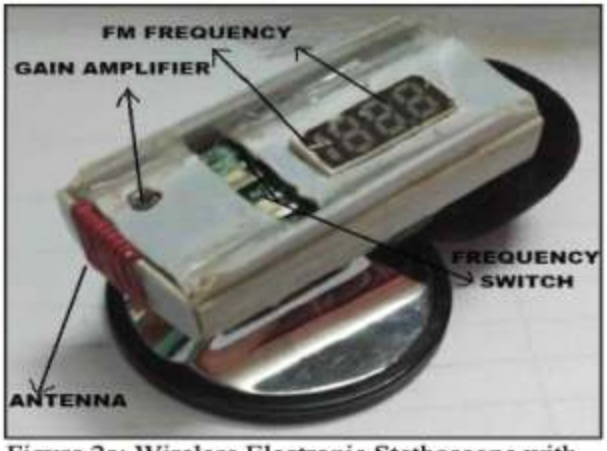

Figure 2a: Wireless Electronic Stethoscope with different parts

Figure 2b: Wireless Electronic Stethoscope with different parts

Figure 3: Photograph of doctors recording heart sound

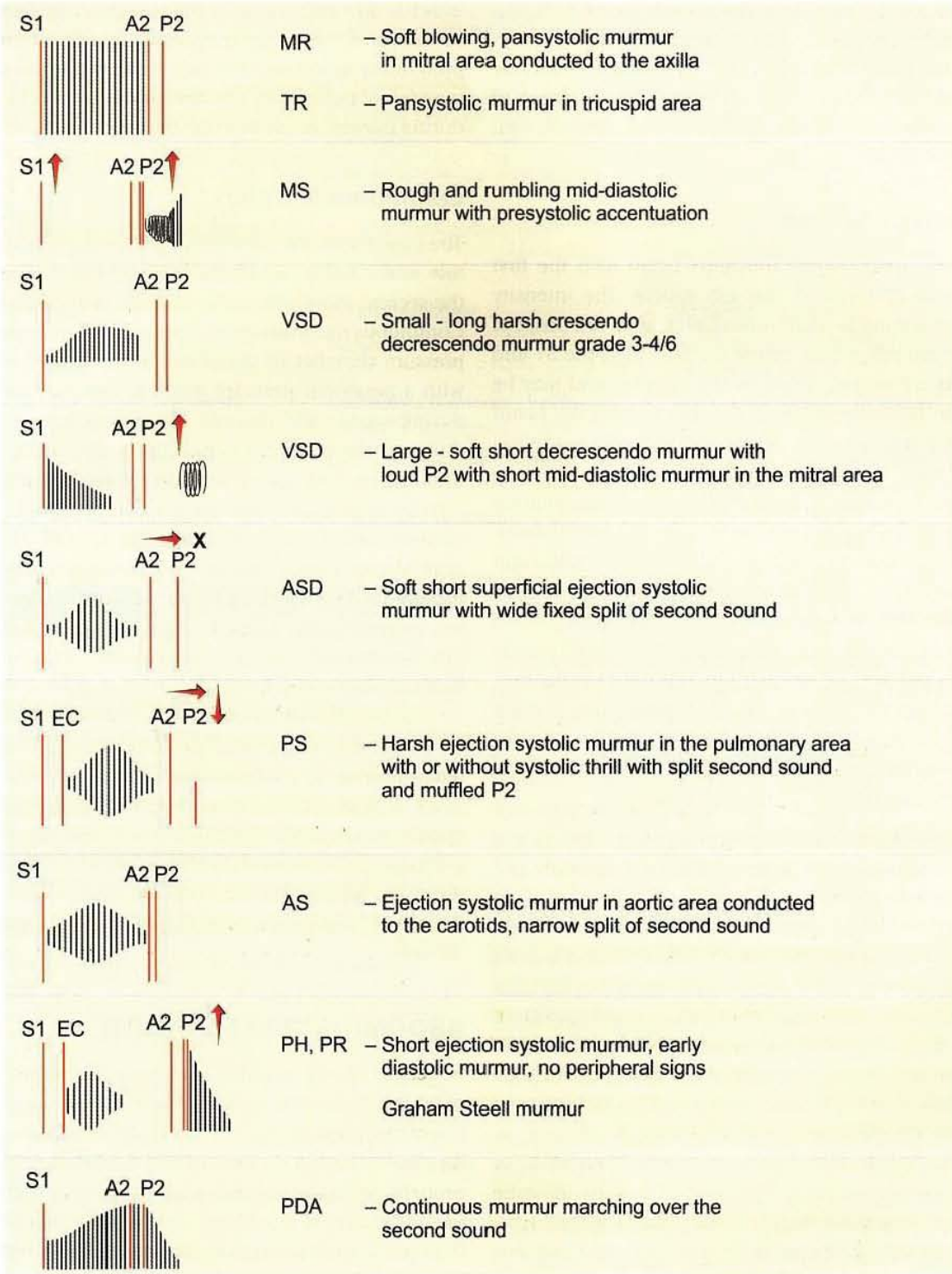

Figure 4: Schematic diagrams (PCG, phonocardiogram) of various murmurs in different congenital heart disease[16]. (A2, aortic component of second heart sound; AS, aortic stenosis; ASD, atrial septal defect; EC, ejection click; MR, mitral regurgitation; MS, mitral stenosis; P2, pulmonary component of second heart sound; PDA, patent ductus arteriosus; PH, pulmonary hypertension; PR, pulmonary regurgitation; PS, pulmonary stenosis; S1, first heart sound; TR, tricuspid refurgitation; VSD, ventricular septal defect).

Results

Out of 60 participants, normal heart sound was found in 17(28%) case and innocent murmur was found in 7 (12%) case. The pathological heart sound and murmur found in 36 participants and diagnosed as shown in the Figure 5. Nature of all murmurs and heart sound recorded in electronic stethoscope were same as found in traditional stethoscope and Echo.

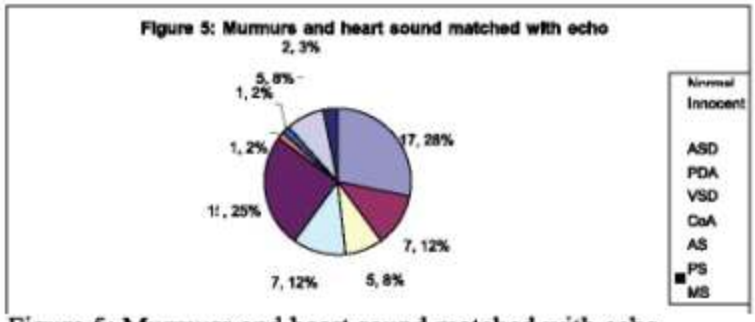

Figure 5: Murmurs and heart sound matched with echo

DISCUSSION

The present study shows that this electronic stethoscope allows digitalised heart sounds to be e-mailed easily, with maintained sound quality. It further indicates that telemedicine is a safe and convenient method for referral of heart murmurs in children for evaluation by paediatric cardiologists[12].

In our study the prevalence of cases with pathological heart sounds was 60%. This is a higher prevalence than what most referral hospitals experience. There is no true prevalence of pathology among the referrals, as this may vary as a function of referring doctors' profiles of referrals.

In a prospective series of 161 patients, with innocent or pathological heart murmurs being clinically examined by paediatric cardiologists, Smythe et al. showed that the clinical examination alone has a sensitivity of 96% and a specificity of 95%[5]. Rajakumar and coworkers reported a clinical evaluation of 128 heart murmurs by paediatric cardiologists and general paediatricians[17]. They found no difference in sensitivity between the two groups (85% *v* 79%, p = 0.53). Paediatric cardiologists, however, had a higher specificity than the general paediatricians (76% *v* 55%, p = 0.001). In a study of the accuracy of clinical assessment of heart murmurs by general paediatricians, the mean sensitivity and specificity were 82% and 72%, respectively[18]. Dahl LB et al concluded that referring the heart sounds with a brief clinical history as e-mail attachments is a safe and accurate method of assessing children presenting with heart murmurs at their primary care doctor[12]. Our observation is similar.

The main difference for the cardiologist, between a real clinical versus a recorded heart sound or murmur consultation, is the fact that in the latter, the cardiologist has to rely on the sounds selected and recorded by somebody else, perhaps with far less experience. This is the weak point in any "store and forward" electronic referral system. In spite of this, the accuracy of the method was very good in our study.

The present study indicates that electronic stethoscope may record and transmit heart sound efficiently for analysis and diagnosis of innocent or pathological murmur. It may also help to diagnose congenital heart disease (CHD). It has the potential for saving time and reducing inconvenience and cost which may incur if the patients are referred to a paediatric cardiologist without any judgment.

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Factors associated with blood pressure control amongst hypertensive patients in Northwest Bangladesh.

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Abstract

Background: Hypertension is a major public health problem worldwide including Bangladesh. In Bangladesh only 31.4% of patients with hypertension on treatment had their blood pressure controlled. **Objective:** To evaluate the control of hypertension and its associated factors among the adults patients with hypertension attending at outpatient clinic in a district headquarter of western part of Bangladesh. **Methods:** This was a cross sectional study conducted among hypertensive patients attending at private chamber in Chapai Nawabganj over 02 years period from January 2016 to January 2018. Total 260 hypertensive patients were selected purposively. Data were collected using a structured questionnaire by interview, physical and clinical examination and review the past medical documents of the patients. The questionnaire was designed to record patients' demographic, anthropometric and lifestyle factors and medical information (present and past up to 6 months) including treatment of hypertension and co-morbid conditions and documented clinical and laboratory findings. Chi-square test was applied to verify an association of demographic and life style factors, BMI status, disease (hypertension) duration and associated co-morbid **(Diabetes mellitus)** with blood pressure status. **Results:** Out of 260 hypertensive patients, only 30 (11.5 %) had their blood pressure levels controlled. Majority of the study subjects, were female (74.6%), >50 years (56.0%), under graduate (83.4%) and overweight or obese (50.4%). A high prevalence (27.3%) of diabetes mellitus was noted in this study. Majority (56.9%) of the study subjects noticed their hypertension within 5 years. Higher educated and more physically active hypertensive patients were significantly and positively associated with optimally controlled BP. **Conclusion:** A higher proportion of hypertensive patients remain with un-controlled BP. Massive public awareness campaign targeting modifiable risk factors is essential in controlling hypertension in Bangladesh, especially focusing on physical exercise and control of diabetes

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Introduction

Hypertension is a major public health problem worldwide.[1] Hypertension is one of the major non-communicable diseases (NCDs) in the world, which significantly contributes to the burden of cardiovascular diseases (CVDs), stroke, renal failure, disability and premature death.[2-4] It is also identified as a global disease burden and ranked third as a cause of disability-adjusted life years.[5] According to WHO, about 17 million deaths occur worldwide due to CVDs, of which hypertension alone accounts for 9.4 million deaths[6,7] and 80% of CVD related death occurred in developing countries.[8] The global prevalence of hypertension is projected to increase from 26% in 2000 to 29.2% by 2025,[6] which will be approximately 29% of the world's population. Although hypertension is more prevalent in developed countries like USA[9],

its prevalence is increasing in low and middle income countries.[2] Countries in Asia, especially Southeast Asia, are having an increasing burden of hypertension including CVDs.[10-12]According to WHO, hypertension has become a significant health concern in Asian region, affecting more than 35% of the adult population.[13]

Bangladesh, a developing country in south Asia, has been experiencing an epidemiologic transition from communicable diseases to non-communicable diseases (NCDs).[14] In recent years, rapid urbanization, increased life expectancy, unhealthy diet and lifestyle changes have led to an increase in the rate of CVD including hypertension in Bangladesh.[15] In Bangladesh, there is a wide range of variation in the prevalence of hypertension reported by several studies ranging from 11-44%.[16-20] Despite the high prevalence of hypertension in Bangladesh and low rate of control, factors associated with hypertension control in those receiving treatment have not been described. These factors may differ from those of developed nations. Despite the availability of multiple effective antihypertensive medications with proven benefits in reducing cardiovascular morbidity and mortality, control of hypertension remains poor.[21,22] In both high and low income countries, less than 27% and 10% respectively of hypertensive patients achieved their target blood pressure.[21,22] In recent population based survey in Bangladesh only 31.4% of patients with hypertension on treatment had their blood pressure controlled.[23] For the improvement of this worse situation, it is needed to identify the factors that affect hypertension control. Unfortunately, the reasons for uncontrolled hypertension remain unclear in low income countries and have been insufficiently studied in Bangladesh. The prime objective of this study is to identify the correlates of blood pressure control among the patients with hypertension attending at outpatient clinic in Chapai Nawabganj, a district headquarter of western part of Bangladesh. Understanding predictors of poor blood pressure control can facilitate development of targeted strategies

Methods

This was a cross sectional study conducted among hypertensive patients attending at private chamber in Chapai Nawabganj over 02 years period from January 2016 to January 2018. Total 260 hypertensive patients were selected purposively. Data were collected using a structured questionnaire by interview, physical and clinical examination, and review the past medical documents of the patients. The questionnaire was designed to record patients' demographic, anthropometric and lifestyle factors, and medical information (present and past up to 6 months) including treatment of hypertension and co-morbid conditions, and documented clinical and laboratory findings. Standing height in meter and weight in kg were measured during the physical examination of the patients, which were used to calculate their body mass index (BMI). Blood pressure was measured with the patient in sitting position after 10 minutes of rest, using a Mercury sphygmomanometer. Phase V korotkoff sound was used to determine the diastolic blood pressure. Hypertension was defined as either systolic BP > 140 mm of Hg or diastolic BP >90 mm Hg.[21] Past medical information provided by the patients during present visit was cross-checked with their medical records.

Data were analyzed by computer using SPSS for windows. Descriptive analytical techniques involving frequency distribution and computation of percentage were applied.

Chi-square test was applied to verify an association of demographic and life style factors, BMI status, disease (hypertension) duration and associated co-morbid (**Diabetes mellitus)** with blood pressure status.

Results

A total of 260 study subjects, three fourth (74.6%) were female. More than 56% of the study subjects were >50 years. Most (83.4%) of the participants were under graduate. Two-thirds (66.2%) of the subjects reported a sedentary life style. A high prevalence (27.3%) of diabetes mellitus was noted in the study sample. Majority (56.9%) of the study subjects noticed their hypertension within 5 years. Almost half (50.4%) of the study subjects were overweight or obese (Table 1).

Table 1: Characteristics of the study subjects. N=260

Characteristics	Number N (%)
Age of the patients	
Up to 30 years	11(4.2)
31 - 50 years	103 (39.6)
>50 years	146 (56.2)
Gender	
Male	66 (25.4)
Female	194 (74.6)
Educational Status	
Up to HSC	217 (83.4)
Graduate or above	43(16.6)
Life style	
Sedentary	172 (66.2)
Active	88 (33.8)
Diabetes mellitus	
Present	71 (27.3)
Absent	189 (72.7)
Disease duration	
5 year or below	148 (56.9)
>5 years	112 (43.1)
BMI status	
<25	129 (49.6)
25 – 29.9	99 (38.1)
30 or above	32 (12.3)

Table 2: Factors associated with blood pressure status. n = 260

Factors	Blood pressure status		p-value
	Controlled N (%)	Uncontrolled N (%)	
Age of the patients			
Up to 30 years (n=11)	3(27.3)	8(72.7)	
31 - 50 years (n=103)	16 (15.5)	87(84.5)	0.37
>50 years (n=146)	11 (7.5)	135 (92.5)	
Gender			
Male (n=66)	10(15.2)	56 (84.8)	0.28
Female (n=194)	20 (10.3)	174 (89.7)	
Educational Status			
Up to HSC (n=217)	20 (9.2)	197 (90.8)	0.008
Graduate or above (n=43)	10 (23.3)	33 (76.7)	
Lifestyle			
Sedentary (n=172)	15 (8.7)	157 (91.3)	0.047
Active (n=88)	15 (17.0)	73 (83.0)	
Diabetes mellitus			
Present (n=71)	4 (5.6)	67 (94.4)	0 .068
Absent (n=189)	26 (13.8)	163 (86.2)	
Disease duration			
5 year or below (n=148)	22 (14.9)	126 (85.1)	**0.054**
>5 years (n=112)	8 (7.1)	104 (92.9)	
BMI status			
<25 (n=129)	18 (14.0)	111 (86.0)	
25 – 29.9 (n=99)	10 (10.1)	89 (89.9)	**0.404**
30 or above (n=32)	2 (6.2)	30 (93.8)	

Out of 260 hypertensive patients, only 30 (11.5 %) had their blood pressure levels controlled and remaining 230 (88.5%) had not.

In Chi-square test higher educated and more physically active hypertensive patients were significantly and positively associated with optimally controlled BP. Age, gender, presence of diabetes mellitus, duration of disease (hypertension) and BMI were not identified as associated factors of blood pressure status. Having Diabetes mellitus and longer duration of disease (hypertension) were marginally non-significant and negatively correlated with optimal BP control. Only 7.5% patients had controlled blood pressure in age group >50 years. On the other hand 27.3% patients had controlled blood

pressure in age group below 30 years. Though the rates of controlled hypertension among the different age groups was not significantly differed, but it showed an upward trend as age advances. Males more likely to have optimal BP control as compared to females patients, but it was not significantly associated with blood pressure control. The patients with BMI <25 kg/m^2 had adequately controlled their blood pressure levels more than the patients who were over weight (25 – 29.9 kg/m^2) or obese (BMI ≥ 30 kg/m^2). Though obese patients experienced less blood pressure control, but BMI was not significantly associated with BP control (Table 2).

Discussion

Despite the availability of multiple effective antihypertensive medications with proven benefits in reducing cardiovascular morbidity and mortality, control of hypertension remains poor.[22,24] The target of 140/90 mmHg is not attained by the majority of hypertensive patients. The proportion of patients achieving this target is still below 50% worldwide 281.[22] The proportion of hypertensive patients achieving this target varies between different countries. In both developed and developing countries, less than 27% and 10% respectively of hypertensive patients have achieved their target blood pressure.[22,24] The lowest rates of blood pressure control have observed in developing countries. For instance in a survey from Asian countries,Van Minh et al. reported that only 5.4% of hypertensive participants had blood pressure below 140/90 mmHg.[25] In this study, we observed that only 11.5% patients had their hypertension controlled, it was much less than the hypertension control rates in the United States (29-53%) and European (30-50%) population.[26,27] It may be due to the difference of individual and social conditions, and the quality of care from health providers. By contrast, in a comparison between the National Health and Nutrition Examination Survey (NHANES) 1988-1994 and 1999-2008 Egan *et al.* found that the percentage of hypertensive patients with controlled blood pressure increased from 27.3% to 50.1% over the period in USA.[28] A similar trend has been observed in England.[28,29] We have also a space to improve the worst situation in Bangladesh by effective intervension programs for controlling the blood pressure. Being older is commonly associated with poor controlled blood pressure.[25,28,30] In this study, though the rates of controlled hypertension among the different age groups was not significantly differed, but it showed an upward trend as age advances. It may be due to age-related increases in blood pressure leading to a higher prevalence of isolated systolic hypertension in individuals specially over 50 years.[33]

The relationship between gender and poor blood pressure control has been contradictory. Some studies revealed a negative association between women and blood pressure control.[32-34] By contrast others studies revealed that women were more likely to have controlled blood pressure.[35,36] In one study the relationship between women and blood pressure control changed with age. Compared to men, younger women were more likely to have controlled blood pressure and older women were less likely to have controlled blood pressure.[37] Moreover, some studies reported being male as a predictor for inadequate blood pressure control.[38-40] Due to these discrepancies, there does not seem to be strong evidence supporting any particular association between gender and poor blood pressure control. The present study finding also didn't find any association of gender with blood pressure control.

A higher level of education was associated with better blood pressure control.[36,41] In study conducted in 184 general practices with free access to care, Paulsen et al identified that patients with less than 10 years education were less likely to achieve blood pressure control compared to those with higher levels of education.[42] In the analysis of NHANES 1999-2004, Ostchega et al. found that hypertensive patients with lower levels of education were less likely to have controlled blood pressure.[43] Sandoval et al found that low education was associated with poor blood pressure control.[41] Wong et al found that individuals with lower education background had 3.5 times higher life years lost than those with higher education. Hypertension was an important contributor to this disparity accounting for 3.5% the total difference in years lost between both groups.[44] In this present study we also observed that lower education levels had been more consistently associated with poor blood pressure control. It may be due to less awareness of the lower educated people about the complications of uncontrol blood pressure.

In previous studies the positive role of physically active life to control the blood pressure up to the optimum level is well documented.[45,46] Physically active lifestyle not only helps control high blood pressure (Hypertension), it also helps to manage weight, strengthen heart and lower stress level. A healthy weight, a strong heart and general emotional health are all good for your blood pressure.[45] Regular physical activity makes your heart stronger. A stronger heart can pump more blood with less effort. If your heart can work less to pump, the force on your arteries decreases, lowering your blood pressure.[46] The present study findings also go in favor of it.

Having Diabetes mellitus was nearly significant and negatively correlated with optimal BP control (≤140/90 mm of Hg) in this study. It is plausible, that diabetic patients, may have encountered challenges in observing the treatment for blood pressure control. This finding is similar with the reported studies that highlight reduced BP control among patients with diabetes.[41,47] It is plausible that among such patients, treatment of the comorbidity may be suboptimal. This poses a challenge to the successful control of hypertension among such patients.

Longer duration of disease (hypertension) was negatively correlated with optimal BP control. Patients with long established hypertension have been found more likely to have uncontrolled blood pressure.[48] This short of observation also noted in the present study.

Lower body weight is associated with better longitudinal BP control. The continually increasing BMI in normotensives may account for increasing prevalence of hypertension.[49] Same trend also observed in our study though BMI was not statistically associated with BP control.

A degree of bias may exist in this present study. We did not assess patients' adherence to antihypertensive medication. However, these data have relevant clinical implications. This study provides a framework for identifying hypertensive patients who are at high risk of poor control, and identified factors, like low educational status, sedentary lifestyle, presence of diabetes and long established hypertension may be amenable to improve the bleak situation.

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Experiences of submucous resection operation under local anaesthesia with deep sedation.

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Abstract

Background :Submucous resection (SMR) operation can be done under either local or general anaesthesia. This operation under local anesthesia (LA) with deep sedation is safe, simple, cost effective and reliable procedure which can save both money and time in developing country like Bangladesh. **Objective:** To achieve the experiences regarding SMR operation under local anesthesia with deep sedation. **Methods:** After taking proper approval from hospital administration, fifty cases were selected for doing SMR operation with maintain all aseptic precaution in Mymensingh Medical College Hospital during July 2013 to July 2014 and the effectiveness was done after completion of operation.**Results:** The age range of patients were from 18-37 years of both sexes where male and female ratio was 13:12. Thirty two (64%) patients felt the procedure was completely painless (Grade 1), 16 (32%) patients complained of slight discomfort (Grade 2) but none of the patients had experienced of severe discomfort. None of them felt any nausea or dizziness after deep sedation. **Conclusion:** SMR operation under LA with deep sedation is very well tolerated, simple, safe, less costly, less time consuming and highly acceptable procedure to the patient. Rhinologist should practice local anesthesia with deep sedation to perform SMR during their daily practice specially in Bangladesh where economy is the major concern.

Key words: SMR operation, local anesthesia, general anesthesia.

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Introduction

Nasal obstruction causing difficulty in breathing is one of the most common problems bringing a patient to the ENT OPD and septal deviation is a frequent structural etiology.[1] Physiological septum deviation is a deviation without subjective or objective reduction of the nasal breathing. Where as a pathological septum deviation is a deviation with subjective reduction of nasal breathing. Thus, the problem of precisely defining the septum deviation is evident.[2] Septal pathology may be deviation, dislocation or spur which can involve only cartilage or both cartilage and bone. Untreated deviations resulting functional sinus problems opened the doors for functional sinus surgery.[3] Surgical correction of septal deviation is the third most common head and neck procedure in the United States and it is generally performed to improve quality of life[4]. The submucous resection (SMR) was first described byFreer in 1902 and by Killian in 1904.The preservation of bilateral mucoperichondrial flaps and cartilaginous supports were considered essential in their technique.[4,5] Most of the surgeons adopted Killian's technique with preservation of caudal and dorsal struts of the septal cartilage to minimize the complications.[6] The major complications of this procedure are septal perforation, septal hematoma, bleeding and crust formation, saddling of nose and retraction of the columella and residual deviation.[4,5] Submucosal resection of the septum aims to remove or straighten part(s) of the deviated cartilage and bone of the nasal septum. The type of surgery used depends on the type of deviation. If the deviation lies posterior to the Cottle's line then sub mucosal resection of septum is

preferred.[1] Nasal septal surgery performed under local anesthesia with pethidine sedation resulted in less surgical bleeding, less post operative pain, a shorter recovery period and a higher level of anesthesia satisfaction. Moreover local anesthesia does not carry the risks of general anesthesia like aspiration and other respiratory problems. Recent evidence suggests that lignocaine with adrenaline is safe.[3] The purpose of this study was to obtain experiences of patients undergoing SMR with deep sedation for symptomatic deviated nasal septum.

Methods

Fifty symptomatic deviated nasal septum (DNS) patients were selected for SMR operation under local anaesthesia who came to the out patient department of ENT in Mymensingh Medical College Hospital during July 2013 to July 2014 after taking proper approval from hospital administration. Patients were informed about the whole operation procedure under LA. The age of the patients more than 17 years of both sexes were included in this study. Exclusion criteria include DNS with septorhinoplasty, any acute or chronic disease in the nose, paranasal sinus, ear and throat and other systemic disease like diabetes mellitus, hypertension, tuberculosis and bleeding or coagulation disorders. Informed written consent was taken before operation under LA with deep sedation. After introducing an intravenous channel, 1000 ml of 5% dextrose saline was pushed in drip and the channel was maintained during per and post operative periods. Injection pathedine (1mg/Kg body weight), pushed 50% in IV route and 50% intramuscular (IM) route. Pathedine was diluted 4 times while pushing through the I/V channel.With all aseptic precaution 2% xylocaine and 1:50,000 adrenaline was infiltrated in subperichondrial planes of nasal septum. A curvilinear incision was given at the mucocutenious junction on left side of the septum. It cuts only mucosa and perichondrium. Then elevate the mucoperichondrial and periosteal flap. Cartilage was incised just posterior to first incision. Elevate the opposite mucoperichondrium and periosteuum with the elevator passed through the cartilage incision. Then cartilage and bone was removed with preserve a strip of cartilage about 1cm wide along the dorsal and caudal border of the septum to prevent collapse of the bridge or retraction of columella. Then anterior nasal packing was giving with Ribbon gauze smeared with an antibiotic ointment and nasal dressing was applied and kept for 24 hours. All the patients were follow up a week later. A few hours after the operation, the patients were interviewed about the pain or discomfort during the operation procedure to grade the effectiveness of the LA with deep sedation. The grades were: grade I include painless, grade II have slight pain, grade III have moderate pain and grade IV have severe pain. The evaluation of SMR operation under local anesthesia was done by 4 parameters *i.e.* cost of the drug used for LA with deep sedation, amount of blood loss, time needed for operation and complications. Patient's satisfaction level regarding relieving nasal obstruction after operation was assessed by a 5 parameters such as strongly dissatisfied (SDS), dissatisfied (DS), un decide(UD), satisfied(S) and strongly satisfied (SS) at any convenient time during follow up after discharge.

Results

A total of 50 patients, 26 (52.0%) were men and 24 (48.0%) were women, male:female ratio was 13:12. Highest [35 (70.0%)] number of patients were in the age group of

18-37 years, followed by 13 (26.0%) in the age group 38-57 years and the rest 2 (4.0%) were more than 57 years.

All the patients well tolerated the procedure. Out of 50 patients, 32 (64.0%) patients were in Grade I, 16 (32.0%) patients were in Grade II and only 2 (4.0%) were in Grade III and none in Grade IV (Table 1). None of them complain about operative analgesia or felt any nausea or dizziness. Most of them were discharged on the following day or at the day after the operation. Regarding relieving of nasal obstruction, 36 (72.0%) patients were very satisfied, 14 (28.0%) were satisfied and none was dissatisfied (Figure 3). Average cost of drugs including local anesthesia with deep sedation was only Tk.500. Average blood loss during the surgery in all cases was minimum (40 – 50 ml both in gauze piece and in the suction bottle). The average operating time in all cases was average 30 - 40 minutes. Complications were negligible, few patients complained only the slight or moderate pain (Table 2).

Table 1: Effectiveness of local anesthesia during operation

Grading	Frequency (%)
Grade I (Painless)	32(64.0)
Grade II (Slight pain)	16(32.0)
Grade III(Moderate pain)	2(4.0)
Grade IV(Severe pain)	0(0.0)

Table 2: Evaluation of submucous resection operation under local anesthesia.

Parameters of evaluation	Findings
Cost of drugs per patient	Tk. 500 per patient
Bleeding at the time of operation	Minimum (40-50 ml)
Total time of operation	Average (30 - 40 minutes)
Complications	Very much negligible

Discussion

SMR under local anesthesia is a better for relieving nasal obstruction due to short hospital stay, cheap, less bleeding, no serious complication, no post operative vomiting and hangover like general anaesthesia and postoperative sore throat.[3] These findings are agreed with this previous observation. Present study suggested that males (52%) cases are more than females (48%). This study is consistent with other studies done by Padma K *et al.*[1] Sheikh MS *et al.*[4], Buckland J R *et al.*[7] The possible reason for male dominance may be more environmental exposure and trauma.[4] Most of the patients remains in age group range of 18-37 years (70%) which was compared favorably with other studies.[1,4,6,7] Majority of the patient (82%) who underwent SRM operation under local anesthesia for relief of nasal obstruction were in very satisfactory. None of the patients were dissatisfied. Similar findings also observed in a study of Gian Chand *et al.*[6] in Pakistan.

In previous studies it was found that patients performed SMR operation under local anesthesia was well tolerated without any pain or anesthesia related complications like,nausea, vomiting, dizziness etc. But a few SMR operated patients under general anesthesia were found to have nausea and vomiting.[3,6] The present study also suggested that most of the patients did not felt any pain or discomfort or anesthesia related complications during SMR operation under local anesthesia with sedation.

In present study the drug expenses of local anesthesia with sedation was remarkably lower than that of general anesthesia which was observed in previous studies.[3,6] This suggests, SMR operation under local anesthesia with sedation is less costly than general

anesthesia. Bleeding at the time of surgery was mild in which was consistent with Chand G *et al*.[6] The average operating time was 34.5 mins. with a range 30-40 mins which was comparable with other study where operating time ranged from a minimum of 10 mins. to a maximum of 1 hr. 55 mins. and the median being 30 mins.[8-10] and the complication was very negligible like other studies.[3,6]

The present study findings suggested that SMR operation under local anaesthesia with deep sedation was cost benefit in comparison of general anesthesia considering short hospital stay, being cheap, less operative bleeding, no serious complication, patient compliance, no post operative vomiting and hangover as in general anesthesia.

This study has some limitations as no comparison group of general anesthesia was allocated. Due to this limitation, the evaluation of SMR operation under local anesthesia in comparison of general anesthesia was dependent completely on previous literatures.

The results of this study have certain implication in clinical practice. Since local anesthesia with deep sedation is the better option in case of SMR operation than general anesthesia. Rhinologist should practiced local anesthesia with deep sedation to perform SMR during their daily practice specially in Bangladesh where economy is the major concern.

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Long Segment Transpedicular Screw Fixation With Decompression in Incomplete Thoracolumbar Spine Injury

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Abstract

Background: Traumatic fracture of the thoracolumbar spine is one of the major causes of disability in adult population of Bangladesh. Long segment transpedicular (LST) screw fixation has gained popularity in the last decade as a effective surgical treatment. **Objective:** To evaluate LST screw fixation in incomplete thoracolumbar spine injury among the patients attending at National Institute of Traumatology and Orthopaedic Rehabilitation NITOR, Dhaka. **Methods:** This prospective follow up study was conducted in the Department of Orthopedics, NITOR, Dhaka, over a period of 2 years from January 2014 to December 2015. Incomplete thoracolumbar spinal injury patients attending at the hospital were the study population. A total of 20 patients aged 18-60 years irrespective of sex were included in the study. The patients were treated by Long segment (LS) posterior instrumentation and followed periodically up to 6 months with a structured data collection sheet developed to record detail history, physical examination, investigations, operative procedure and follow-up findings of the patients. Pre and post operative patient status were measured by ASIA grading of spinal cord injury. At the end of 6 months patient's satisfaction was assessed by modified Macnab criteria. **Results:** A total of 20 patients, male female ratio and mean age were 5.67:1 and 33.2±11.8 years. Fifty percent cases were due to road traffic accident and the rest 50.0% were due to high energy falls. The pre-operative ASIA grade status of the patient's SCIs was B in 9 (45.0%), C in 10 (50.0%) and D in 1 (5.0%) patients. At the end of 6 month after operation, all the patients had improvement in neurological function: ASIA grade C was in 3 (15%), D was in 8 (40%) and E was in 9 (45%) of study patients. All the patients but one were satisfied about the outcomes of the (LS) posterior instrumentation. **Conclusion:** Long segment transpedicular screw fixation with decompression by laminectomy is an effective method of treatment of thoracolumbar spine Iinjuries. This method enhances anatomical, clinical and functional recovery, reduce pain and improve working status with early rehabilitation.

Key Words: thoracolumbar spine injury, long segment transpedicular screw fixation, ASIA grade, modified Macnab criteria

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Introduction

Thoracolumbar junction is the mechanical transition zone between rigid thoracic and more mobile lumbar spine. Vertebral fracture in this area are usually extremely unstable with marked kyphotic deformity. At this level spine injury associated with damage to cord or caudaequina 14-38%.[1] Inserting the screw only one level above and below the fractured segment might not have provided adequate stability.[1,2] Traumatic fracture of the thoracolumbar

spine is a major cause of disability in adult population. It can be treated conservatively but the surgical treatment is the modern way of treatment. Among the surgery posterior transpedicular fixation has been the preferred method for stabilizing acute unstable thoracolumbar fractures.[3]

Fractures at the thoracolumbar junction T11—L2 are most problematic, since the injured segments are junction between the rigid thoracic spine and the lumbosacral vertebrae. The type of instrumentation used depends on the injured level, the fractured pattern, the need for stabilization or decompression and the surgeon's level of experience and training. Long segment transpedicular screw fixation in unstable thoracolumbar spine has gained popularity in the last decade as it reduce the kyphosis, decreased instrument failure and sagittal collapse as well as relieve of pain. Residual deformity at this level is poorly tolerated and mechanical imbalance predisposes to pain and construct failure.[4]

Short-segment pedicle screw construct is the method of choice for reduction and stabilization of unstable thoracolumbar spinal injuries. Many investigators have recently reported a high rate of instrument failure. The use of segmental transpedicular fixation two levels above and two level below the fractured vertebra reduce the kyphosis, decreased instrumental failure and sagittal collapse.[5] It has been demonstrated that short-segment (SS) instrumentation is associated with an unacceptable rate of failure. The highest rate of the instrumentation failure resulting in re-kyphosis of the entire segment is associated with SS posterior reduction and stabilization of burst fractures showing the inadequacy of the SS transpedicular instrumentation used for the treatment of thoracolumbar and lumbar fractures.[6] Burst fractures are common thoracolumbar junction injuries. Dorsal fixation of the thoracolumbar burst fractures is widely accepted as a treatment option, especially in unstable burst fractures.[7]

Burst fractures most frequently affect the thoracolumbar region due to the fulcrum of increased motion at the T12–L1 junction. Approximately 90% of spinal fractures are found in the thoracolumbar segment. They often lead to collapse of the vertebral body and an associated kyphotic deformity. This vertebral collapse is usually accompanied by varying degrees of spinal canal invasion which may or may not result in neurological compromise. Clinical results depends on reduction with transpedicular screw fixation and lateral fusion.[8] Inspite of progress in imaging, understanding of spinal stability and modern classification systems, there is no generally accepted consensus regarding the type of the surgical approach in the treatment of thoracolumbar fractures. But several authors showed that a long posterior stabilization is the most frequently used treatment modality.[9] Fractures involving the anterior and middle columns of the vertebrae and the canal were mildly compressed by the retropulsed bone fragment. However, there was no obvious neurologic deficit in these patients. They initially underwent conservative treatment and thoracolumbar spinal orthosis (TLSO) brace for at least 3 months but the intractable pain caused patients to be bedridden for prolonged periods of time and

limited daily activity. Surgical intervention is often necessary for the patients with unstable thoracolumbar fractures or those with neurologic deficits related to compression of the neural structures by bony elements or hematomas leading to partial cord injuries or caudaequina injuries. In patients with fractures and associated spinal cord injury, the efficacy of decompressive surgery varies depending on the level and degree of injury. [10]

The recommended method for examining neurological function is the American Spinal Injury Association (ASIA) method and neurological function impairment should be graded according to the ASIA Impairment Scale. Examination of anal sensation and sphincter autonomic contraction should be performed to identify complete or incomplete spinal cord injury as a standard protocol.[11] The goal of treatment in thoracolumbar fractures are to restore vertebral column stability and obtain spinal canal decompression. After Holds worth described vertebral burst fractures in 1983, numerous articles and treatment methods, were developed, including posterior fixation with pedicular screws and rods, fusion or both.[12] However the present study was conducted to evaluate Long Segment Transpedicular Screw Fixation in Incomplete Thoracolumbar Spine Injury among the patients attending at NITOR, Dhaka.

Materials & methods

This was a prospective follow up study. The study was conducted in the Department of Orthopedics, NITOR, Dhaka, over a period of 2 years from January 2014 to December 2015. Patients having unstable thoracolumbar spine injury with incomplete neurological deficit of single vertebra envelopment attending at NITOR were the study population. A total of 20 patients, 18 to 60 years of age with incomplete neurological deficit of single vertebra envelopment were included in this study by purposive sampling. Patients having a history of spinal surgery, infective disease of spine (TB spine), bone tumour of spine, complete cord lesion and associated cervical spine, head injury and chest injury were excluded from the study. Prior permission was taken from Ethical Review Committee, NITOR, Dhaka, Bangladesh to conduct this study. The patients were treated by long-segment (LS) posterior instrumentation and followed periodically up to 6 months after operation . All the selected patients were operated within 21 days of admission.

A structured data collection sheet was developed to record detail history, physical examination, investigations, operative procedure and follow-up findings of the patient and finalized after pretesting. Data were collected by interview and physical examination of the patients, from treatment records and interview of the concerned attending doctors during pre and post operative period periodically up to 6 months. Plain x-ray both anterior posterior & lateral view and MRI of thoracolumbar region for all cases were done. 3D CT scan was done, if necessary. Pre and post operative patient status were measured by

ASIA grading of spinal cord injury.[13] At the end of 6 months patient's satisfaction was assessed by modified Macnab criteria (Table 1).[14]

Table 1 Modified Macnab Criteria

Result (Outcome)	Criteria
Excellent	No pain, no restriction of mobility; return to work with good level of activity.
Good	Occasional non radicular pain, relief of presenting symptoms, able to return to modified work.
Fair	Some improved functional capacity, still handicapped and unemployed.
Poor	Continued objective symptoms of root involvement, additional operative intervention needed at the index level irrespective of length of postoperative follow - up.

Data were analyzed in the computer using SPSS for windows. Descriptive analytical techniques involving frequency distribution, computation of percentage etc. were done. In statistical analysis, outcome categories of patient satisfaction were regrouped. Excellent and good categories were considered as satisfactory, fair and poor categories were considered as unsatisfactory.

Results

A total of 20 patients, 17 (85.0%) were males and the rest 3 (15.0%) were females. The male female ratio was 5.67:1. The mean age of them was 33.2±11.8 years with a range 18-60 years. Fifty percent cases were due to road traffic accident and the rest (50.0%) were due to high energy falls. Spinal injury at the level of twelve thoracic vertebra (T_{12}) occurred in 8 (40.0%) patients, first lumbar vertebra (L_1) in 8 (40.0%)) and second lumber vertebra (L_2) in 4 (20.0%) patients. Sixty percent of the spinal injuries were compression and rest (40.0%) were burst fractures.

The pre-operative ASIA grade status of the patient's SCIs was B in 9 (45.0%), C in 10 (50.0%) and D in 1 (5.0%) patients. At the end of 6 month after operation, all the patients had improve in neurological function. In particular, a neurological improvement of 1 ASIA level was observed in 7 (35.0%) patients, 2 grade improvement in 12 (60.0%) and 3 grade improvement in 1 (5.0%) (Table 2).

Before operation mean Cobb angle and Kyphotic deformation of vertebral body and Beck Index of the present study patients were 21.3±6.9 and 23.2±4.8 degree respectively. And at the end of 6 months of operation both of them reduced to 12±3.3 and 9.5±2.3 degree respectively. Pre-operative mean Beck Index of the patients was 0.80±0.40 and at end of 6 months, it increased to 0.88±0.42.

Patients' satisfaction about the out comes of operation was excellent in 13 (65.0%), good in 6 (30.0%), fair in 1 (5.0%) study patients. Poor was not found (Table 3). A total of 20 patients, 19 (95.0%) patients

were satisfied about the outcomes of the long-segment (LS) posterior instrumentation and only one (5.0%) patient was dissatisfied about the outcomes of the operation.

Table 2 Pre and post operative status of the study patients according to ASIA grading.

Pre operative		Post operative ASIA grade (After 6 months follow up)				
ASIA Grade	Frequency N (%)	A N (%)	B N (%)	C N (%)	D N (%)	E N (%)
A	-	-	-	-	-	-
B	9 (45.0)			3(33.4)	5(55.5)	1(11.1)
C	10 (50.0)				3(30.0)	7 (70.0)
D	1 (5.0)					1 (100.0)
E	00 (00.0)					
Total N(%)	20 (100.0)			3(15.0)	8(40.0)	9(45.0)

Table 3. Patients' satisfaction after 06 months follow up according to modified Macnab criteria. n=20

Modified Macnab criteria	Frequency N	Percentage %
Excellent	13	65.0
Good	06	30.0
Fair	01	05.0
Poor	00	00.0

A total of 20 patients, only 5 patients (25.0%) developed post operative complications, among them urinary tract infection was in 3 (15%) and bed sore was in 2 (10%) patients

DISCUSSION

Thoracolumbar fractures with neurologic deficit are frequent. It is widely accepted that thoracolumbar unstable fractures should be addressed surgically. The purpose of treating vertebral fractures are the immediate mobilization of the patient with less depending of bracing, the distribution of corrective force over multiple levels and the reduction of likelihood of implant failure. The purpose of treating thoracolumbar fracture is to achieve early neurological decompression and stabilization for early rehabilitation. The pedicle offers a strong point of attachment of the posterior elements to the vertebral body. Pedicle screw fixation revolutionized spine surgery and lumbosacral instrumentation is a more effective management of thoracolumbar burst fractures either SS and LS pedicle instrumentation.15-17[13-15]. Verlaan et al.[18] eviewed 132 papers, published within a 30-year period (1970-2001), for studying the surgical outcome of this instrumentation in the management of thoracic and thoracolumbar fractures and its complications rates. Though, there are inequities as far as the severity of the injury is concerned between the different groups. Eventually, no difference found between the outcomes of patients treated with long constructs compared to them who treated with short constructs. However LS instrumentation needs more time to perform than SS instrumentation. But a low rate of complications and a very low rate of serious complications was reported among the

patients with long constructs. The present study findings also revealed that LS instrumentation is an effective intervention for the recovery of neurological function in Transient Symptoms with Infarction (TSI). Neurological recovery of one or more ASIA impairment scale was seen in all patients. More than 60% (13/20) of the study subjects had 2 grade or above improvement of neurological function in the ASIA scale at the end of 6 months of follow up period after LS instrumentation. Additionally there was no reported implant failure within the follow up period. Similar findings also noted in a study of Islam, *et al.*[2] In studies of Sapkas, G *et al.*[9] and Verlaan *et al.*[18], the radiographic indexes (Cobb angle and kyphotic deformation) were far improved after LS pedicle instrumentation. The present study findings also consistent with their observations. No remarkable difference between pre and post operative beck index was observed in this study, indicating that this index is not reliable enough for the evaluation of LS pedicle instrumentation. It goes in favor to Sapkas, G *et al.*[9]

The present study findings suggests that middle aged males are commonly prone to develop thoracolumbar spine injury, because they are supposed to be more exposed to trauma than other groups. The mean age and male female ratio of the present study subjects were 33.2±11.8 years and 5.67:1 respectively, Which correlate well with the findings of the previous studies. [19,20].

The predominant causes of (TSI) are falls from heights and road traffic accident.[5,21] Similar findings also observed in the present study.

Previous studies[2,22] revealed that according to modified Macnab criteria, functional result of LS instrumentation were excellent to good in more than 84% patients. It was 95% in the present study.

The results of this study have certain implication in clinical practice however. The study findings suggest that Long Segment Transpedicular Screw Fixation with Decompression by Laminectomy is an effective method of treatment of Thoracolumbar Spine Injuries. This method enhances anatomical, clinical and functional recovery, reduce pain and improve working status with early rehabilitation.

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Teenage marital pregnancy and its risk factors in a rural community of Bangladesh

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Abstract

Background: Teenage pregnancy is a major health concern both in Bangladesh and developed countries. The important risk factors identified for teenage pregnancy in South Asian countries including Bangladesh are teenage marriage, low socio- economic status, low educational attainment, disrupted family structure and birth intention. **Objective:** To find out the proportion of teenage marital pregnancy and its risk factors in rural community of Bangladesh. **Methods:** It was cross sectional descriptive type of study conducted among the married women aged <30 years in a rural community Bangladesh. A total of 419 women were included in this study. Data were collected by 4th year medical students of Barind Medical College with the help of a pretested semi structured interview schedule by face to face interview. Chi-square test was used to find out the association between variables and teenage pregnancy. Multiple logistic regression analysis was also applied to identify the important risk factors of teenage pregnancy. **Results:** A total of 419 women, 215 (51.3%) women experienced teenage marital pregnancy. The mean age of first pregnancy was 18.6 (SD = 2.4) years. More than 53.0% of the women were married before completion of 18 years and their mean age of first marriage was 16.4 years. Marriage before 18 years (OR 24.21, 95% CI 13.48 to 45.57), Low education (OR 2.97, 95% CI 1.23 to 7.14) and unplanned child birth (OR 5.86, 95% CI 2.75 to 12.50) of the women were identified as risk factors of teenage age pregnancy in the rural area. **Conclusion:** The ordinance of legal age at marriage (18 years) should be properly implemented in Bangladesh specially in rural areas. Policy and special programmatic measures should be undertaken to remain girls in school for a longer duration to prevent dropouts giving emphasis on the education for treating the effect social and cultural norms favouring girls to get marry earlier and to have early childbirth. User- friendly reproductive health services as well as accurate information on reproductive health should be availed to the young women to avoid unwanted and mistimed births.

Key words: teenage pregnancy, risk factors, rural community, Bangladesh

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Introduction

Teenage pregnancy is a major health concern both in developed and developing countries.[1-3] Around the world, fifteen million women less than 20 years of age bear child which is one-fifth of all births.[4] Evidence in developing world indicates that one-third to one-half of women become mothers within 19 years of age[5,6] The situation in South Asian countries is severe as there are higher proportions of teenage pregnancies in this region due to common practice of early marriage and socio-expectation to have a child soon after marriage.[7-9] Half of all world adolescent births occur in just seven countries:

Bangladesh, India, Brazil, the Democratic Republic of the Congo, Ethiopia and the United States.[10] Bangladesh has the highest adolescent fertility rate in South Asia where 1 girl in 10 has a child before the age of 15 yrs. whereas 1 in 3 teenager becomes mother or pregnant by the age of 19 yrs.[11-13]

There are ample evidences suggesting that adolescent motherhood takes a toll on a girl's health, education and rights, which prevents her from realizing her own potential and has adverse impacts on the baby. Adolescent childbearing is generally associated with higher risk of adverse health outcomes of mother and newborns including spontaneous abortion, preterm delivery and low birth weight even death among adolescent girls as compared to older women aged >19 yrs.[14] In addition to the adverse health outcomes, pregnancy can induce tremendous psychological stress on the adolescents. Due to negative medical, psychological and social outcome, it is pertinent to launch interventions to avoid teenage pregnancies. Identification of the risk factors that influence the occurrence of teenage pregnancies is the basis on which effective preventive programmes should be developed.[15]

Risk factors of teenage pregnancy are enormous and may vary population to population. Teenage pregnancy in developed countries usually occurs outside marriage, but in developing countries, it is often within marriage.[16] Disrupted family structure and limited education, risky sexual behaviour such as early sexual initiation increasing number of partners and nonuse of contraceptives were the important factors associated with teenage pregnancies in USA and European Union Countries. The important risk factors identified for teenage pregnancy in South Asian countries include teenage marriage, low socio- economic status, low educational attainment, disrupted family structure and birth intention. [16,17]

A lot of studies conducted in Bangladesh so far on fertility related issues greatly focused on the relationship between age at first marriage, unwanted pregnancies, contraceptives use, etc. and socio-demographic factors[9,13,18] Little attention has been paid to understand the risk factors of adolescent pregnancy specially in rural communities of Bangladesh.[19-21] Under these circumstances this study attempts to identify the risk factors of adolescent pregnancy and also aims to investigate to what extent the factors influence adolescent motherhood in a rural community of Bangladesh.

Methods

It was a cross sectional type of descriptive study with the objective to find out the proportion of the married rural women aged <30 years became pregnant within 19 years and the key risk factors of the teenage marital pregnancy in a rural community of Bangladesh. All married women aged <30 years residing in the rural community constituted the study population. A total of 419 women were selected purposively as sample unit in this study. Data were collected by 4th year medical students of Barind Medical College with the help of a

pretested semi structured interview schedule. The interview schedule was designed to record the socio-demographic characteristics, age of first marriage and pregnancy, and complications related to this pregnancy. Obtaining informed consent of the selected women and maintaining all confidentiality and privacy, survey method was applied to collect information from them by face to face interview. Data were entered in the computer and processed using SPSS for windows. Descriptive analytical techniques involving frequency distribution, computation of percentage, mean, SD etc. were applied. However, association between variables were conducted applying Chi-square. Multiple logistic regression analysis was used to identify the important risk factors of teenage pregnancy.

Results

A total of 419 women, 215 (51.3%) were experienced first marital pregnancy within 19 years. The mean age of first pregnancy was 18.6 (SD = 2.4) years.

Of the total 419 respondents, 224 (53.5%) were married before completion of 18 years and the rest 195 (46.5%) respondents were married at 18 year or above. The mean age of first marriage was 16.4 years. Eighty three percent of the married women before 18 years experienced first marital pregnancy within 19 years but it was only 14.9% among the women who married at 18 year or above. Higher educated participants had significantly (p=0.000) lower teenage marital pregnancy compared to their less educated counterparts. Participants with educated husband also were significantly (p=0.000) less likely to experience teenage marital pregnancy. Middle class Women (with monthly family income Tk.10001–30000) had experienced teenage marital pregnancy in lowest proportion comparison to other economic groups. Richest women had higest proportion of teenage pregnancy. Participants' teenage pregnancy significantly (p=0.018) associated with their economical status. Women desired for more than two children were experienced significantly more teenage marital pregnancy compared to the participants desired for ≤2 children (63.7% vs 46.1%). Participants exposed to one mass media had significantly (p=0.002) lesser experience teenage marital pregnancy than those exposed to more than one mass media. Similarly, participants whose pregnancies were planned were significantly (p=0.000) less likely to experience teenage marital pregnancy. This analysis also revealed that occupation (house wife and working mother) and family type (nuclear family and joint or extended family) were not associated with teenage pregnancy (Table 1).

Multivariate logistic regression analysis was performed to identify the risk factors of teenage marital pregnancy. Marriage before 18 years of the rural women was identified as the most important risk of teenage pregnancy. Participants who married before 18 years had 24 times more risk to experience teenage marital pregnancy compared to the participants married at 18 years or above. Low education (OR 2.97,

95% CI 1.23 to 7.14) and unplanned child factors of teenage age pregnancy in the rural
birth (OR 5.86, 95% CI 2.75 to 12.50) of area (Table 2).
the women were also identified as risk

Table 1: Teenage marital pregnancy and its associated factors: a bi-variate analysis n = 419

Factors	Age of marital pregnancy		Test Statics	P value
	Within 19 years N (%)	After 19 years N (%)		
Age of marriage				
Before 18 years (n = 224)	186 (83.0)	38 (17.0))	193.9	0.000
At 18 years or above (n = 195)	29 (14.9)	166 (85.1)		
Maternal education				
Up to secondary (n = 335)	200 (59.7)	135 (40.3)	47.07	0.000
Higher secondary or above(n = 84)	15 (17.9)	69 (82.1)		
Husband education				
Up to secondary (n = 308)	182 (59.1)	126 (40.9)	47.07	0.000
Higher secondary or above(n = 111)	33 (29.7)	78 (70.3)		
Family income				
≤Tk. 10000 (n = 270)	150 (55.6)	120 (44.4)	8.02	.0.018
Tk.10001 – 30000 (n = 133)	55 (41.4)	78 (58.6)		
>Tk.30000.00 (n=16)	10 (62.5)	6 (37.5)		
Occupation				
House wife (n = 392)	205 (52.3)	187 (47.7)	2.35	0.125
Working mother (n=27)	10 (37.00	17 (63.0)		
Family type				1.000
Nuclear family (n=257)	132 (51.4)	125 (48.6)	.001	
Joint or extended family (n=162)	83 (51.2)	79 (48.8)		
Desire number of children				
Up to 2 (n=295)	136 (46.1)	159 (53.9)	10.83	0.001
More than 2 (n=124)	79 (63.7)	45 (36.3)		
Mass media exposure				
Exposure to one media (n=224)	131 (58.5)	93 (41.5)	9.90	.002
Exposure to > one media (n=195)	84 (43.1)	111(56.9)		
Birth intention				
Intended (n=327)	147 (45.0)	180 (55.0)	24.102	0.000
Unintended (n=92)	68 (73.9)	24 (26.1)		

Table 2: Teenage marital pregnancy and its associated factors: a bi-variate analysis n = 419

Variables	Odds ratio	95% CI	p-value
Age of marriage			0.000
Before 18 years	24.21	13.48 – 45.57	
At 18 years or above	1.00	Reference	
Maternal education			0.015
Up to secondary	2.97	1.23 – 7.14	
Higher secondary or above	1.00	Reference	
Husband education			0.708
Up to secondary	1.15	0.53 – 2.51	
Higher secondary or above	1.00	Reference	
Family income			0.499
≤Tk. 10000	1.00	Reference	
Tk.10001 – 30000	0.81	0.43 – 1.53	
>Tk. 30000	2.08	0.39 – 10.86	
Desire number of children			0.961
Up to 2	1.00	Reference	
More7 than 2	1.01	0.55 – 1.87	
Mass media exposure			0.189
Exposure to one media	1.47	0.82 – 2.62	
Exposure to > one media	1.00	Reference	
Birth intention			0.000
Intended	1.00	Reference	
Unintended	5.86	2.75 – 12.50	

Discussion

Despite substantial advancement in human development in the recent decades, the early marriage and early childbearing is still persistent as a major social problem in Bangladesh. Studies reveal that the females' age at first marriage in Bangladesh is still one of the lowest in the world. Traditionally, Bangladesh has one of the highest rates of child marriage worldwide. Although the legal age of marriage in Bangladesh for girls is 18 years, about 66% of the women get married before that age.[22] The median/mean ages at first marriage of Bangladeshi women were reported to be 14.1 years in 1996, 15.2 years in 2007.[23,24] According to the analysis of the data from the Bangladesh Demographic and Health Surveys starting from 1993 to 2014, the mean age at first marriage was 15.0 years.[21] In this study it was 16.4 (SD=2.92) years. The present study findings suggest that

there has been limited and patchy progress in prevention of child marriage in Bangladesh in last two decades.

This study found that more than 50% of the participants had experienced teenage marital pregnancy, which was closed to the other study findings conducted in last decade in rural and urban areas of Bangladesh, where mean age at first birth was below 18years.[24-26] The study also did not find any remarkable trend of decreasing of adolescent childbearing in Bangladesh. It is consistent with the findings of Islam *et al.*[21]

Multivariate analysis of the data in this present study suggest that early marriage (<18 years) is the most important risk factor of the teenage pregnancy. Early marriage is the patriarchal Bangladeshi culture and due to this they are at risk to pregnant at this time. Teenage pregnancy in developed countries usually occurs outside marriage, so early marraige was not identified as an risk factor of the teenage pregnancy in this society. But in developing countries, like Bangladesh teenage pregnancy is often within marriage. The present study reveals that more than 68% teenage pregnancy may be reduced by prevention of marriage before 18 years, which is illegal but a tradition deeply embedded in Bangladeshi society. Not only Bangladesh, other South Asian countries like India, Pakistan, Nepal, Maldives, Bhutan have high proportions of teenage pregnancies, since early marriage is common and there is a social expectation to have a child soon after about within one year of marriage.[7,9] Since in Bangladesh, where child births are confined to marriage, age at first marriage marks the onset of the period of offspring procreation, and therefore, first marriage before 18 years is considered the prime determinant of teenage pregnancy.

A relatively lower attainment of educational status which was found to be a risk factor for teenage pregnancy in the present study is well documented as a risk factor for teenage pregnancy in different countries.[9,16,17] Widely eccepted hypothesis for the above observation is, women's higher secondary or above education acts as catalyst toward delayed childbearing. Because the women have postponed substantial times during their schooling for education and married at later ages compared to their lesser educated counterparts. As well as higher education empowered and at the same time aware the women more than the lesser educated women. As a result the autonomy towards making decisions of their own health care is increased significantly more than the lesser educated women.[24] On this assumption, Female Stipend Programme (FSP) was implemented in 1982 in Bangladesh to help increase the enrolment and retention of girls in secondary schools, delay their marriage and motherhood, and increase girls' income-earning potential that empowered them.[27] Secondary school enrolments for girls jumped from 39% in 1998 to 67% in 2017 in Bangladesh , but dropout rates for girls were at a high 42% percent.[28] Despite of wide expansion of FSP in Bangladesh, early marriage and early childbearing have not been substantially decreased over the decades.[24] The findings of the present study also consistence with this. The above fact suggests that FSP effectively increased the enrolment. But failed to retain the girls at

secondary school level, which is the main contributor of teenage marriage.

Most of the teenage pregnancy in the western countries particularly USA are unintended, only 6 to 10% of the teenage pregnant mothers are intended to become pregnant.[29] Abortion is used by 4 out of 10 pregnant adolescents (44%) to terminate unwanted pregnancy in USA. In the United Kingdom, Teenage Pregnancy Strategy Evaluation estimated that up to 90% of teenage pregnancies had been unplanned.[30] But in developing countries like Bangladesh it is just opposite.[24] In this study more than 68% of the teenage pregnancies in the rural community were planned or intended. It is consistent with the findings of Kamal SMM.[24] It indicates that adolescent childbearing and adolescent motherhood are highly valued in Bangladesh. In this study, the women who have not a definite intention/plan of pregnancy or child birth, have 5 times more risk to become pregnant in teenage than those have. It suggests that the married teenagers, who had no intention/plan for pregnancy, were either reluctant about the use of contraceptives or facing an unmet need for family planning services in the study area.

Consistent with other studies,[1,20] this study identified that women's husband education had a negative association with teenage marital pregnancy only in bi-variate analysis, but no influence in multi-variate analysis indicates the importance of other factors and incapacity of husband education to influence adolescent pregnancy in multidimensional settings. Similarly, monthly family income, desire number of children and mass media exposure appeared to have significant association with teenage marital pregnancy only in the bvariate analysis likely for the same reason.

The study has several limitations. First, study area and sample size were preselected for the convenience of the data collections. So the findings can't be generalized due to selection bias.

Second, the survey included a wide range of retrospective questions, so it suffers from recall bias. Third, the rural women underreported their age than their actual age. It is a common phenomenon of developing countries where vital registration system is not strictly followed. Such underreporting may bias the estimates. Considering the above limitations, caution is warranted when interpreting the results.

The results of this study have certain implication in preventive measures to get rid of teenage pregnancy from Bangladesh. Immediate policy and special programmatic measures should be undertaken to prevent the child marriage *i.e.* marriage before 18 years. Adolescents and their guardians should be made more aware of the adverse health outcomes, social and economic consequences of early marriage and early childbearing. The ordinance of legal age at marriage (18 years) should be properly implemented in Bangladesh specially in rural areas. Policy makers and planers should be rethinking about the FSP. Special measures should be undertaken to remain girls in school for a longer duration to prevent dropouts. In addition, giving emphasis on the education for treating the effect social and cultural norms, which are still favouring girls to get marry earlier and to have early childbirth. User friendly

reproductive health services as well as accurate information on reproductive health should be availed to the young women to avoid unwanted and mistimed births. Social movement and social campaigns should be taken to reduce adolescent motherhood highlighting the adverse outcomes of early marriage, long run health consequences of mothers and child.

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