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Contents

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INFORMATION TO AUTHORS

Focus

Chattagram International Medical College (CIMC) established on 2013 is one of the famous and reputed Medical College among the Private Medical Colleges in Bangladesh as reflected by the performances of students in examinations of Chittagong Medical University. A very good number of academicians and researchers are performing in this institute.

Chattagram International Medical College commenced to publish a peer reviewed scientific Journal from 1st January 2016 which is recognized by BMDC and having International Standard Serial Number (ISSN) 2520-484X. The journal publishes article of authors from any part of the globe, but has a special interest in publishing research articles of authors from Bangladesh and of relevance to developing countries. It publishes Editorial, Original (Research) articles, Special articles, Review articles, Short Communications, Case report and letters on new findings of Medical Science.

Chattagram International Medical College journal is published in english, biannually eg. January and July with prior approval of Editorial board.

Appropriate measures has been taken to make the journal indexed / abstracted in major international indexing systems including the PubMed/MEDLINE, Index Medicus, Google Scholar, DOAJ, Hinari and Scopus etc.
The theme of Chattagram International Medical College Journal is

"Excellence Through Peer Review"

Submission of Manuscript

Manuscript (Papers) are submitted to the Editor-In-Chief or authorised persons at any time. Papers accepted for publication are subjected to peer review and editorial revision. With full title (Title should be concise and informative) two copies of papers (Along with CD) accompanied by a covering letter signed by Principal and Co-authors including name, academic degrees, designation, the departmental and institutional affiliation. Complete address, Cell number including Email address of Corresponding author should be mentioned. Not more than 7 (Seven) authors will be accepted for all manuscripts.

Manuscript should be typed in English (Font size and style : 12, Times New Roman) on one side of white bond paper of A4 size with margins of at least 2.5 cm, using double space throughout.

Manuscript may be additionally submitted by email also. Email : info.cimchbd@gmail.com (MS word).
Rejected manuscript will not be returned.

Abstract

A structured abstract should not be of more than 250 words. It should be a factual description of the study performed organized with the heading of Background (Includes aim or objectives) Methods (Includes patient population, procedures and data analysis) Result and Conclusion. The abstract should contain the data to support the key findings or conclusions of the study and this should be self explanatory without references to the text. the first time an abbreviated term is used it should be spelled out in full form and follow with the abbreviation in parentheses for example :- BPH (Benign Prostatic Hyperplasia). Please do not cite any references in the abstract.

3 (Three) to 10 (Ten) key words may be provided below the abstract using terms from the medical subject heading (Index Medicus, NLM, USA).

Types of Manuscripts

Editorial : Its a invited article. Based on current affairs of Medical Science with any disciplines. Maxium length of the editorial may be with in 1000 words and number of references maxium in 10 (Ten).

Original Article : A research, observational and experimental article should be devided into the following sections with headings :

- Introduction
- Materials and methods
- Result
- Discussion
- Conclusion
- Recommendation (If any)
- Acknowledgements (If any)
- Limitation (If any)
- Disclosure

Single digit numbers used in the text should be in words except datas and reference numbers. Maximum length of text may be with in 2500 words (Excluding abstract, table, figure and references). The total number of reference should not be less than 15 (Fifteen) for the original article.

Special Article / Short Communication

Its a medical based text of any disciplines. Maximum length of the Special article / Short Communication may be with in 2500 words (Excluding abstract, table, figure and references). The total number of reference should not be less than 10 (Ten).

Review Article

Its a prestigious article, which is divided into the following sections with headings

- Introduction
- Search Strategy
- Discussion
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- Disclosure

Review article should not generally exceed 3500 words, including illustrations and the number of references should not be more than 30 (Thirty).

Case Report

Text of Case report with the following section

- Introduction
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- Discussion
- Figure / Legends (If any)
- Conclusion
- Disclosure

Maximum length of the text may be with in 1500 words (Excluding abstract and references). The total number of reference should not be less than 10 (Ten).

Letter

Letter should be brief and to the point with in 500-600 words only.

It is noted that standard abbreviations should be used whenever. The full form for which the abbreviations stands followed by the abbreviation in parenthesis should preceede the use of the abbreviation in the text except for standard ones like 45^{o}c, 35mg/L etc in all types of text.

References

Regarding references please follow the Vancouver style (Uniform requirements for manuscripts submitted to biomedical journals prepared by the International Committee of Medical Journal Editors (ICMJE guideline http://www.icmje.org).

Reference citations in the text should be numbered in arabic numerals at the end of the sentence eg [1,2] consecutively in order in which they are mentioned in the text.

Book references should have the name of the authors, chapter title, editors, Book name, the edition, place of publication, the publisher, the year and the relevant pages.

Journal references should have the name of the authors, title of the article, editors, name of the journal volume and issue number, place of publication, the publisher, the year and relevant pages.

The first six authors of a work should be named, followed by 'et al' if there are more than six. If less than six authors the name of the all authors may be mentioned.

Examples

Book reference : Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumors. In : Vogelstein B, Kinzler KW, editors. The genetic basis of human cancer. New York, USA : McGraw Hill. 2002; 6:93-113.

Journal reference : Halpern SD, Ubel PA, Caplan AL. Solid organ transplantation in HIV infected patients. N EngL J Med. 2012; 34(4) : 284-287.

Citation from a website : Cancer - Pain.org [Internet]. New York : Association of Cancer Online Resource, Inc, c 2000 - 2001 Available from : http : //www.cancer-pain.org/.

Table

- All tables should be numbered using Roman numerals (I, II).
- Table should always be cited in text in consecutively using Roman numericals (eg Table I, II).
- Mentioned the caption at the top of table. Table should be planned as brief as possible.
- Significance values and other statistical data should be included beneath the table.

Figures / Graphs

- All Figures / Graphs are to be numbered using Arabic numerals (1, 2).
- Figures / Graphs always to be cited in text in consecutively using Arabic numerical (eg figure 1, 2).
- Provide a caption at the bottom for each figures / graphs.
- Reduce figures / graphs to fit either in one column or within the two column width of the journal page.

According to guidelines of the International committee of Medical Journal Editors (http:// www.icmje.org) please provide only 4/5 table with Roman numerical I, II with caption at the top of the table and only 4/5 figures / graphs with Arabic numerical 1, 2, with caption at the bottom of the figures / graphs.

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Unmounted glossy print, B-2 size with good contrast (600 pixels). 3 Images / Photographys / Legends are allowed for whole text.

Declaration

The article should accompany a declaration signed by author and co-authors which includes a statement that neither the article nor any part of its essential subtance table or figures is published in any journal nor submitted elsewhere for consideration of publication before appearing in this journal. The declaration form must be collected from the office of Editor-In-Chief

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Competing Interests

Chattagram International Medical College Journal requires authors to declare any competing financial or other interest in relation to their work. Where an author gives no competing interests, the listing will read the author (s) declare that they have no competing interests.

Editorial

Chattagram International Medical College Journal
Volume 10 Number 1 January 2025; 1-2

Accreditation in Medical Education: WFME and Bangladesh

Mohammad Kamrul Islam [1*]

Accreditation in medical education ensures that institutions meet globally recognized standards of quality, fostering the development of competent healthcare professionals. The World Federation for Medical Education (WFME) plays a pivotal role in advancing accreditation practices worldwide by setting standards and promoting high-quality medical education. In Bangladesh, the integration of WFME guidelines represents a critical step toward aligning its medical education system with global standards, enhancing the quality and reputation of its medical institutions.

The Role of WFME in Global Medical Education

The WFME, established in 1972, aims to enhance the quality of medical education globally. Its recognition program, initiated in collaboration with the World Health Organization (WHO), assesses accreditation agencies to ensure that their evaluation processes align with international standards. WFME accreditation provides assurance of quality, facilitating the mobility of medical graduates and fostering global collaboration in healthcare.

WFME's standards for basic medical education focus on key areas such as institutional autonomy, educational outcomes, student assessment, faculty development and quality assurance mechanisms. These standards provide a framework for accreditation bodies to assess medical schools rigorously and consistently, ensuring that they produce competent and ethical healthcare professionals.

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The Landscape of Medical Education in Bangladesh

Bangladesh has made remarkable strides in medical education since independence. With over 100 public and private medical colleges, the country produces a significant number of medical graduates annually. However, challenges such as uneven quality across institutions, outdated curricula and insufficient clinical training persist. These issues underscore the need for a robust accreditation system that ensures consistency and quality.

Currently, the Bangladesh Medical and Dental Council (BMDC) oversees the accreditation of medical colleges in the country. The Bangladesh Medical Education Accreditation Act 2023 was passed by parliament. The Bangladesh Medical Education Accreditation Council (BMEAC) was formed in 2024.

What are the Benefits?

The accreditation council will recognize medical educational institutions in Bangladesh

This will improve the quality of medical education and treatment in Bangladesh

It will allow students from Bangladesh to study abroad and be recognized as doctors in other countries

The BMEAC must apply for accreditation from the WFME.

The Importance of WFME Accreditation for Bangladesh

Global Recognition: WFME accreditation enables medical graduates to pursue further training, employment, and certification in countries that recognize WFME standards, such as the United States and Canada. This is particularly crucial as many Bangladeshi doctors seek opportunities abroad.

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Quality Enhancement: Adopting WFME standards promotes a culture of continuous quality improvement within medical institutions. This includes updating curricula, enhancing faculty development programs and strengthening student assessment methods.

Benchmarking: WFME accreditation facilitates benchmarking against international standards, enabling medical schools in Bangladesh to identify areas for improvement and adopt best practices.

Healthcare Impact: High-quality medical education translates into better-prepared healthcare professionals, ultimately improving patient care and public health outcomes.

Steps Forward for Bangladesh

To achieve WFME accreditation, Bangladesh must undertake several initiatives:

Formulation and Strengthening Accreditation Council: The Bangladesh Medical Education

Accreditation Council (BMEAC) was formed in 2024. The BMEAC should align its accreditation criteria with WFME standards. This involves revising guidelines, training evaluators and adopting transparent and evidence-based assessment processes.

Institutional Capacity Building: Medical colleges must prioritize faculty development, infrastructure improvement, and the integration of modern teaching and assessment methods.

Government Support: Active support from the government, including financial investment and policy reforms, is essential to drive the accreditation process forward.

Stakeholder Engagement: Collaboration among medical educators, policymakers, and healthcare professionals can ensure the successful implementation of WFME standards.

To facilitate and augment that important journey for accreditation- Bangladesh Private Medical College Association (BPMCA) in collaboration with Association for Medical Education (AME) Bangladesh has arranged an International Conference on Accreditation for Quality Medical Education, which was hold on 29-30 September 2024 involving all other concerned stakeholders. The President of World Federation of Medical Education (WFME) Professor Dr. Ricardo Leon Borquez has joined the conference physically. Medical education experts and experienced in Accreditation activities from India, Indonesia, Thailand and Sri-Lanka, USA have also joined the conference and shared their countries experiences. Policy level peoples, administrators, members of regulatory bodies, principals and teachers of govt. and non-govt. medical colleges and medical educationists were invited and participated in the conference.

Conclusion

The alignment of Bangladesh's medical education accreditation system with WFME standards represents a transformative opportunity. By adopting these globally recognized benchmarks, Bangladesh can enhance the quality and reputation of its medical institutions, better prepare its graduates for global practice and strengthen its healthcare system. The journey toward WFME accreditation requires commitment, collaboration and sustained effort, but the potential benefits for medical education and public health in Bangladesh are immense.

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Original Article

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Volume 10 Number 1 January 2025; 3-9

Effects of Ultrasound Guided Intra-Articular Platelet Rich Plasma Injection on Pain and Function of Patients with Knee Osteoarthritis

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Md. Abirul Islam[4] Md Asad Raihan[5] A M M Ashraful Islam[6] Shakir Ur Rashid[7]

Abstract

Background: Osteoarthritis (OA) is one of the most prevalent Musculoskeletal Disorder. The knee is the most frequent joint involved in osteoarthritis Knee Osteoarthritis is a chronic degenerative disease which is major cause of physical disability with millions of patients around the globe. Apart from many treatment options available, intra articular Autologous Platelet Rich Plasma (PRP) is becoming increasing popular as a treatment alternative to knee osteoarthritis. The present study was to determine the effects of ultrasound Guided Intra-Articular Platelet Rich Plasma Injection on Pain and Function of Patients with Knee Osteoarthritis.

Materials and methods: This Randomized Clinical Trial Study over a period of six months. Total 50 patients with knee osteoarthritis were selected and randomly allocated into two groups, group A- experimental or interventional group (Received Ultrasound Guided Intra-Articular Platelet Rich Plasma Injection) and group B-control group (received non interventional conservative management). The patients were assessed by VAS (For assessing Pain) and WOMAC (For assessing function) Scale before the first procedure (Baseline). After that they received 3 Platelet Rich Plasma injections at 15 days interval. Then patients were conducted same assessment in the follow-ups at first month and third month after the third intervention for measuring the beneficial effect of PRP.

Results: After 1st month and 3rd month follow up period, VAS score decreased in both groups, but significantly reduced in group A. The severity of knee OA was assessed using the patient's WOMAC scores (i.e. The sum of functional limitations, stiffness and pain-level scores). After treatment, results were significant in group-A. In PRP group (Group-A), the WOMAC score dropped from 62.67 before treatment to 28.93 in the 1st month, and then rose to 32.80 in the 3rd month. A similar pattern was seen for group-B, for which the score dropped from 61.37 before treatment to 43.14 in the 1st month and then rose to 52.09 in the 3rd month. Briefly, all pairwise comparisons of WOMAC in different time periods for the treatment group (Group-A) was statistically significant, p-value (<0.001). PRP injection has been shown to be a safe treatment option with no serious complications.

Conclusion: The present study showed significant improvement in pain, stiffness and physical functions of knee joint with intra-articular PRP injection. Results of the present study suggested a significant decrease in the overall WOMAC score of patients who undergo PRP therapy, an improvement in the quality of life of patients with knee OA after the PRP injection.

Key words: Autologous platelet rich plasma; Musculoskeletal disorder; Osteoarthritis; Pain.

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Introduction

Osteoarthritis (OA) is one of the most prevalent Musculoskeletal Disorder, that affects people globally out of which about 86.80% suffer from knee osteoarthritis.[1] It is major form of joint disease and also among the top 10 causes of disability in the world.[2] The prevalence of symptomatic osteoarthritis is approximately 10% in male and 13% in female who cross age of 60. The number of people is essentially increasing with improvement in rate of life expectancy and also due to rise of obesity in general population.[3] This increase in prevalence of osteoarthritis in society is having a devastating economic impact due to healthcare expenditure.[4]

Osteoarthritis refers to a clinical syndrome of joint pain with multifactorial etiopathogenesis characterized by the gradual loss of articular cartilage, osteophyte formation, subchondral bone remodeling and inflammation of joint.[5] It is a complex whole joint disease pursued by inflammatory mediators, rather than just a process of "wear & tear".[6] Osteoarthritis was considered exclusively a serious degenerative disease of cartilage until recent studies which has shown its multifactorial etiology where multiple causative factors like trauma, mechanical force, inflammation, biochemical reactions and mechanical derangements play vital roles.[7] Increasing age and obesity causing mechanical overload are among the prime risk factor for osteoarthritis.[6]

The knee is the most frequent involved joint in osteoarthritis.[7] Clinical symptoms are joint pain, morning stiffness (Less than 30 min) swelling, functional restrictions.[8] The grading of severity of knee osteoarthritis is done by Kellgren–Lawrence (KL) system described in 1957.[9] Treatment options includes conservative and surgical interventions both aiming to increase life's quality by reduction of symptoms and improving function of knee.[10]

Among conservative treatments, combination of both pharmacological and non-pharmacological treatment options is necessary for appropriate management of osteoarthritis.[11] Non-pharmacological option includes patient education, lifestyle modification, exercise, pacing of activities, obesity management, using walking aids, brace, insoles, use of physical modalities like heat, ice massage, TENS. While Pharmacological options includes Acetaminophen, oral NSAIDs, topical NSAIDs and Capsaicin, Glucosamine or Chondroitin Sulphate, Intra articular injection of corticosteroid, Viscos-supplements and Platelet Rich Plasma.[10,11] Platelet Rich Plasma has developed a lot of attention in recent years due to its painless minimalistic approach, high safety windows, rare adverse effects, readily producible and hassle-free administration.[12]

Platelet Rich Plasma contains platelet about four to five times higher than the baseline obtained by centrifuging autologous blood.[13] The platelet releases growth factors through degranulation which are considered to stimulate cartilage repairing and pain reduction.[14] Platelet rich plasma causes inhibition of inflammation causing deceleration of progression of osteoarthritis, it diminishes joint friction, reduces pain.[15-17] Recent recommendations regarding Platelet rich plasma states that PRP injection should be done under Ultrasound guidance and arthrocentesis should performed before the injection.[18] Injection based on anatomic landmark may cause the drug to be in incorrect destination causing increase in discomfort and pain for the patient.[19] Recent studies revealed that an ultrasound guided intra-articular injections had an accuracy of about 95.6% whereas blind injections based on anatomic landmark had only 77.3% of accuracy.[20] Ultrasound Guidance highly enhanced the accuracy of intra-articular injection both in knee with effusions and also in dry knee diseases.[21] It also proved to be tremendous beneficial in reducing procedural pain and also in improving clinical outcome.[22] Recent PRP clinical trial study performed under ultrasound guidance found significant improvement in pain reduction.[23] An extensive literature review revealed that PRP is still studied worldwide for developing unified recommendations. Thus the current study will be carried out to reveal the fact, to be more assured that, the therapy concerned in this study is effective in improving pain and function in patients suffering from knee osteoarthritis and the present study was to determine the effects of ultrasound Guided Intra-Articular Platelet Rich Plasma Injection on Pain and Function of Patients with Knee Osteoarthritis.

Materials and methods

This Randomized Clinical Trial Study was conducted in Department of Physical Medicine and Rehabilitation, Chittagong Medical College Hospitala period of six months from 5th April 2022 to 4th October 2022 to observe the effect of

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Ultrasound guided intra-articular Platelet Rich plasma injections in pain and function in knee osteoarthritis. After Institutional Ethics Committee approval and written informed consent of the participants, a total of 50 patients with knee osteoarthritis (Diagnosed with ACR criteria) were enrolled according to selection criteria. Following taking the informed written consent from the patient and proper counseling, detail history was taken and a preset data form filled up for every patient. Past history of illness & any systemic disease was inquired cautiously. Clinical examination was done systematically followed by relevant investigation. The investigations were Complete Blood Count (CBC) Fasting Blood Sugar (FBS) Blood sugar 2 Hours After Breakfast (2HrABF) C - Reactive Protein (CRP) Rheumatoid Factor (RA), S. Uric Acid, plain X-ray of involved knee Antero-posterior and lateral view. All reports were properly recorded in the data sheet. Then patients were allocated into two groups, group A-experimental or interventional group (Received Ultrasound Guided Intra-Articular Platelet Rich Plasma Injection) and group B-control group (Received non interventional conservative management).

PRP preparation: For preparation of PRP, about 40ml venous blood collected from antecubital vein with an 18-gauze needle maintaining aseptic precautions and then transferred to vacuum tubes containing sufficient Acid-citrate-dextrose as anti-coagulant. The tubes then centrifuges in centrifugal machine (Golden wall 80-2 Electronic Centrifuge) at 1500 RPM for 15 minutes. After centrifugation, a two layer formed in the tubes where RBC and WBC sediment was settle inferiorly and plasma supernatant. The supernatant plasma was transferred to another tube and it centrifuged again at 3500 RPM for 10 minutes. This again yields two layers. The lower part contained platelets and upper layer was removed. The final product is being the sediment formed inferiorly which was approximately 6-8 ml in amount which was used for injection. In this study, the PRP concentration was not measured before the injection.

Injection Technique: With the patient in supine position and under sterile precautions, the linear probe (6-12 MHz) of the ultrasound machine (Sonosite Ultrasound machineM Turbo P16893) was used to identify the suprapatellarpouch under the quadriceps tendon in a transverse plane, after optimizing imaging focus and depth, a 21-gauze needle was inserted in the superior lateral quadrant of patella and directed with in-plane technique into the joint space. After complete aspiration of any joint fluid present, Intra articular PRP injection were administered. Intervention was done by the investigator himself with the help of a physiatrist with extensive clinical experience in musculoskeletal ultrasound. After injection, patient were kept in a supine position for 15 min and then sent home with instructions to avoid weight bearing for 72 hours. Patients were asked to follow the post injection protocol.

Group B or control group patients received non-interventional conservative management.

Follow up: All the patients were followed up in outpatient clinic and assessed clinically by visual analog scale (VAS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) after 1 month, 3 months after third injection. The endpoints in the present study were changes in the Visual Analogue Scale (VAS) score (For assessing pain severity) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) (for assessing pain and function) from baseline to third month follow up after three injections. The WOMAC measures five items for pain (Score range 0–20), two for stiffness (Score range 0–8) and 17 for functional limitations (Score range 0–68). Thus, the possible WOMAC score is between 0 and 96.[10, 13, 14]

All this information, together with the demographic characteristics of the patients was analyzed. All collected questionnaire checked very carefully to identify the error in the data. Data processing work consist of registration schedules, editing computerization, preparation of dummy table, analyzing and matching of data.

Results

Table I Age distribution of the patients (n=50)

Age (Years)	Frequency and Percentage		p-value
	Group-A (n=25)	Group-B (n=25)	
40-50	5 (20.0)	4 (16.0)	
51 - 60	6 (24.0)	8 (32.0)	
>60	14 (56.0)	13 (52.0)	
Total	25 (100.0)	25 (100.0)	
Mean ± SD	58.2 ± 7.6	57.9 ± 8.0	0.914^{ns}

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Table I shows, the age distribution among the groups. Mean±SD of age was calculated to be, (58.2±7.6) for Group–A and (57.9±8.0) for Group–B. Accordingly, p-value=0.914, which explains that there was no significant statistical difference among the groups.

Table II Gender distribution of the patients (n=50)

Gender	Frequency and Percentage		Total
	Group-A (n=25)	Group-B (n=25)	
Male	14 (56.0)	15 (60.0)	29
Female	11 (44.0)	10 (40.0)	21
Total	25 (100.0)	25 (100.0)	

Table II illustrates that, most of the participants in all Group-A [14 (56.0%)] and in Group-B [15 (60.0%)] were males. Male: Female ratio was about 1.3:1. There was no statistically significant difference in male-female distribution between the groups.

Table III Distribution of cases according to residence (n=50)

Residence	Frequency & Percentage		Total	p-value
	Group-A (n=25)	Group-B (n=25)		
Urban	21 (84.0)	20 (80.0)	41	
Rural	4 (16.0)	5 (20.0)	9	
Total	25 (100.0)	25 (100.0)		0.525^{ns}

Table III shows the residency of study subjects. Most of the participants hailing from urban area, 21 (84.0) in group-A and 20 (80.0) in group-B. There was no statistically significant difference between the groups.

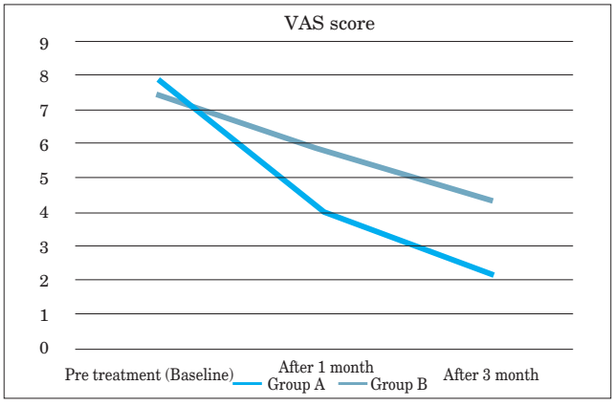

Figure 1 Comparison of VAS score between two groups (n=50)

Above Figure showed the VAS score of the patients of group A and B. In group A, at the beginning of treatment (Baseline) the mean VAS score of the patients was 7.86. The VAS score significantly decreased after 1 month (4.08) and after 3 month (2.12). In group B, at the beginning of treatment, the mean VAS score of the patients was 7.50. The VAS score decreased after 1 month (5.83) and after 3 month (4.39). From 1st month to 3rd months follow up showed group-A had better outcome than group B. The differences were statistically significant.

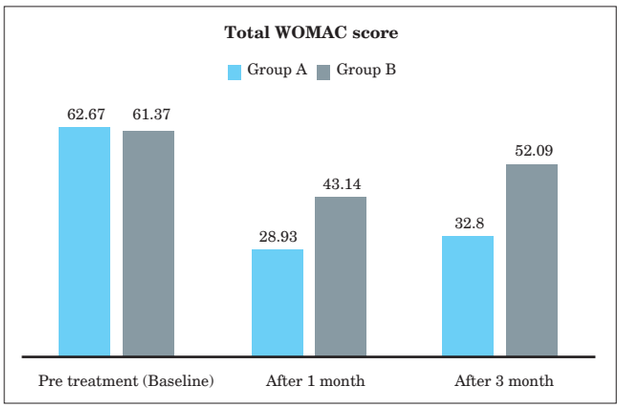

Figure 2 Comparison of total WOMAC scores in between groups (n=50)

Figure shows the comparison of total WOMAC scores between two groups. There was no statistical difference in WOMAC total scores at baseline as $p>0.05$. After treatment, both groups of patients were examined followed up after 1 month and 3 month following treatment. In this study in group A, WOMAC total score of the patient improved better than group B and it was statistically highly significant as $p < 0.001$.

Discussion

Fifty patients with chronic knee osteoarthritis were included from OPD of the Physical Medicine and Rehabilitation Department of CMCH. The patients were assessed at baseline using VAS and WOMAC scales. PRP injection has been shown to be effective in both reducing pain and improving function

The mean Age of the patients at enrollment was 58 (± 7.6) for Group – A and 57.9 (± 8.0) for Group – B. The mean of the patient was 63.23 (± 8.03) in the study of Tevassoli M et al. In another study the mean age was 65 (±6.64) the findings of the present study are similar to those of previous studies and existing studies indicates that knee osteo arthritis is a disease of elderly and physically less-active persons.[24]

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In the present study, male patients (49%) were more than female with a male to female ratio 1.3:1. In a double-Blind Randomized Controlled Trial Comparing Platelet-Rich Plasma with Intra-Articular Corticosteroid Injections showed female preponderance.[25]

Most frequent occupation category in the study was Homemaker, in group A 60% and group B 56%, followed by service holder (Group A 20%, Group B 16%) Business man (Group A 8%, Group B 16%) retired person (Group A 8%, Group B 4%) teacher Group A 4%, Group B 8%). Majority of the patients had formal education and only 20% were illiterate or only able to read and write. Majority of the patients were from the urban area (82%) as the study was done in the public tertiary level hospital, it might not represent the socio-demographic characteristics of knee osteo arthritis of patients of Bangladesh.

The effect of PRP was evaluated by improvement in the severity of pain and improvement of function outcome. The mean VAS value of group A was 7.86 ± 1.32 in Group A and Group B 7.50 ± 1.35. One month after 3rd PRP injection, the mean of Group A reduced to 4.08 ±1.05 and Group B reduced to 5.95 ± 1.47. Eventually after 3 months the mean of Group A reduced to 2.12 ± 0.92 and Group B reduced to 4.39 ± 1.03. A mean improvement of 5.74 ± 0.40 at the end of the treatment in Group A. Present study findings were in line with the previous by Tevassoli M et al. where the mean improvement from the baseline was 5.86.

The Functional and Pain improvement of the patient was measured by WOMAC scale. The functional limitation subset of WOMAC scores of Group A at baseline was 43.62 ± 12.66 and Group B was 42.34 ± 12.92. At the first follow up the score reduced in group A to 20.86 and in similar pattern to 29.66 ± 9.91 in Group B. After 3 months, at final follow-up the score remained at steady low 23.75 ± 7.23 in Group A but increased to 36.12 ± 9.72 in Group B indicating an improvement of functional subset of WOMAC due to PRP injection.

Similarly, when comparison of Stiffness subset of WOMAC was done, at baseline the Mean score of Group A revealed 5.48 ± 1.79 and Group B 5.41 ± 1.65. At the first follow-up after one month the mean dropped to 2.24 ± 1.05 in Group A and to 4.31 ± 2.52 in Group B. Finally after 3 months the WOMAC of Group A was steady at 2.97 ± 1.36 and increased to near to initial stage at 5.14 ± 2.35. The Pain subset of WOMAC revealed that mean of Group A was 13.75 ± 2.97 at baseline reduced to 5.83 ± 2.12 after one month and was 6.08 ± 1.75 after 3 months. On the other hand, Group B was 13.62 ± 2.95, 9.17 ± 3.83, 10.83 ±4.27 at baseline, after one month, after 3 months respectively.

When total WOMAC score was considered, it was seen that there was a significant reduction of WOMAC score from 62.67 ± 17.42 at baseline to 28.93 ± 11.38 after one month and finally increased minimally to 32.80 ± 10.34 after 3 months. On the other hand, Group B showed no significant improvement with initial mean of 61.37 ± 17.32 to decreased 43.14 ± 16.26 and finally increased to near initial findings 52.09 ± 16.34. A study found a significant fall in WOMAC score after first month and the fall was consistent even after 3rd month. At baseline the WOMAC score was 53.20 which reduced to 24.96 after first month and was close at 25.70 even after 3 months of PRP injection. Similarities were also found when subset of WOMAC was individual matched. In a similar study by Tucker et al. WOMAC scores decreased for up to 3 months from baseline and remained low at 6 and 12 months in the PRP group.[26] However WOMAC scores for patients who received the saline injection were relatively unchanged for up to 12 months.

In a randomized controlled trial with level of evidence I, Yurtbay et al. observed that compared with placebo (Sodium saline), LR-PRP injections were efficacious in the management of OA.[27] The better group scores were found at 3 and 6 months. Patients who received PRP injections maintained better scores at 3, 6, and 12 months compared with the placebo group ($p < 0.05$). Multiple doses of PRP were found to be more efficacious than single-dose PRP at 6 and 12 months ($p < 0.05$). The most positive change in scores was found in those with K/L grade 2 OA, and the most positive change in Range of Motion (ROM) was found in those with K/L grade 3 OA. In the PRP groups, knee circumference diminished more at 1 and 6 months ($p < 0.05$).[27]

The present study was in line with other studies which assessed the efficacy of PRP in knee osteoarthritis reflecting the importance of it in the treatment of Knee osteoarthritis.

Limitations

- A small sample size was included in the study
- The study had a short to midterm follow-up period.

Conclusions

The present study concluded that PRP injection was more effective in reducing pain, stiffness and functional limitations in OA patients after 1 month and for up to 3-6 months of follow-up with no significant side effects. The results of the present study indicated that PRP injection appears to be an effective means for the treatment of Knee osteoarthritis.

Disclosure

All the authors declared to have no conflicts of interest.

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Original Article

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Health Care Seeking Behavior Related to Non-Communicable Diseasesamong Adult Population of a Slum of Chattogram

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Abstract

Background: The epidemic of Non-Communicable Diseases (NCDs) in slums has pushed its residents to heightened vulnerability. This study aimed to analyze the healthcare seeking behavior related to NCDsamong the adult slum dwellers at a slum of Chattogram city.

Materials and methods: This descriptive cross-sectional study was undertaken to asses "Health care seeking behavior related to non-communicable diseases among 135 adult population of a slum in Chattogram. From July to September 2023, data were collected by face to face interview method. A pretested questionnaire containing structured and unstructured questions was used for data collection. After that, data were analyzed and results were presented according to variable.

Results: Among 135 respondent 31.11% was Male and 68.9% was that of female. In the study, 57.77% of the population was in the group of lower middle class. 35.55% reported about the history of hypertension, 33.75% was suffering from Diabetes mellitus, 8.89% had history of COPD,11.35% respondents were obese and 7.75% was suffering from Osteoarthritis. In our study, 62.22% seek treatment from medical college hospital followed by 14.07% preferred private clinic, 11.85% visited private chamber.77.78% slum dwellers mentioned financial crisis as a barrier to seek proper treatment.

Conclusion: Health care seeking behavior was substantially correlated with age, gender, length of illness and most importantly-modifiable factors such as multimorbidity, preferred health facility distance and level of education and economic condition. HSB was found to be inappropriate in this study. Health education, promoting healthy diet, regular physical activity, identifying the burden of modifiable risk factors for developing NCDs among the slum population are simple and cost-effective measures to reduce premature death and disability from non-communicable diseases.

Key words: Health seeking behavior; NCD; Slum.

Introduction

Urbanization is a global phenomenon with 55% of the global population living in urban areas. Rapid population growth in urban areas of Asia and Africa will bring this figure closer to 70% by 2050, the bulk of which will concentrate in slums or low-income settlements characterized by crowding, insecurity, inadequate housing and limited access to basic services.[1-3] With urbanization comes economic development and greater availability of healthcare services.[4] However, the urban advantage is not enjoyed uniformly by all urban residents.[5] Consistent with Julian Tudor Hart's (1971) inverse-care law, evidence suggests that the better-off disproportionately benefit from urban healthcare access while poorer citizens are more likely to experience unhealthy environments and poorer health outcomes.[6,5] The adverse physical and social conditions of slums are inimical to the SDG Goal 3 of "ensuing healthy lives for all", as are many barriers slum dwellers face in accessing quality health services including the high costs of care, lack of proximity, limited hours of service, overburdened facilities, as well as a perceived lack of respectful and effective treatment.[3,7,8–11] In Bangladesh, approximately 55% of the urban population live in slums.[12]

The umbrella term "Non-Communicable Diseases (NCDs)" also known as chronic diseases, are not passed from person to person, tend to be of long duration. Non- Communicable Diseases (NCDs)

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comprised of cardiovascular diseases, cancers, diabetes and chronic respiratory diseases, have become an important public health agenda for low and middle income countries.[13] According to WHO, NCDs were responsible for 38 million (68%) of the world's 56 million deaths, among which 28 million deaths occurred in low and middle income countries.[14] NCDs were regarded to be associated with higher socio-economic status now, however, they are recognized as major public health threats across all socio-economic groups. Furthermore, in most countries, people of low socio- economic status who live in poor or marginalized communities have a higher risk of dying from NCDs than those from groups that are more affluent.[15] The burden of NCDs in Bangladesh, a lower-middle income country in South Asia is increasing and represents a challenge to public health.[16,17,18] Among the NCDs, 8% (12.88 million) of total population 562 of Bangladesh was affected by diabetes whereas 3% of total deaths of all-ages occurred due to diabetes.[19] The upward trend of NCDs can be attributable to various factors including economic development, changes in lifestyle, accompanied by nutrition transition accelerated by rapid urbanization.750. A Total of 5, 22,300 Deaths occurred due to NCDs, accounting for nearly half of the total mortality in the country. Studies have shown that 75-85% of conditions can be deal with by utilizing Primary Health Care (PHC) providers, while a consultation with a specialist is only necessary 10-12% of the time. Furthermore, only 5% of cases require a referral to higher levels of care. In order to better manage NCDs, emphasis is put on public health prevention policies through PHC institutions. PHCs are a hub for continuity of care because they are the "first point of contact" and help patients coordinate their care across the system." In this preliminary report, we describe the prevalence of self-reported Non-Communicable Chronic Diseases (NCCD) and ascertain the factors associated with the health-seeking behavior of the diseases. Identification of these factors will guide further preventive interventions and rehabilitative programs.

Materials and methods

This cross-sectional survey was undertaken over the period of July 2023 to September 2023 in slum settlements located at Shamsherpara, Chattogram among willing participants over 18 years of age and residing in the area for at least a year. Those who were seriously moribund and unable to respond to the interview were excluded. The site was Eksho colonyat Shamsherpara Chattogram. By using statistical formula and through non-probability type of purposive sampling 135 slum dwellers were enrolled in this study following the inclusion and exclusion criteria. A pretested, semi-structured questionnaire was used, which included sociodemographic particulars and screening for selected NCDs (diabetes mellitus, hypertension, osteoarthritis, obesity) through a screening questionnaire that also included questions on latest documented investigation reports. All the respondents were informed verbally about objectives, patterns of questionnaires and ethical issues concerned with the study. Data collected from proforma was coded and entered in Statistical Package for the Social Sciences (SPSS) v 25.

Results

Table I Distribution of respondents according to Gender, Age, Sex, Educational level and occupation, Family type, Marital Status

Variables(n=135)	Frequency	Percentage (%)
Gender		
Male	42	31.11
Female	93	68.89
Age group (Years)		
18-27	57	42.22
28-37	44	32.59
38-47	8	5.93
48-57	16	11.85
58 and above	10	7.41
Education		
Illiterate	38	28.15
Primary Incomplete	28	20.74
Primary complete	41	30.37
Secondary incomplete	10	7.41
Secondary complete	10	7.41
HSC and above	8	5.93
Occupation		
Housewife	68	50.37
Garments worker	18	13.35
Rickshaw puller	15	11.11
Daily labor	13	9.63
Mason	11	8.15
Others	10	7.41
Type of family		
Nuclear	87	64.44
Joint	47	34.81
Extended	01	0.75
Marital status		
Married	105	77.78
Unmarried	21	15.56
Others	9	6.67
Socioeconomic class		
Lower middle class	78	57.77
Lower class	45	33.33
Upper middle	12	8.89

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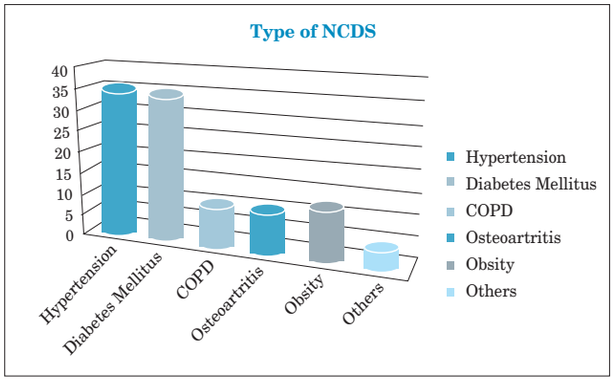

Figure 1 Distribution of respondents according to their sufferings from different NCDs

Pie chart showed that, hypertension was the most prevalent chronic disease that was 35.55%, followed by 33.75% diabetes mellitus, 11.35% obesity, 8.89% COPD, 7.75% osteoarthritis.

Table II Health care seeking behavior of the study population who have utilized medical facilities within the last 6 months

Variables (n=135)	Frequency	Percentage (%)
Medical facilities		
Medical College Hospital	84	62.22
Private Clinic	19	14.07
Private Chamber	16	11.85
Others	09	06.67
Barriers in health care seeking		
Financial	105	77.78
Transport	21	15.56
Long distance	7	5.18
Others	2	1.48

In our study, 62.22% got treatment from medical college hospital followed by 14.07% preferred private clinic,11.85% visited private chamber. 77.78% slum dwellers mentioned financial crisis as a barrier to seek proper treatment.

Discussion

Out of 135 respondents, 42.22% were in between 18-27 years of age & 68.89% of respondents were female.64.44% respondents hailed from joint family.In our study, Hypertension was the most prevalent chronic disease that was 35.55%, followed by 33.75% Diabetes mellitus, 11.35% obesity, 8.89% COPD, 7.75% osteoarthritis. A study on similar background was conducted by Rajat Das Gupta found the similar findings among the senior citizens in a selected urban area of Bangladesh.[20] Taking no treatment, self-treatment without any consultation from a qualified health practitioner, and traditional treatment from quacks is considered inappropriate HSBs. In this study, a significant proportion of the participants did not go for treatment initially for as long as the symptoms were bearable. However, for almost all other diseases, the participants preferred to go to an allopathic health practitioner from the beginning. In our study, 62.22% seek treatment from medical college hospital followed by 14.07% preferred private clinic, 11.85% visited private chamber. Similar proportions were seen in a study done at Kathmandu to find out prevalence and determinants of non- communicable disease risk factors among adult population.[21] For majority of the study population there was out-of-pocket expenditure involved. Important factors associated with poor health seeking were financial crisis 77.78%, 15.56% complained about transport scarcity followed by 5.18% identified distance of preferred health facility as a barrier. It was observed that those who needed specialized treatment from hospitals often missed timely follow-up. Multiple chronic morbidities frequently led to uneven attention to the conditions; more symptomatic NCDs received more attention, whereas silent conditions like diabetes and hypertension were commonly ignored at first.

Limitations

The small portion doesn't reflect the overall status of the slum community. Due to a shortage of time, some of the important aspects were not included in the study.

Conclusion

In our study, HSB was determined to be inappropriate, despite the fact that the majority were receiving therapy of some kind. Significant efforts should be made to educate population about the necessity of timely investigations, frequent follow-up, programs and schemes tailored to their needs, and the preventative components of health care. Promoting healthy diet, physical activity, reduced alcohol and tobacco use are simple and cost-effective measures to reduce premature death and disability from non-communicable diseases. This study performed can make a platform for large scale study on this topic which will help our national level planners to improve awareness about NCDs.

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Recommendations

During our study, we noticed that majority of the people have little or no knowledge about non-communicable diseases. So, proper knowledge of noncommunicable diseases should be provided to them. People don't have adequate amount of health facilities, which should be improved by government and non-government activities. Well established referencing system can help the patient to go to the specialist doctor easily.

Disclosure

Both the authors declared to have no conflicts of interest.

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Original Article

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Estimation of Adenosine Deaminase Activity in Cerebrospinal Fluid in Tuberculous Meningitis

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Abstract

Background: Tuberculous Meningitis (TBM) is one of the most common infectious diseases of the central nervous system and a major health problem in developing countries like Bangladesh. Delay in diagnosis and initiation of specific treatment causes significant morbidity and mortality. CSF-ADA is used to differentiate between TBM and Non-Tuberculous Meningitis (NTBM). The study aimed to compare the CSF-ADA level in various meningitis types and consider its diagnostic value for TBM in a tertiary-level hospital in Bangladesh.

Materials and methods: Eighty-five admitted patients diagnosed with meningitis in the Neurology and Medicine Inpatient Department at Chittagong Medical College Hospital, Chattogram, from 2015 to 2017 were selected and divided into three groups: TBM, Bacterial Meningitis (BM) and Viral Meningitis (VM) depending upon the clinical criteria. CSF ADA activity levels were compared among these groups.

Results: Out of 85 patients, 30, 25 and 30 were diagnosed as TBM, BM and VM, respectively, based on clinical features and CSF analysis. Mean CSF ADA levels were 11.30 IU/L, 8.76 IU/L, and 6.03 IU/L in TBM, BM, and VM, respectively ($p<0.001$).

Mean CSF ADA levels were 11.30 IU/L in TBM and in non-TBM, it was 7.27 IU/L ($p<0.0011$). Out of 30 TBM patients, 24 (80%) patients had positive CSF-ADA activity compared to only 4 (7.3%) out of 55 NTBM patients ($p<0.001$). With the cut-off value of 10 U/L, CSF-ADA had a sensitivity and specificity of 80% and 92.7%, respectively for diagnosing TBM.

Conclusions: CSF ADA level was significantly higher in TBM compared to NTBM (VM and BM).

Key words: Adenosine deaminase; Bacterial meningitis; Tubercular meningitis; Viral meningitis.

Introduction

Meningitis is characterized by the inflammation of the meninges and CSF. It has a rapid clinical evolution and diverse etiology - viruses, bacteria and tubercular being the most common agents.[1] In addition to fatalities, the disease often causes irreversible neuropsychological sequelae to survivors such as significant motor impairment and serious deafness.[2] Despite the increasing availability of newer diagnostic techniques, CSF analysis is of vital importance in suspected meningitis as clinical characteristics alone are unable to distinguish meningitis from other diagnoses, and bacterial from non-bacterial aetiologies.[3]

Among different types of meningitis, recognition and diagnosis of TBM is difficult given the variability in clinical presentation. Although a scoring system of diagnostic criteria has been established for research studies, it is not generally used in clinical practice.[4] Classical method for diagnosis of TBM includes demonstration of tuberculous bacilli in Ehrlich-Ziehl-Neelsen (EZN)

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stain of CSF and/or isolation of bacteria in CSF culture.[5] But these tests lack sensitivity and cultures takes more than six to eight weeks to show any evidence of growth and is often negative. Other tests based on nucleic acid analysis are available but cannot be used routinely, because of the high cost and specialized infrastructure involved. Therefore, for differentiation of TBM from NTBM, a reliable and cost- effective test should be available.[4]

The determination of CSF-ADA activity may be a reliable and valuable adjunct in differentiating TBM from NTBM in conjunction with other CSF parameters like mononuclear pleocytosis, high protein and low glucose. ADA is an enzyme involved in purine metabolism.[6] As a marker of cellular immunity, activity is found to be elevated in diseases producing a cell-mediated immune response, especially tuberculosis. The reliability of ADA activity in the CSF for early differential diagnosis of patients with TBM from those with NTBM has already been established in prior studies.[7-9] However, the results were variable and one study has shown that ADA is of limited value as it is also raised in other types of meningitis especially Pyogenic Meningitis.[10,11] The ADA activity in Bangladeshi patietns with suspected meningitis was underreported. So, this study was conducted to to know how far the CSF-ADA activity varies in various types of meningitis and to know its diagnostic value for TBM in a tertiary-level hospital in Bangladesh.

Materials and methods

A comaprative cross sectional study was conducted in the Inpatient Department of Neurology, Neurosurgery and Medicine, Chittagong Medical College Hospital, Chattogram, Bangladesh from January to December 2017. The study protocol was approved by the Ethical review Committee of Chittagong Medical College and informed consent was obtained from the patients or from their caregivres.

Clinically diagnosed cases of TBM, BM and VM, age 13 years and above were included in this study. Patients with signs of meningism due to other than meningitis were excluded. From the eligible participants detailed history was obtained. Then lumber puncture was done as early as possible. Approximately 3ml of CSF was obtained, 2 ml of CSF was used for total and differential cell count, biochemistry, smear for Gram's, acid fast bacilli staining and the remaining CSF was used for ADA estimation.

CSF ADA was estimated by quantitative method and results were expressed as Unit per Litre (U/L). ADA MTB diagnostic kit from Microexpress- a division of Tulip Diagnostics Pvt. Ltd. India was used. A cut off reference value of 10 U/L CSF ADA was taken as positive result.

Case definitions

BM: BM was defined as the clinical chracteristics of meningitis with organism on CSF Gram's stained smear. In the absence of organism, CSF showed pleocytosis with predominantly polymorphs, sugar less than <50% of corresponding blood sugar and protein more than 45 mg/dl.

VM: VM was defined as the clinical chracteristics of meningitis CSF pleocytosis with >10 cells/mm^3, predominantly lymphocyte, raised protein and sugar more than 50% of corresponding blood sugar value and absence of organism on Gram's stain or culture.

TBM: Symptoms and signs of meningitis including one or more of the following: headache, irritability, vomiting, fever, neck stiffness, convulsions, focal neurological deficits, altered consciousness, or lethargy plus one or more of the following: acid-fast bacilli seen in the CSF, M. tuberculosis cultured from the CSF or a CSF positive commercial nucleic acid amplification test.

In statistical analysis, descriptive statistics of mean, median, standard deviation, minimum and maximum values were used. Sensitivity, specificity, positive and negative predictive value, positive and negative likelihood ratio and diagnostic accuracy were calculated. To compare the mean ADA activity between the TBM, BM and VM group, the ANOVA test was used. Again, Student's t test was used to compare the mean ADA activity between TBM and NTBM group. A p value of <0.05 was taken as statistically significant. IBM -SPSS Statistics v.20.0 for Windows statistical software package were used for statistical analysis.

Results

A total of 85 patients with a diagnosis of meningitis were included in this study and divided into three groups: 30 (35.3%) with TBM, 25 (29.4%) with BM and 30 (35.3%) with VM. The majority of patients, 36(42.3%), were in the 21-40 age group and 47(55.3%) were male. Most of the patients came

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from rural areas (48, 56.5%). Table I shows the CSF-ADA activity of the patients according to the type of meningitis. In BM, CSF ADA activity ranges from 7-12 IU/L with a mean activity of 8.76 IU/L, whereas in VM, it ranges from 4-7 IU/L with a mean activity of 6.03 IU/L. The distribution of CSF ADA among the TBM, BM and VM groups was statistically highly significant (p<0.001). The difference between TBM and NTBM groups was also highly significant (p<0.001).

Table I Distribution of CSF ADA among the study subjects

Type of meningitis	CSF ADA (U/L)					p value
	n	Mean	±SD	Median	Range	
Three groups						
TBM	30	11.30	2.81	10.00	8 – 20	
BM	25	8.76	1.01	9.00	7 – 12	<0.001*
VM	30	6.03	0.85	6.00	4 – 7	
Two groups						
TBM	30	11.30	2.81	10.00	8 – 20	<0.001†
NTBM	55	7.27	1.65	7.00	4 – 12	

* TBM=Tuberculous Meningitis, NTBM=Non-Tuberculous Meningitis * TBM=Tuberculous Meningitis, BM=Bacterial Meningitis, VM=Viral Meningitis.

*Analysis of varience (F test), †Independent sample t test.

Table II shows the association of CSF ADA activity among the study subjects with TBM, BM and VM, where ADA ≥10 U/L was taken as positive. It shows a significantly higher proportion of patients with TBM (80%) had positive CSF-ADA activity than the patients with BM (16%) and VM (0%).

Table II Association of CSF ADA activity among the study subjects

CSF ADA Activity	Study Groups						p value
	TBM (n=30)		BM (n=25)		VM (n=30)		
	n	%	n	%	n	%	
Positive (≥10 U/L)	24	80.0	4	16.0	0	0.0	<0.001*
Negative (< 10 U/L)	6	20.0	21	84.0	30	100.0	

*Chi-square test.

Figure 1 CSF-ADA activity status between TBM and NTBM patients (TBM=Tuberculous Meningitis, NTBM = Non-Tuberculous Meningitis)

Figure 1 shows that, out of 30 TBM patients, 24 (80%) patients had positive CSF-ADA activity compared to only 4 (7.3%) out of 55 NTBM patients (p<0.001).

Table III projects the evaluation of CSF ADA activity as a screening test (taking a cut-off value of ≥ 10 U/L as positive) with validity (95% Confidence Interval) showing Sensitivity 80.0 (66.3 - 88.2)%, Specificity 92.7 (85.2 - 97.2)%, Positive Predictive Value 85.7 (71.0 - 94.5) %, Negative Predictive Value 89.5 (82.3 - 93.8)% and Diagnostic Accuracy 88.2 (78.5 - 94.0)%.

Table III Diagnostic accuracy paramters of CSF-ADA activity level of ≥ 10 U/L for diagnosing TBM

Diagnostic accuracy paramter	Statistics (95 % Confidence Interval)
Sensitivity	80.0 (66.3 – 88.2) %
Specificity	92.7 (85.2 – 97.2) %
Positive Predictive Value	85.7 (71.0 – 94.5) %
Negative Predictive Value	89.5 (82.3 – 93.8) %
Diagnostic Accuracy	88.2 (78.5 – 94.0) %

Discussion

Tuberculosis continues to be a significant health problem in developing countries like Bangladesh. There is considerable urgency in establishing the correct diagnosis of TBM because specific therapy is most effective when instituted early in the course of illness. The present study demonstrated that determining ADA level in CSF can be a simple and handy test for early diagnosis of TBM in a low-resource setting in countries like ours.

TBM can occur in any age group but is common in young children. In the present study, the age of patients ranged from 13 years to 80 years and the mean age was 37.27 years. The observation of the present study correlates with that of Desai et al. (Mean age 31.04) and Kent et al. (Mean age 31 years).[12,13] Regarding sex distribution, out of 30 patients with TBM, there was a male to female ratio of 1.1:1. The observation of the present study correlates with that of Agarwal et al.[9]

Among the studied cases of TBM, the CSF-ADA value ranges from 8 to 20.0 IU/L with a mean value of 11.30 ± 2.81 IU/L. All the patients except 6 showed higher than the cut-off value of 10 IU/L of CSF-ADA with a sensitivity of 80% and specificity of 92.7%. The comparative study showed a statistically significant difference in CSF-ADA level of TBM with other groups (BM and VM) of meningitis. Other studies have also shown this significantly high value of CSF-ADA.[6,9] In addition, the positive and negative predictive value of the

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test is 85.7% and 89.5%, with overall accuracy being 88.2%. However, other researchers have reported PPV and NPV of 87.5% -92% and 80%-95%, respectively.[6-9]

The CSF-ADA value ranged between 4-7 IU/L with a mean value of 6.03±0.85 IU/L in patients with VM, and none of the VM cases attained or crossed the cut-off value. A similar value was observed by Agarwal et al.[9] The BM cases showed overlapping values with VM, whereas TBM cases always have CSF-ADA values more than those of VM. Thus, CSF-ADA activity can differentiate between TBM and VM.

Among the BM cases, the CSF-ADA value ranged from 7 to 12 IU/L with a mean of 8.76 ±1.01IU/L. In most BM patients (21 out of 25 cases), the CSF ADA value shows a lower-than-normal cut-off value, and the mean CSF-ADA activity was much lower than TBM (11.3 IU/L). This observation is similar to previous studies.[6-9]

Different values for CSF ADA in various studies may be due to study methods, disease profiles, gender, age, and race factors. Besides this, the disease stage during which ADA is determined may also cause changes in the ADA level.[6] Additionally, standardized cut-offs of ADA values for the diagnosis of TBM have not been established, and the values used in the various studies ranged from 5.0 to 15IU/liter, making the practical use of this assay more difficult.[4] Different populations need multicentre studies to determine the standard CSF ADA levels.

Currently, TBM and early diagnosis are global issues that are becoming increasingly crucial. All relevant studies share the view that ADA is a valuable test in early differential diagnosis of TBM. On the other hand, there is no consensus on standardizing the cut-off value, which suggest that, further large studies are needed to standardize the test.[14]

Limitation

The primary limitation of this study was that it was a hospital-based study done in a selected hospital. An adequate number of study subjects were not included due to limited resources. Due to the small size of the study population, results may not reflect the actual situation. Prior antimicrobial therapy, in a few cases, was a limitation that reduced the yield of the organism. The inability to isolate organisms was another limitation in identifying the causative agent for meningitis.

Conclusion

From the current study, we found that the level of CSF ADA is higher in TBM compared to NTBM, which has high sensitivity and relatively high specificity, as well as high negative and positive predictive values. Since the test is inexpensive, practical, suitable, and less time-consuming, it might be explored as one of the diagnostic markers to differentiate TBM from NTBM (Bacterial and viral) meningitis. It can be cost-effective as it will help avoid unnecessary use of antibiotics and antiviral drugs. Ultimately, it would help reduce hospital stays and the financial burden on the patient and the health care provider.

Recommendation

All conventional tests done to diagnose TBM have limitations. So, the potential of newer methods of diagnosis, like CSF ADA, should be explored in a large study.

Disclosure

All the authors declared to have no conflicts of interest.

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Original Article

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Knowledge, Attitude and Practice on Cervical Cancer Screening and HPV Vaccination among Female Students of Non-Government Medical College in Bangladesh

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Abstract

Background: Cervical cancer is the fourth most common cancer among women globally, with a disproportionately high burden in Low- and Middle-Income Countries (LIMCs) including Bangladesh. Despite the availability of preventive measures such as HPV vaccination and screening, the disease remains a significant public health challenge due to poor awareness and low uptake of these interventions. This study assessed the Knowledge, Attitudes and Practices (KAP) related to cervical cancer screening and HPV vaccination among first and second year female medical students

Materials and methods: This cross-sectional study surveyed from July 2023 to June 2024 among 1st and 2nd-year female MBBS students from three medical colleges in Chattogram using a structured self-administered questionnaire to assess Knowledge, Attitude and Practice (KAP) regarding cervical cancer screening and HPV vaccination. Data were analysed using SPSS, with Chi-square tests for group comparisons ($p<0.05$).

Results: The majority of participants were aged 21 years (38.8%), with most being second-year students (77.0%) and unmarried (98.9%). Eighty-two percent had heard of cervical cancer, primarily from teachers (42.6%) and news/media (40.5%). Only 48.3% correctly identified a virus as the causative agent, while just 26.4% recognized HPV as a risk factor, and 33.7% identified all key symptoms associated with the disease. Seventy-six percent expressed a positive attitude toward cervical cancer prevention, but only 16.9% reported having been vaccinated. Minimal screening practices were noted, with only 7.9% of participants indicating that family members had undergone screening. Key barriers included lack of information (87.0%) and cost (7.1%). Knowledge scores were significantly associated with vaccination status ($p < 0.001$) where significantly higher knowledgeable participants were more vaccinated.

Conclusion: Although attitudes toward prevention were generally positive, the low uptake of HPV vaccination and screening for carcinoma cervix highlights the need for targeted interventions to reduce cervical cancer incidence in Bangladesh.

Key words: Attitude; Carcinoma Cervix; HPV vaccine; Knowledge; Practice.

Introduction

Cervical cancer is the fourth most common cancer among women worldwide, with an estimated 604,000 new cases and 342,000 deaths in 2020. Low- and Middle-Income Countries (LIMCs) bear 90% of the global burden of cervical cancer cases and deaths.[1] In Bangladesh, more than 50 million women are at risk of developing cervical cancer, with 17,686 new cases and 10,362 deaths reported annually.[2] The high mortality rates in Bangladesh are linked to factors such as poor awareness of cervical cancer symptoms, risk factors and underutilization of screening and preventive programs.[3] Recent studies in Bangladesh have consistently shown poor knowledge about cervical

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cancer among various populations.[4,5] Even when women are aware of the disease, screening remains underutilized and HPV vaccine coverage is notably low.

The primary cause of cervical cancer is infection with Human Papillomavirus (HPV) which is responsible for about 70% of cervical cancer cases.[7] Other risk factors include early marriage, multiple sexual partners, prolonged use of oral contraceptives, multiple childbirths and immunosuppressive conditions.[8,9] Unlike many cancers, cervical cancer is preventable and treatable through early detection. Regular screening methods like Pap smear, HPV DNA testing, and Visual Inspection with Acetic Acid (VIA) have proven to reduce both the incidence and mortality of cervical cancer, especially in developed countries.[10]

Vaccination against HPV plays a critical role in preventing the transmission of HPV and significantly reducing the risk of cervical cancer.[11] The first HPV vaccine was approved by the US FDA in 2008, with the goal of preventing 70% of cervical cancer cases.[12] By 2017, HPV vaccines were available in 71 countries as part of routine immunization for girls, typically between the ages of 9 and 13, with two or three doses recommended depending on the individual's health condition.[13,14] In Bangladesh, HPV vaccination was introduced in 2016 through a demonstration project in the Gazipur district, funded by the Global Alliance for Vaccines and Immunization.[15] Bivalent (Cervarix) and quadrivalent (Gardasil) vaccines are now available in the country, with ongoing efforts to assess the cost-effectiveness of adding the HPV vaccine to the national immunization program.[15]

International studies have consistently identified gaps in knowledge about cervical cancer, HPV and HPV vaccination among medical students. In Nigeria, Turkey, China, and India, medical students showed inadequate knowledge and low acceptance of HPV vaccines.[16-23] Although a study from Hong Kong found that senior medical students had more comprehensive knowledge and positive attitudes towards HPV vaccination, the actual practice of vaccination remained low, even when compared to non-medical students.[23] Similarly, studies in Malaysia, Saudi Arabia and Scotland highlighted disparities in knowledge and practices regarding cervical cancer screening and HPV vaccination among medical students.[24-26]

In Bangladesh, there are only a few studies assessing medical students' knowledge and attitudes towards cervical cancer and HPV vaccination. A recent study by Chowdhury et al. among medical and dental students showed that only 43.29% of participants demonstrated good knowledge, and just 11.82% practiced preventive measures. However, 75.88% had a positive attitude toward HPV vaccination.[27]

Given the importance of early prevention and the gaps in knowledge and practices in perspective of Bangladesh, this study aimed to explore the knowledge, attitudes and practices regarding cervical cancer screening and HPV vaccination among female medical students in non-government medical colleges in Chattogram, Bangladesh.

Materials and methods

This descriptive cross-sectional study was conducted from July 2023 to June 2024 among 1st-year and 2nd-year MBBS female students of Chattagram International Medical College, Chattagram Maa-O-Shishu Hospital Medical College and Institute of Applied Health Sciences. The study period lasted for one year after protocol acceptance. The study population consisted of female MBBS from the afore mentioned institutions who were willing to participate by providing consent. Participants refusing to participate or those with incomplete answers were excluded. A consecutive samplingmethod was used, encompassing all 1st and 2nd-year female students of the included medical colleges.

Data were collected using a structured, self-administered questionnaire in English, without translation into Bengali. The questionnaire comprised two sections: socio-demographics and questions assessing Knowledge, Attitude and Practice (KAP) regarding cervical cancer screening and HPV vaccination. For knowledge, cause, symptoms, risk factors and screening of cervical cancer were assessed, with scores ranging from 0 to 11. A score of 9-11 indicated good knowledge, 6-8 indicated satisfactory knowledge while scores <6 indicated poor knowledge. Attitude was measured using five questions using the Likert scale, with scores ranging from 5 to 15. A score of ≥12 was classified as positive attitude, 8-12 was neutral attitude and <8 was classified as negative attitude. Practice was categorized as yes/no based-on responses about screening of their family members and their own vaccination.

Data collection was conducted by trained collectors who explained the study objectives to participants before distributing the questionnaire. Female students were given 10-15 minutes to complete the questionnaire.

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Data were processed and analysed using SPSS 26.0. Qualitative variables were presented as frequencies and percentages, while quantitative variables were reported as means and standard deviations. Comparisons between groups were conducted using the Chi-square test for qualitative data. A p-value <0.05 was considered statistically significant.

Results

The study included 178 participants. The majority were aged 21 years (38.8%), followed by 20 years (30.3%) and 22 years (23.6%), with 1.1% aged 18 and 6.2% aged 19. Most were second-year students (77.0%) and unmarried (98.9%).

Among the participants, 82% had heard of cervical cancer. Teachers (42.6%) and news/media (40.5%) were the main sources of information. Nearly half of the participants correctly identified a virus as the causative agent, while 7.9% thought it was bacteria, 4.5% thought fungi, and 1.1% mentioned parasites. Notably, 38.2% were unsure. Regarding cervical cancer symptoms, 33.7% identified all key symptoms, while 42.7% were unsure. Only 26.4% correctly identified HPV infection as a risk factor, with 44.9% uncertain about risk factors.

Table I Responses regarding the knowledge related statements/questions

Variables	Categories	Frequency	Percent (%)
Awareness about carcinoma cervix	Yes	146	82
	No	32	18
Causative agent of carcinoma cervix	Virus	86	48.3
	Bacteria	14	7.9
	Fungi	8	4.5
	Parasite	2	1.1
	Don't Know	68	38.2
Symptoms of carcinoma cervix *Multiple answer question	Foul Smelling Vaginal Discharge	14	7.9
	Irregular Vaginal Bleeding	25	14.0
	Post-coital Bleeding	5	2.8
	All the Three	60	33.7
	Don't Know	76	42.7
Risk factors of carcinoma cervix	Early Age of Marriage	10	5.6
	HPV Infection	47	26.4
	Having Multiple Sexual Partners	13	7.3
	Cigarette Smoking	1	0.6
	All the Four	39	21.9
	Don't Know	80	44.9

Regarding attitudes, 70.2% agreed that cervical cancer is a cause of death, and 53.9% agreed that any woman could acquire the disease. Half of the participants believed cervical cancer is completely preventable and 80.9% agreed that regular screening and HPV vaccination prevent it. However, 34.8% were unsure if persistent HPV infection increases cancer risk.

*Multiple answer question.

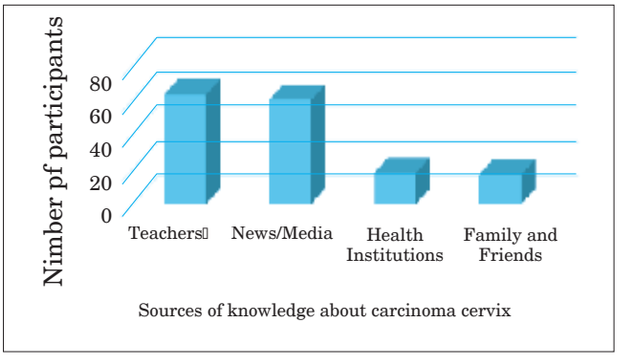

Figure 1 Source of knowledge about Carcinoma Cervix

Regarding screening, 7.9% reported that their family members had been screened for cervical cancer, with 53.8% underwent a PAP smear and 46.2% a VIA test. The main reason for not being screened was a lack of information (87.0%), followed by cost (7.1%) and shyness or indecision (5.8%). In terms of HPV vaccine awareness, 63.8% were aware of the vaccine, but only 16.9% had received it. Among those vaccinated, 80.0% had received all three doses, while 13.3% had received only one dose.

Table II Responses regarding the attitude related statements about cervical cancer

Attitude related statements	Disagree (n%)	Neither Agree nor Disagree (n%)	Agree (n%)
Carcinoma of cervix is the cause of death	9 (5.1)	44 (24.7)	125 (70.2)
Any woman can acquire cervical cancer	19 (10.7)	63 (35.4)	96 (53.9)
Cervical cancer is completely preventable	33 (18.5)	56 (31.5)	89 (50.0)
Regular screening & HPV vaccine prevent cancer	2 (1.1)	32 (18.0)	144 (80.9)
Persistent HPV infection increases cancer risk	4 (2.2)	62 (34.8)	112 (62.9)

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Table III Practices of the participants and their family members regarding cervical cancer screening and vaccination

Variables	Categories	Frequency	Percent (%)
Screening of the participants'family members	Yes	14	7.9
	No	164	92.1
Vaccination status of the participants	Vaccinated	30	16.9
	Not Vaccinated	148	83.1

The mean knowledge score was 3.53 (SD = 2.982), indicating low awareness, while the mean attitude score was 12.80 (SD = 1.835), reflecting favorable attitudes. Most participants (70.2%) had poor knowledge and 24.7% had satisfactory knowledge. In terms of attitude, 76.4% had a positive attitude, while 23.6% were neutral attitude. Knowledge level was associated with vaccination status. Regarding vaccination, 44.4% of participants with good knowledge were vaccinated, compared to only 10.4% of those with poor knowledge (p = 0.001).

Table IV Knowledge and attitude scores of the participants

Scores	Categories	Frequency	Percent (%)
Knowledge score of the participants	Good Knowledge	9	5.1
	Satisfactory Knowledge	44	24.7
	Poor Knowledge	125	70.2
Attitude score of the participants	Positive Attitude	136	76.4
	Neutral Attitude	42	23.6

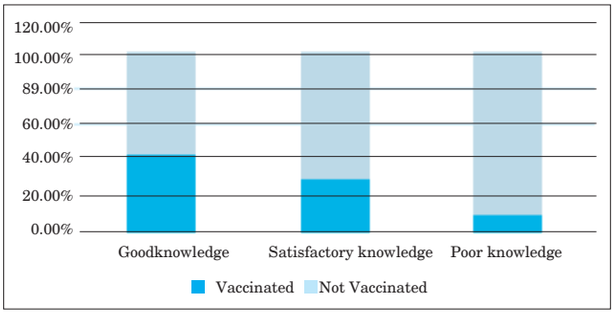

Figure 2 Association between knowledge and vaccination status
*p < 0.05, Association is statistically significant

Discussion

In this study, 82% of participants had heard of cervical cancer, but only 26.4% identified HPV infection as a risk factor, with 70.2% categorized as having poor knowledge. These findings align with a study from Ethiopia, where 19.87% of participants exhibited good knowledge and another from South Africa, in which 42.9% had heard of cervical cancer. Comparatively, a study from Malaysia reported much higher awareness levels, with 95.5% recognizing HPV as a cause of cervical cancer, demonstrating a significant gap in knowledge in our study group.[28-30] Similarly, a study in the United States found gaps in the understanding of HPV despite high awareness levels.[31]

The most common sources of information in this study were teachers (42.6%) and media (40.5%), while a study from Malaysia highlighted social media as the primary source (51.79%).[30] The reliance on formal educational settings in our study contrasts with findings from Ethiopia, where mass media was a more significant source of information (57.4%) and another from the United States, which emphasized the role of media and campus-based health programs in spreading HPV-related information.[32,31] These differences suggest that campaigns targeting students via newer media platforms could enhance awareness, particularly among younger populations.

While 80.9% of participants in our study recognized that regular screening and HPV vaccination could prevent cervical cancer, only 16.9% had been vaccinated. This low uptake mirrors results from a study in Malaysia, where only 6.25% of medical students had been vaccinated, despite 84.38% being aware of the vaccine's availability.[30] Similarly, a study in India found a gap between high awareness and low vaccination rates.

Our study found significant knowledge gaps regarding cervical cancer risk factors, with only 26.4% identifying HPV as a risk factor and 33.7% identifying all symptoms. A study from Malaysia reported higher awareness of risk factors, with 52.23% identifying multiple partners and 47.32% recognizing early marriage as risk factors.[30] A study in India, however, showed that only 39% of their participants were aware of any risk factors, which aligns more closely with our findings. Similarly, a study from Ethiopia found that 40.5% of respondents recognized risk factors such as multiple partners and HPV.[33,32]

This study demonstrated positive attitudes toward screening and vaccination, with 76.4% of participants holding favorable views. This aligns with a study

from India, where 76.2% of participants had a positive attitude, but only 9.5% were ever screened.[33] Likewise, a study in Ethiopia found minimal screening practices despite positive attitudes, as did another from South Africa, where only 9.8% had undergone a Pap smear.[32,29] These results indicate that while attitudes may be generally positive, there is a considerable gap between awareness and actual preventive behaviors.

Overall, this study's findings align with trends observed in other research, which shows significant gaps in knowledge regarding HPV, cervical cancer risk factors, and preventive practices, despite high awareness and positive attitudes. Consistent with the results of studies from Ethiopia, Ethiopia and India, this study demonstrates the ongoing need for educational interventions to bridge these knowledge gaps and encourage the uptake of preventive measures such as screening and vaccination.[28,32,33] Additionally, differences in sources of information, as observed in Malaysia[30] and the United States, highlight the importance of utilizing diverse communication channels, including social media, to effectively reach younger populations and improve HPV vaccination rates.[31]

Limitations

This study was of a cross-sectional design, which restricts causal inferences and generalizability due to the focus on a specific population of female MBBS students. Additionally, self-reported data may introduce bias, as participants could provide socially desirable responses rather than accurate reflections of their knowledge and practices regarding cervical cancer.

Conclusion

This study highlights significant knowledge gaps among female medical students in Chattogram regarding cervical cancer, especially relating to its symptoms, risk factors, and HPV vaccination, despite high awareness of the disease. While attitudes towards prevention were generally positive, vaccination rates were low.

Recommendations

Comprehensive health education programs focusing on HPV awareness, vaccination, and cervical cancer screening are essential to improve knowledge and practices, ultimately helping reduce cervical cancer prevalence in Bangladesh.

Disclosure

All the authors declared to have no conflicts of interest.

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Original Article

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Cardiovascular Risk among Young Healthcare Workers: Insights from a Cross-Sectional Study in A Tertiary Care Hospital in Bangladesh

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Abstract

Background: Cardiovascular Diseases (CVDs) are a leading cause of morbidity and mortality worldwide. Young healthcare workers, particularly in developing countries like Bangladesh, face unique occupational stressors that may predispose them to increased cardiovascular risk. This study aims to evaluate the prevalence and determinants of cardiovascular risk factors among young healthcare workers in a tertiary care hospital in Bangladesh.

Materials and methods: A cross-sectional study was conducted at Sher-E-Bangla Medical College, Barisal, from October 2023 to May 2024. The study included 96 young doctors, comprising intern doctors, postgraduate doctors, and doctors from the hospital site, all aged 32 years or younger. Data were collected using a structured questionnaire and physical examinations, focusing on demographics, lifestyle factors, medical history and work-related variables. Key measurements included BMI, blood pressure, and fasting blood glucose levels.

Results: The study revealed that 56.25% of participants were male and 70.83% were single. Lifestyle factors showed that 37.50% were smokers, 58.33% exercised irregularly, and 63.54% had unhealthy dietary habits. Family history of hypertension and diabetes was reported by 46.88% and 41.67% of participants, respectively. Personal history of hypertension and diabetes was less common, affecting 15.63% and 10.42% of participants, respectively. More than half of the participants (52.08%) worked 8-10 hours per day, with 68.75% reporting moderate to high work stress levels. Clinical measurements indicated that 57.29% of participants had normal weight, 29.17% were overweight and 8.33% were obese. Hypertension and diabetes were present in 20.83% and 12.50% of participants, respectively. Smoking was significantly associated with hypertension (p=0.02), and regular exercise was associated with a lower prevalence of hypertension (p=0.03).

Conclusion: The study highlights significant cardiovascular risk factors among young healthcare workers in a tertiary care hospital in Bangladesh. Key factors include smoking, irregular exercise and unhealthy dietary habits. These findings underscore the need for targeted interventions to reduce cardiovascular risk and promote health among healthcare workers, thereby enhancing the overall efficiency and sustainability of the healthcare system.

Key words: Cardiovascular Risk; Tertiary Care Hospital; Young Healthcare Workers.

Introduction

Cardiovascular Diseases (CVDs) remain the leading cause of mortality worldwide, accounting for an estimated 17.9 million deaths annually. A significant body of research has been dedicated to understanding and mitigating cardiovascular risk factors, which include hypertension, diabetes, obesity, smoking, and a sedentary lifestyle. While much of this research focuses on the general population, specific occupational groups, such as healthcare workers, are often underrepresented in these studies. Healthcare workers, particularly young professionals, are frequently exposed to unique stressors and lifestyle challenges that may

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predispose them to cardiovascular risks. The demanding nature of their work, extended hours, high stress levels and irregular eating habits can contribute to the development of cardiovascular conditions.[1-3]

In Bangladesh, a developing country with a burgeoning healthcare sector, young healthcare workers are a critical component of the workforce. These individuals, including intern doctors, postgraduate doctors and those employed in tertiary care hospitals, face a multitude of pressures that could impact their cardiovascular health. Despite the importance of this issue, there is a paucity of data specifically examining cardiovascular risk factors in this group. Understanding these risks is essential for developing targeted interventions to protect the health and well-being of these vital healthcare providers.[4-6]

This study aims to bridge this gap by comprehensively analyzing cardiovascular risk factors among young healthcare workers in Bangladesh. Conducted at Sher-E-Bangla Medical College, Barisal, from October 2023 to May 2024, the study evaluates various risk factors, including BMI, hypertension, diabetes, family history of cardiovascular diseases, smoking habits, exercise routines, disease history, duration of work per day, and dietary habits. By identifying the prevalence and interrelations of these risk factors, this research seeks to inform healthcare policies and workplace wellness programs tailored to the needs of young healthcare professionals.[7,10]

The relevance of this study extends beyond individual health, as the well-being of healthcare workers directly impacts the quality of care provided to patients. High cardiovascular risk among healthcare workers can lead to increased absenteeism, decreased productivity and higher turnover rates, ultimately affecting the overall efficiency and effectiveness of the healthcare system. Therefore, addressing cardiovascular risk factors in this population is not only a matter of personal health but also a critical component of healthcare system sustainability[8,11].

This study will employ a cross-sectional design to provide a snapshot of the current state of cardiovascular health among young healthcare workers. Data will be collected through structured questionnaires and physical examinations, ensuring a comprehensive assessment of both subjective and objective health indicators. Statistical analyses will be conducted to determine the prevalence of various risk factors and their associations, providing valuable insights into the multifaceted nature of cardiovascular risk in this population[9].

In summary, this study aims to elucidate the cardiovascular risk profile of young healthcare workers in a tertiary care hospital in Bangladesh. By highlighting the prevalence of key risk factors and their interrelationships, the research will contribute to the development of targeted strategies for risk reduction and health promotion among healthcare workers. This, in turn, will enhance the overall functioning of the healthcare system, ensuring that those who care for others are themselves well-cared for and supported.

Materials and methods

This cross-sectional study was conducted at Sher-E-Bangla Medical College, Barisal, from October 2023 to May 2024, aiming to assess cardiovascular risk factors among young healthcare workers. The study included 96 participants, comprising intern doctors, postgraduate doctors and doctors from the hospital site, all aged32 years or younger. A structured questionnaire and physical examinations were utilized for data collection. The questionnaire covered demographic information, lifestyle factors, medical history, and work-related variables, while physical examinations measured BMI, blood pressure and fasting blood glucose levels. Demographic variables included age, gender and marital status. Lifestyle factors assessed were smoking habits, exercise frequency and dietary habits. Medical history focused on family and personal histories of hypertension and diabetes, as well as any other chronic diseases. Work-related factors included the duration of work per day and perceived work stress levels. Clinical measurements involved BMI, categorized as underweight, normal weight, overweight or obese, hypertension, defined as systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg and diabetes, defined as fasting blood glucose ≥ 126 mg/dL. Data were analyzed using descriptive statistics, presenting continuous variables as means and standard deviations and categorical variables as frequencies and percentages. The chi-square test assessed associations between categorical variables, while t-tests compared continuous variables. A p-value < 0.05 was considered

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statistically significant, ensuring robust analysis of the relationships between lifestyle factors, clinical measurements, and cardiovascular risk.

Results

Table I Demographic characteristics of participants

Variable	Number (n=96)	Percentage (%)
Gender		
Male	54	56.25
Female	42	43.75
Marital Status		
Single	68	70.83
Married	28	29.17

Table I shows that most participants were male (56.25%) and single (70.83%).

Table II Lifestyle factors

Variable	Number (n=96)	Percentage (%)
Smoking Habits		
Non-smoker	60	62.50
Smoker	36	37.50
Exercise Frequency		
Regular	40	41.67
Irregular	56	58.33
Dietary Habits		
Healthy Diet	35	36.46
Unhealthy Diet	61	63.54

In Table II, A significant proportion of participants were smokers (37.50%) and did not exercise regularly (58.33%). Additionally, most participants reported unhealthy dietary habits (63.54%).

Table III Medical history

Variable	Number (n=96)	Percentage (%)
Family History of HTN		
Yes	45	46.88
No	51	53.12
Family History of Diabetes		
Yes	40	41.67
No	56	58.33
Personal History of HTN		
Yes	15	15.63
No	81	84.38
Personal History of Diabetes		
Yes	10	10.42
No	86	89.58

In Table III, Nearly half of the participants had a family history of hypertension (46.88%) and diabetes (41.67%). Personal history of hypertension and diabetes was less common (15.63% and 10.42%, respectively).

Table IV Work-related factors

Variable	Number (n=96)	Percentage (%)
Duration of Work per Day		
< 8 hours	25	26.04
8-10 hours	50	52.08
> 10 hours	21	21.88
Work Stress Levels		
Low	30	31.25
Moderate	40	41.67
High	26	27.08

In Table IV, More than half of the participants worked 8-10 hours per day (52.08%) and a considerable proportion reported moderate to high work stress levels (41.67% and 27.08%, respectively).

Table V Clinical measurements

Variable	Mean ± SD	Number (n=96)	Percentage (%)
BMI (kg/m²)	24.5 ± 3.2		
Underweight (<18.5)		5	5.21
Normal weight (18.5-24.9)		55	57.29
Overweight (25-29.9)		28	29.17
Obese (≥30)		8	8.33

In Table V, The average BMI of participants was 24.5 kg/m², with the majority being within the normal weight range (57.29%). However, 29.17% were overweight and 8.33% were obese.

Table VI Association between lifestyle factors and cardiovascular risk

Variable	Hypertension (n=20)	No Hypertension (n=76)	p-value
Smoking (Yes)	12 (60%)	24 (31.58%)	0.02
Regular Exercise	4 (20%)	36 (47.37%)	0.03
Healthy Diet	6 (30%)	29 (38.16%)	0.45

In Table VI, Smoking was significantly associated with hypertension (p=0.02), and regular exercise was significantly associated with a lower prevalence of hypertension (p=0.03). No significant association was found between dietary habits and hypertension (p=0.45).

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Discussion

This study provides an insightful examination of cardiovascular risk factors among young healthcare workers in a tertiary care hospital in Bangladesh. The findings reveal significant associations between lifestyle factors, clinical measurements and cardiovascular risk, underscoring the critical need for targeted interventions in this population.

The demographic analysis showed that 56.25% of participants were male and 43.75% were female, with 70.83% being single and 29.17% married. This demographic profile reflects the youthful and dynamic nature of the healthcare workforce, who are at the early stages of their professional careers. Furthermore, it is already established in the literature that the incidence of cardiovascular events increases progressively with age and in males.[11-15]

The high levels of work-related stress and extended working hours observed in this study are consistent with the demanding nature of medical professions. Specifically, 52.08% of participants worked 8-10 hours per day, while 21.88% worked more than 10 hours per day. Additionally, 41.67% reported moderate work stress levels, and 27.08% reported high work stress levels. These factors are known to contribute to unhealthy lifestyle choices, such as smoking and irregular exercise, which were prevalent among the participants. Moreover, they are associated with a set of symptoms and diseases, such as stress, fatigue, musculoskeletal problems, gastrointestinal disorders, hypertension and depression[16-18].

The lifestyle factors examined in this study highlight several areas of concern. A significant portion of the participants were smokers (37.50%), exercised irregularly (58.33%), and had unhealthy dietary habits (63.54%). These behaviors are well-documented risk factors for cardiovascular diseases. The association between smoking and hypertension found in this study aligns with existing literature, indicating that smoking significantly elevates the risk of developing hypertension (60% of those with hypertension were smokers compared to 31.58% of those without hypertension, p=0.02). Similarly, the protective effect of regular exercise against hypertension further emphasizes the importance of physical activity in cardiovascular health (20% of those with hypertension exercised regularly compared to 47.37% of those without hypertension, p=0.03).

Family history of hypertension and diabetes was notably high among the participants, with 46.88% and 41.67%, respectively. However, the lower prevalence of personal history of hypertension and diabetes (15.63% and 10.42%, respectively) suggests that these young healthcare workers have not yet fully manifested the conditions their families are predisposed to. This finding presents a crucial window of opportunity for early intervention and lifestyle modification to prevent the onset of these diseases.

The clinical measurements revealed that a substantial proportion of participants were overweight (29.17%) or obese (8.33%) which are significant risk factors for cardiovascular diseases. The prevalence of hypertension and diabetes among the participants, although lower than the general adult population, is concerning given their young age (20.83% had hypertension and 12.50% had diabetes). These findings highlight the need for regular health screenings and preventive measures within the healthcare workforce to identify and manage these risk factors early.

Work-related factors such as extended working hours and high-stress levels were prevalent among the participants. These factors are known to contribute to adverse health outcomes, including cardiovascular diseases. The significant association between work stress and cardiovascular risk observed in this study underscores the importance of addressing occupational stressors through workplace policies and support systems.

Conclusion

This study highlights the significant cardiovascular risk factors present among young healthcare workers in a tertiary care hospital in Bangladesh. Key factors include smoking, irregular exercise, unhealthy dietary habits, and high-stress levels. The prevalence of overweight and obesity, as well as family history of hypertension and diabetes, further accentuates the need for targeted interventions. Implementing health promotion programs focusing on lifestyle modifications and stress management can help mitigate these risks. Ensuring the well-being of healthcare workers is essential not only for their personal health but also for maintaining the overall efficiency and effectiveness of the healthcare system.

Disclosure

All the authors declared to have no conflicts of interest.

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Original Article

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Association of Hyperphosphatemia with Decline in eGFR in Chronic Kidney Disease Patients: A Cross Sectional Study in a Tertiary Level Hospital

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Abstract

Background: Chronic Kidney Disease (CKD) is a significant global health concern due to its association with cardiovascular events and advanced kidney disease. Hyperphosphatemia develops as a consequence of positive phosphate balance in CKD. Many observational studies have established hyperphosphatemia in progressive kidney disease. Due to its direct stimulus to vascular calcification, resulting in cardiovascular events, it is a contributing factor to excess mortality in CKD. The aim of the present study was to establish a relationship between hyperphosphatemia and progressive kidney disease.

Materials and Methods: A cross-sectional observational study was conducted from January 2023 to December 2023, in the Department of Biochemistry in collaboration with the Nephrology Department in Marine City Medical College and Hospital (MCMCH). Purposive sampling was employed to recruit a total of 224 subjects of 18 years and above, after following the inclusion criteria and obtaining permission from ethical/Institutional Review Board (IRB). The study population was grouped as CKD: stage III (eGFR 30-59 ml/min/1.73m²) stage IV (eGFR 15-29 ml/min/1.73m²) and stage V (eGFR< 15 ml/min/1.73m²).

Results: The study revealed a male predominance, with 54% of participants being male and 46% female, with the mean age 56.22 ± 12.78 years. Significant differences were observed in both eGFR and serum phosphate levels between male and female participants. Among the study population about 164 (73.2%) subjects showed elevated serum phosphate level out of which 130 subjects were under the category of CKD stage V.ANOVA test revealed significant differences in serum creatinine levels, eGFR and serum phosphate levels across the three stages of CKD. Pearson's correlation analysis revealed a negative correlation between eGFR and serum phosphate levels.

Conclusion: The study established an association between hyperphosphatemia and Chronic Kidney Disease (CKD).

Key word: Chronic Kidney Disease (CKD); Estimated Glomerular Filtration Rate (eGFR); End Stage Renal Disease (ESRD); Hyperphosphatemia Parathyroid Hormone (PTH).

Introduction

Chronic Kidney Disease is a significant global health problem due to its relation to cardiovascular disease and advancement of kidney failure.[1] According to the WHO, CKD was responsible for 1.5% of deaths worldwide in 2012.[1,2,3] Therefore, prevention of progressive kidney dysfunction in CKDis crucial. Numerous studies have investigated factors that predict the worsening of kidney function, which can help identify individuals who should receive targeted treatment.[4]

Metabolic conditions like hypertension, dyslipidemia, hyperuricemia and diabetes are known to contribute to kidney dysfunction.[4,5] However, since CKD results from a variety of factors that cause irreversible changes to kidney function and structure, these contributing factors can vary based on underlying conditions and the

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severity of CKD.[6,7] Most research to date has concentrated on identifying these factors in patients with CKD or those with an estimated Glomerular Filtration Rate (eGFR) of <60 ml/min/1.73 m^2.[1] Nonetheless, since kidney function may progressively decline even before reaching stage 3 CKD, it is also important to investigate factors linked to a decrease in eGFR in individuals who have not yet advanced to CKD stage 3 or higher.[8,9]

Identifying modifiable risk factors for the progression of Kidney Diseaseis crucial for developing, studying, and implementing effective preventive strategies.[10,11] Disturbances in mineral metabolism are common in advanced stages of CKD and are believed not only to result from CKD but also to potentially accelerate the decline in kidney function.[12,13]

Hyperphosphatemia has been consistently linked to the progression of CKD due to elevated levels of FGF-23 and calcium-phosphorus product.[14-19] However, apart from serum phosphate, there is also a relationship between calcium disturbances and the decline in kidney function. But Schwarz et al. found no significant association between calcium levels and CKD whereas Lim et al. observed that low serum calcium had association with a more rapid decline in CKD.[18,20] The kidney employs compensatory mechanisms to regulate calcium-phosphate balance until the progressive stages of CKD.[20,21]

Hyperphosphatemia plays a significant role in the pathophysiology of CKD, contributing to high mortality rates.[2] Approximately 11–15% of Americans are affected by CKD and their risk of death from cardiovascular events is greater than their likelihood of surviving long enough to require renal replacement therapy for End-Stage Kidney Disease (ESKD).[22-24] The mortality rates for CKD patients undergoing hemodialysis are alarmingly high. The usual cardiovascular risk factors do not fully account for the increased risk seen in CKD. Observational studies indicate that the tendency of ESKD patients to develop heterotopic mineralization of soft tissues, including blood vessels, significantly contributes to their cardiovascular risks.[25,26] Additionally, hyperphosphatemia has been identified as an independent cardiovascular risk factor in CKD with a strong association with vascular calcification.[27-29]

In CKD, the failure to excrete phosphorus disrupts phosphorus homeostasis, leading to hyperphosphatemia. This condition arises from a positive phosphorus balance, which increases the concentration of phosphorus in the exchangeable pool. This often occurs even when the overall phosphorus pool size is reduced, as seen in adynamic bone disorder.[30]

Regulating phosphate balance during CKD before a significant imbalance occurs is complex. A key factor is the loss of calcitriol production, which reduces calcium absorption, leading to hypocalcemia and the subsequent stimulation of parathyroid hormone (PTH) secretion.[31] Elevated PTH levels help mitigate the phosphate load by enhancing phosphate excretion, thus compensating for the reduced filtered phosphorus load due to decreased glomerular filtration.[32]

Materials and methods

A cross-sectional observational study was conducted from January 2023 to December 2023, in the Department of Biochemistry in collaboration with the Nephrology Department in Marine City Medical College & Hospital (MCMCH). Purposive sampling was employed to recruit a total of 224 subjects of 18 years and above, after following the inclusion criteria and obtaining permission from ethical/Institutional Review Board (IRB). The study population was grouped as CKD: stage III (eGFR 30-59 ml/min/1.73m^2), stage IV (eGFR 15-29 ml/min/1.73m^2), and stage V (eGFR < 15 ml/min/1.73m^2).

Inclusion criteria

Subjects above 18 yrs of age diagnosed with CKD stage III, stage IV and stage V were included.

Exclusion criteria

Individualspositive for HIV and HbsAg, bedridden patients, pregnant individuals and subjects diagnosed with malignancy, were excluded.

Data was collected using a pre-tested structured questionnaire with all variables of interest fromrecruited subjects of Nephrology Department (MCMCH) after a brief history-taking and explainingthe purpose of the study. Verbal and written consent was obtained and the subjects were asked to report in Biochemistry Laboratory, MCMCH between 8:00-9:00 am. Then 5ml of blood was drawn from median cubital vein with strict aseptic precautions. The blood was collected in a

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Red-top tube and promptly sent to Biochemistry Laboratory for analysis of serum phosphate and serum creatinine

Data was analyzed by Microsoft Excel on Windows 10 and IBM-SPSS (Statistical Package for Social Science) version 23. For Qualitative data, mean and standard deviation was calculated. Statistical significance across different stages of CKD was assessed by Student's t-test, Chi-square tests and ANOVA tests. Data was presented in tables.

Results

In this study, 224 participants aged over 18 years were selected using a purposive sampling method and were categorized into three groups based on the stages of CKD: stage III (eGFR 30-59 ml/min/1.73 m^2) stage IV (eGFR 15-29 ml/min/1.73 m^2) and stage V (eGFR <15 ml/min/1.73 m^2) after recording clinical profile of the participant.

The gender distribution in the study revealed a male predominance, with 54% of participants being male and 46% female. The mean age of the participants was 56.22±12.78 years, with ages ranging from 18 to 85 years. Significant differences were observed in both eGFR and serum phosphate levels between male and female participants [Table I].

ANOVA test was conducted to analyze serum creatinine, serum phosphate and eGFR across different stages of CKD. The test revealed significant differences in serum creatinine levels among the three stages of CKD. Specifically, the mean serum creatinine levels were 1.87 ± 0.34 mg/dl in stage III, 2.92 ± 0.61 mg/dl in stage IV, and 8.64 ± 4.13 mg/dl in stage V. The differences were statistically significant (F = 77.64, p < 0.00001) [Table-II]. There was a significant differences in eGFR across the three stages of CKD and the mean eGFR values were 35.83 ± 5.23 ml/min/1.73 m^2 in stage III, 21.2 ± 4.63 ml/min/1.73 m^2 in stage IV and 7.04 ± 3.21 ml/min/1.73 m^2 in stage V(F = 775.05, p<0.00001) [Table III]. There was also a significant differences in serum phosphate levels across the three stages of CKD with the mean serum phosphate levels, 4.23 ± 1.06 mg/dl in stage III, 4.65 ± 0.99 mg/dl in stage IV and 6.17 ± 2.09 mg/dl in stage V, with the differences being statistically significant (F = 20.18, p < 0.00001) [Table IV]. Pearson's correlation analysis revealed an inverse relationship between eGFR and serum phosphate levels in the study cases [Fig 1].

Among the study population about 164 (73.2%) subjects had high serum phosphate levelof which 130 subjects were under the category of CKD stage V [Table V].Association test of CKD stages with serum phosphate was done which showed that 164 cases had increased serum phosphate level in which stage III comprises 9, stage IV comprises 25 and stage V comprises 130 patients and there was a significant association of CKD stages (Stage III, IV, V) with increased serum phosphate level in the study cases (χ^2 value = 39.84, p <0.00001).

Table I Serum creatinine and phosphate level between male and female cases (n = 224)

Variables	Male(n=121) (Mean± SD)	Female (n=103) (Mean± SD)	Significance
S. Creatinine (mg/dl)	5.20 ± 4.72	6.74 ± 4.15	p=0.89 Not Significant
eGFR ml/min/1.73m^2	15.09 ± 11.4	11.3 ± 9.6	p=0.008 Significant
S. Phosphate (mg/dl)	5.38 ± 2.11	5.9 ± 1.76	p=0.03 Significant

Table II ANOVA test of significance for distribution of serum creatinine level according to different CKD stages(n = 224)

Variable	CKD Stage	Number (n)	Mean± SD	Range	Significance
S. Creatinine (mg/dl)	Stage III	28	1.87 ± 0.34	1.42-3.17	F = 77.64
	Stage IV	43	2.92 ± 0.61	1.8-4.2	p<0.00001
	Stage V	153	8.64 ± 4.13	3.2-21.5	Highly
	Total	224	6.69 ± 4.46	1.42-21.5	Significant

Table III ANOVA test of significance for distribution of eGFR according to different CKD stages (n = 224)

Variable	CKD Stage	Number (n)	Mean± SD	Range	Significance
eGFR (ml/min/ 1.73m^2)	Stage III	28	35.83 ± 5.23	29.9-50.2	F = 775.05
	Stage IV	43	21.2 ± 4.63	15.0-29.2	p<0.00001
	Stage V	153	7.04 ± 3.21	2.0-14.3	Highly
	Total	224	13.35 ± 10.81	2.0-50.9	Significant

Table IV ANOVAtest of significance for distribution of serum phosphate level according to different CKD stages(n = 224)

Variable	CKD Stage	Number (n)	Mean± SD	Range	Significance
S. Phosphate (mg/dl)	Stage III	28	4.23 ± 1.06	3.0-7.72	F = 20.18
	Stage IV	43	4.65 ± 0.99	3.0-8.2	p<0.00001
	Stage V	153	6.17 ± 2.09	2.9-19.9	Highly
	Total	224	5.64 ± 1.99	2.9-19.9	Significant

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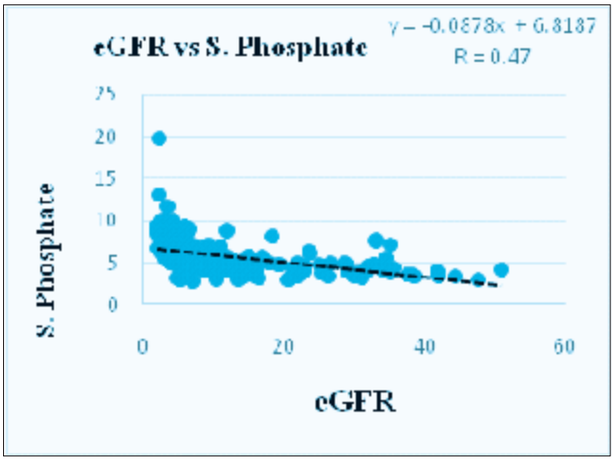

Figure 1 Scatter diagram shows negative correlation between eGFR and S. Phosphate in the study cases

Table V Percentage distribution of high Serum Phosphate level in the study cases (n= 224)

S. Phosphate (mg/dl)	Stage III	Stage IV	Stage V	Number (n)	Percentage (%)
Low (<3.4 mg/dl)	02	03	06	11	4.9%
Normal (3.4 to 4.5 mg/dl)	17	15	17	49	21.9%
High (>4.5 mg/dl)	09	25	130	164	73.2%
Total	28 (12.5%)	43 (19.2%)	153 (68.3%)	224	100%

Discussion

CKD is characterized by reduced kidney function, indicated by a GFR, < 60 mL/min per 1.73 m^2 or by markers of kidney damage or both, lasting for at least 3 months, regardless of the underlying cause. DM and hypertension are the primary causes of CKD. The incidence, prevalence, and progression of CKD vary within countries based on ethnicity and social determinants of health, influenced by epigenetic factors. Many individuals with CKD are asymptomatic or exhibit non-specific symptoms, making diagnosis only when symptoms become severe. The most reliable indicator of kidney function is the eGFR. To explore this further, a cross-sectional study was conducted in the Department of Biochemistry in collaboration withNephrology Department at Marine City Medical College and Hospital.

In this study, 224 participants aged over 18 years were enrolled using a purposive sampling method and were categorized into three groups based on the stages of CKD: stage III, stage IVand stage V. The study revealed a male predominance with mean age of the participants being 56.22 ± 12.78 years, ranging from 18 to 85 years. Significant differences were observed in both eGFR and serum phosphate levels between male and female participants. ANOVA test revealed significant differences in serum creatinine levels, eGFR and serum phosphate levels across the three stages of CKD. The mean eGFR values were found to be substantially declined on progression of the disease. There was also a significant differences in serum phosphate levels across the three stages of CKD and was found to be higher in CKD stage V. Pearson's correlation analysis revealedan inverse relationship between eGFR and serum phosphate levels. To be added among the study population about 164 (73.2%) subjects had hyperphosphatemia of which 130 subjects were under the category of CKD stage V.The results of the present study was similar to other previous research works by authors Satoru Mizushiri et al. Cynthia J Janmaat et al. Kestenbaum B et al. Block GA et al. and Liu S et al.[1,10,27,29,31] Thus the present study established a strong association between elevated serum phosphate level and progression of CKD. However further research work is necessary to better understand the biochemical strategy of different stages of CKD.

In patients with CKD, particularly those with ESRD, hyperphosphatemia is a common and serious complication. Early in the disease course, the body tries to counteract rising phosphate levels through compensatory mechanisms such as Fibroblast Growth Factor 23 (FGF23) and Parathyroid Hormone (PTH).These compensatory mechanisms work tomitigate the increase in serum phosphate levels despite the progressive loss of kidney function. However, as CKD advances and kidney function deteriorates further, these compensatory systems become less effective. Consequently, the continuous intake of phosphate from the diet begins to outpace the body's ability to excrete it, leading to a positive phosphate balance and the development of hyperphosphatemia.[33]

The use of medications, mainly vitamin D and its active derivatives, may further aggravate the positive balance by increasing intestinal absorption of phosphate. Altered bone metabolism may also play a part in hyperphosphatemia through bone resorption. In advanced CKD, persistent high phosphate levels contribute to various complications, including vascular calcification, bone disorders, and cardiovascular issues.[33]

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In certain clinical conditions such as lactic acidosis and diabetic ketoacidosis, there can be significant shifts of phosphate out of the cells into the bloodstream, leading to severe acute hyperphosphatemia. Moreover, metabolic acidosis not only facilitates the release of phosphate from cells but also reduces glycolysis and cellular phosphate utilization, which further contributes to elevated serum phosphate levels. Although the link between phosphate retention and secondary hyperparathyroidism has been well-documented, it wasn't until the late 1990s that hyperphosphatemia was widely recognized as a significant cardiovascular risk factor. Research using data from the US Renal Data System by Block et al. revealed that serum phosphate levels above 6.5 mg/dl were associated with a 27% increased risk of death.[29]

Thus the present study will create a platform for further research and help in reviewing the treatment approaches, addressing their potential benefits, harms and limitations which may shed light to many practical challenges that arise when managing hyperphosphatemia in patients with CKD.

Limitations

The study has several limitations, including its short duration, small sample size, and a cross-sectional design. Additionally, the participants may not have accurately represented the general population, and the study did not assess changes in estimated Glomerular Filtration Rate (eGFR) over time.

Conclusion

The study established that hyperphosphatemia is associated with the progression of CKD and is a significant risk factor for a rapid decline in eGFR. This association persists independently of other previously identified metabolic risk factors for kidney dysfunction, such as blood pressure, dyslipidemia and diabetes. Therefore, additional research using cohort populations with extended follow-up periods is needed to further explore these findings.

Recommendation

Further prospective multicenter studyon different tertiary level hospital of different parts of Bangladesh involving a large population size will be more representative of entire country.

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Disclosure

All the authors declared to have no conflicts of interest.

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Original Article

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Occurrence of Hypertension, Diabetes Mellitus and Renal Insufficiency in a Rural Population of Chattogram, Bangladesh

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Abstract

Background: Health awareness in rural areas is generally lower compared to urban areas and access to healthcare services in rural areas is often limited by various sociodemographic factors. The extent of the triple burden of Diabetes (DM) Hypertension (HTN) and renal insufficiency affecting Bangladeshi rural population is unknown. This study aimed to assess the triple burden of DM, HTN and renal insufficiencyamong the rural population of Bangladesh.

Materials and methods: This cross-sectional study was conducted in selected rural areas in the Chattogram district of Bangladesh from January 2014 to December 2014. A total of 2500 individuals aged 18 years and above were determined by a multistage sampling method. Self-reported sociodemographic, hypertension, diabetes and renal disease-related data were collected using a structured case record form. Blood and urine samples were tested for detecting DM and renal insufficiency.

Results: The overall prevalence of DM, HTN and renal insufficiency was 575 (22.3%), 35.5% (812/2500) and 24.6% (616/2500), respectively. Among hypertensive people 41.1% were unaware of their hypertensive state and 41.7% of the diabetic patient were unaware of their diabetic state. Respectively, 25.7%, 32.9% and 7.3% patients with renal involvement had both HTN and DM, HTN only and DM only.

Conclusion: Given the vast rural population in Bangladesh, the present study results emphasize the need to improve the early detection and prevention of DM and HTN and there complications.

Key words: Diabetes mellitus; Hypertension; Renal involvement.

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Introduction

Hypertension (HTN) Diabetes Mellitus (DM) and renal insufficiency have enormous public health significance in both developed and developing countries because these conditions are associated with increased risks of developing complications, such as Cardiovascular Disease (CVD) and chronic kidney disease.[1,2] Although Bangladesh has achieved most of the Sustainable Development Goals and made rapid progress over the last decade in meeting, NCDs remain a crucial public health challenge.[3] Over the last decades, the prevalence of NCDs has increased in Bangladesh.[4,5] Since more than 75% people of Bangladesh live in rural area, tertiary health care level screening will be failed to detect large population with HTN and DM.[6] Obesity, level of education, economic condition, occupation and gender significantly modify the occurrence of DM and HTN.[7] Though several small scale population based studies were earlier in Bangladesh at different times in rural and urban communities, most of these studies were near the capital Dhaka.[8-10]

Our study aimed to determine the occurrence of DM, HTN and renal insufficiency in rural areas of the Chattogram District in Bangladesh. This study would inform the appropriate stakeholders about preventing DM, HTN and their associated renal insufficiency in rural Bangladesh.

Materials and methods

This population-based cross-sectional study was conducted from January 2014 to December 2014 after obtaining approval from the Ethical Review

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Committee of Chittagong Medical College. Informed written consent was obtained from the participants after full explanation of the details of the study procedure and purpose of the study.

Individuals, either male or female, aged 18 years and older, were eligible to participate in the study. Pregnant women were excluded. Participants were selected through a multistage sampling from five Unions of different Upazilas of Chattogram, Bangladesh. A total of 3196 people were invited to participate in this study and 2551 subjects participated, with an overall response rate of 79.44%. Of these participants, there was complete information on 2500 subjects, which were included in the analysis. Trained community health workers with a minimum of 10th-grade education collected data. They received one-day study-specific training following standard operating procedures before data collection.

Sociodemographic data were collected by using a structured case record form. Participants were asked whether or not they had previously been diagnosed with DM, HTN, and renal disease. If the answer was yes, their medical records were reviewed to confirm the diagnosis and treatment. Subsequently, a physical examination was performed, including measurements of height, weight, hip circumference and blood pressure. A participant was considered to have hypertension if the SBP was ≥140mm Hg, DBP was ≥90mm Hg or the BP was below these cut-offs and the study participant reported taking antihypertensive medication.[11]

For HbA1c, Hb% and serum creatinine 5ml blood were drawn by the trained laboratory technician. The person with CBG level ≥5.6mmol/L was suggested to do Oral Glucose Tolerance Test or HbA1C. A diagnosis of previously diagnosed diabetes was confirmed by Fasting Plasma Glucose (FPG) level ≥7.0 mmol/l, or taking oral hypoglycaemic agents or insulin regardless of the FPG level. Undiagnosed diabetes was defined by FPG concentration of ≥7.0 mmol/l, and/or 2-h plasma glucose concentration of ≥11.1 mmol/l after a 75-g glucose load.[12] Renal impairment was defined by serum creatinine >1.2 mg/dl and/ urinary protein 1+.

Statistical analysis was carried out using the SPSS version 15.0. Both descriptive and inferential statistics were used in the results. $p< 0.05$ was considered to be statistically significant.

Results

The sociodemographic and anthropometric characteristics of the study population are presented in Table I. It depicts that respondents ≤40 years and >40 years were equal. The females were higher than the males, with a male-to-female ratio of 1: 1.23. The majority (79.6%) of them were educated and had a monthly family income of ≥10000 tk (61.84%). The average Body Mass Index (BMI) and waist-hip ratio were higher than the standard reference level.

Table I Sociodemographic and anthropometric characteristics of the study population (n=2500)

Characteristics	n (%)/Mean±SD/Range
Age groups	
≤40 years	1234 (49.4)
>40 years	1266 (50.6)
Sex	
Male	1120 (44.8)
Female	1380 (55.2)
Educational level	
No formal education	511 (20.4)
Literate	1989 (79.6)
Monthly family income	
<10000 tk	954 (38.2)
≥10000 tk	1546 (61.8)
Body mass index, kg/m^2	
Mean ± SD	24.7 ± 4.2
Range	14.8-46.5
waist-hip ratio	
Mean ± SD	0.93 ± 0.08
Range	0.71- 1.41

SD: Standard Deviation.

Table II shows comorbidity pattern of the study population. Out of 2500 participants 812 (32.5%), 575 (22.3%) and 616 (24.6%) participants had HTN, DM, and renal insufficiency, respectively.

Table II Occurrence of renal insufficiency, DM, and HTN among the participants (n = 2500)

Comorbidity		Frequency	Percent (%)
Renal insufficiency	Absent	1844	75.4
	Present	616	24.6
Hypertension	Absent	1688	67.5
	Present	812	32.5
Diabetes mellitus	Absent	1925	77.7
	Present	575	22.3

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Overall 1268 (50.7%) of the study participants had ever had their blood pressure measured. Females were more likely to have ever had their blood pressure measured compared to males [Women 58.3% versus men 42.0%]. Among the 812 people that had hypertension 478 (58.9%) were aware that they have the disease. Of those aware of the disease 404 (84.5%) were on treatment and 285 (70.5%) had achieved control of the disease. Among all people with hypertension only 315 (38.8%) participants had controlled hypertension.

Table III Blood pressure status and related practice among the participants

Variables	Frequency	Percent (%)
Ever measured BP (n=2500)	1268	50.7
Knew their hypertension status (n=812)	478	58.9
On treatment (n=478)	404	84.5
Control among hypertensive (n=812)	315	38.8
Control among on treatment (n=404)	285	70.5

Out of 557 diabetic patient, 325 (58.3%) patients were aware of DM and 232 (41.7%) were not aware of DM. Table IV shows that the majority (86.5%) were aware of DM who were on medications.

Table IV Association between anti-diabetic drug adherence and knowledge on their diabetes status among the diabetic patients (n = 557)

	Diabetic patients knew that they were diabetic		Total (n = 557)	p value
	Yes (n = 325)	No (n = 232)		
On Medication Yes	281 (86.5)	35 (15.1)	316 (56.7)	< 0.001
No	44 (13.5)	197 (84.9)	241 (43.3)	

Data were expressed as frequency (%), p value was obtained from Chi-square test.

Table V showing among the patients with renal involvement, one fourth(25.7%) patients had both hypertension and diabetes, one third(32.9%) had only hypertension, 7.3% had diabetes only and one third(34.1%) had other causes.

Table V Occurrence of HTN and DM in patients with renal insufficiency (n = 616).

HTN and DM status	Frequency	Percentage (%)
Both hypertension and diabetes mellitus	158	25.7
Only hypertension	203	32.9
Only diabetes mellitus	45	7.3

Discussion

In this study rural people of 18 years and above was included and half of the participants were young adult (≤40 years). The females were higher than the males, with a male-to-female ratio of 1: 1.23. Around one-fifth (20.4%) of them were not educated and had 38.2% had a monthly family income of ≥10000 tk. The sociodemographic characteristics of the present study more or less represent the rural people of Bangladesh.[13]

In accordance to the global trend, NCD is rising in Bangladesh.[9,10] Present study also confirmed this trend. Respectively, one in every three individuals and one in every four individuals had hypertension and diabetes, respectively, in this study. Among the 812 people that had hypertension 478 (58.9%) were aware that they have the disease. Of those aware of the disease 404 (84.5%) were on treatment and 285 (70.5%) had achieved control of the disease. Among all people with hypertension only 315 (38.8%) participants had controlled hypertension. Out of 557 diabetic patient, 325 (58.3%) patients were aware of DM and 232 (41.7%) were not aware of DM and the majority (86.5%) were aware of DM who were on medications.High prevalence of undiagnosed DM and HTN, uncontrolled DM and HTN among the diagnosed patients puts a great challenge ahead for Bangladesh, a resource-poor setting.[14,15] Regular health check or health screening along with implementation of hypertensive guidelines should be reinforced.

Another important finding of the present study was the presence of renal insufficiency in about one-fourth of the (24.6%) of the participants. In a nationwide, population-based, prevalence study in Australia examine the three key indicators of kidney damage: proteinuria, hematuria, and low GFR. This study demonstrates that approximately 16% of Australian adults have one or more indicators of kidney damage.[16]Among these patients, one fourth (25.7%) patients had both hypertension and diabetes, one third (32.9%) had only hypertension and 7.3% had diabetes only. In a previous study which was conducted among the urban slum dwellers in Dhaka city in Bangladesh found that among proteinuric participants 2% had diabetes, 3.7% had hypertension and 0.7% had both, while 2.8% had isolated proteinuria.[10] Present study gave a snapshot of the occurrence of HTN, DM and renal insufficiency in rural areas of Bangladesh, which would help in future studies for

a nationwide survey. A large scale study should be conducted on rural population of different parts of Bangladesh to know the exact picture and at the same time aware the rural people about these conditions.

Limitations

The main limitation of the present study was a relatively small sample size. Due to resource limitations, a detailed investigation of the morbidity pattern was not possible.

Conclusions

The prevalence of HTN, DM and renal insufficiency in rural adult population of Chattogram was found 32.5%, 22.3% and 24.6%, respectively and nearly half of them were diagnosed during the study.

Recommendations

There is an urgent need to raise the level of awareness of NCDs, especially, HTN, DM and kidney diseases in the rural population in Bangladesh.

Disclosure

All the authors declared to have no conflicts of interest.

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Original Article

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Microbiological Profile and Risk Factors in Case of Surgical Site Infection (SSI) following Caesarean Section

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Abstract

Background: Surgical Site Infections (SSI) are a common complication after any operation including a caesarean section (C-section) and mainly responsible for increased maternal mortality and morbidity, longer hospital stays as well as higher treatment costs. To assess the microbiological profile and risk factors of the Surgical Site Infection (SSI) in case of post C/S patient.

Materials and methods: We conducted a prospective observational cohort study involving 1200 women.We included 400 women of emergency and elective C-sections from January 2018 to December 2018 at BBMH USTC, in the Department of Obstetrics and Gynaecology. Each woman was followed for 30 postoperative days. Within this paper the importance of ethical conduct while engaging with research, is discussed, including the need to obtain ethical approval and consideration of issues around informed consent, conflict of interest, risk of harm and confidentiality. Data analysis included descriptive statistics, univariate and multivariate logistic regression analysis.

Results: Overall, the SSI rate was 9.85% and the median time to SSI was the 7th postoperative day. The mean age of the patients was 30.2 ± 5.4 years (Range from 18 to 45 years). The average length of stay was 4.2 ± 3.4 days. Several factors reduced the risk of SSI. These included: age less than 35 years (RR 0.25, 95% CI, 0.199– 0.906 and p = 0.027) preoperative use of antibiotics (RR 0.232, 95% CI, 0.107–0.502 and p = 0.000) and duration of the operation less than 1 h (RR 0.135, 95% CI, 0.054–0.338 and p = 0.000). We found a statistically significant association between SSI and co-morbidity, preoperative antibiotic use, duration of operation, age and history of previous caesarean section (p = 0.000, 0.000, 0.0001, 0.023, 0.000, respectively using chi-square test). Multivariable logistic regression analysis confirmed that one or more co-morbidity, previous C-section, preoperative antibiotics and duration of the surgery < 1 h are predictors of SSI.

Conclusion: The high incidence rate of SSIs after C-sections in this study highlights the need for prioritizing SSI control and surveillance. Patient demographics, procedures utilized and surgical factors must be incorporated in programs to reduce the infection rate.

Key words: Antibiotics; Bacteriological profile; Caesarean delivery; Centers for Disease Control and Prevention (CDC); Surgical site infections.

Introduction

Surgical Site Infections (SSI) are commonest nosocomial infections after Urinary Tract Infections (UTI) responsible for increasing cost, substantial morbidity and to be major problem even in hospital with most modern facilities and standard protocols of pre-operative preparation and antibiotic prophylaxis.[1,2] SSI rate has varied from a low of 2.5% to a high of 41.9%.[1] The Surgical Site Infection (SSI) is defined by the CDC criteria as an infection which occurs within 30 days after a surgical procedure and is further divided into superficial incisional primary and secondary SSIs, deep incisional primary and secondary SSIs and organ/space SSIs if involving structures deeper than muscle and fascia space.[3] SSIs are associated with increased costs, increased length of hospital stay and high mortality and morbidity.[4] Globally

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rates of SSIs differ substantially and are higher in less developed countries, compared to more developed countries.[5] The World Health Organization (WHO) recommends C-section rates between 10 and 15% since 1985.[6] Pre-existing morbidities associated with SSIs include: obesity, smoking, blood transfusion, age, malnutrition, immunosuppressive therapy, longer preoperative hospitalization and diabetes mellitus.[7] Factors specifically related to C-sections include: lack of prenatal care, multiple pregnancies, history of previous C-section, pre-labour rupture of the foetal membranes, labour dystocia, emergency/elective delivery.[8] As in other less developed countries, in Kosovo one of the major obstacles is the control and prevention of the SSIs. The overall prevalence rate of nosocomial infections in Kosovo was 17.4%.[9,10] There are often insufficient data in less developed countries to determine the SSI rate and risk factors and often there are no post discharge surveillance programs. Another advantage is that the NNIS risk index uses a procedure related cut point to indicate a long duration of surgery for an individual procedure, rather than a 2-hour cut point for all procedures.[11] ASA score is an index to assess overall physical status of patient before operation ranging from 1 to 5. It has been shown highly predictive for development of SSI.[12] The present study was aimed at obtaining the incidence of surgical site infections and determining the factors influencing the infection rate with special reference to the NNIS risk index. Various risk factors were studied, including Patient related risk factors viz. age, diabetes, prolonged preoperative hospital stay, Operative procedure related risk factors viz. nature of surgery, type of anaesthesia, duration of surgery and type of Surgical technique.

Materials and methods

This prospective observational cohort study involving 1200 women had C/S either elective or emergency.We included only 400 cases who underwent emergence and elective C-sections from January 2018 to December 2018, in the Department of Obstetrics and Gynaecology, Bangabandhu Memorial Hospital (BBMH) Institute of Applied Health Sciences (IAHS) Chattogram. Pregnant women who underwent C-sections were enrolled in the study who had SSI and followed for 30 days postoperatively. On day of admission, after taking proper history with the risk factors for our study was recorded as independent variables like age, place of residence, pre-existing conditions, diabetes mellitus, anaemia, obesity, hypertension.

After surgery, data documenting pre and postoperative antibiotic prophylaxis, duration of the surgery, type of surgery, ASA score, General Anaesthesia (GA) or spinal anaesthesia, were prospectively extracted from the medical charts, anaesthesia list, patients' medication list and from the discharge.[12] Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends that all women undergoing elective or emergency C-section should receive antibiotic prophylaxis (I-A) and the choice of antibiotic for C-section should be a single dose of a first-generation cephalosporin.In case of lengthy procedure or estimated blood loss > 1.5 l, an additional dose of the antibiotics may be given 3–4 h after the initial dose (III-L).[12] According to the study protocol all subjects participating in the study were followed until 30 days after the operative procedure. Follow-up took place in the Outpatient Department within the hospital. Sample was taken with proper maintenance of SOP and Culture-based microbiological methods were used to identify causal agents.

Statistical data analysis was performed using SPS Statistics 20 version 10. Descriptive statistics with percentages, mean, standard deviation, frequencies were used for patient, surgical and procedure related factors. Univariate and multivariate logistic regression analysis was used to identify predictors for SSI development. p-value less than 0.05% was considered statistically significant.

Results

Table I Patient demographics, procedures utilized and surgical factors at the Emergency Hospital in BBMH, for Obstetrics and Gynaecology (n = 400)

Variables	Frequency	Percent
Age (Mean±SD)	30.2±5.4	
Age range (Mean±SD)	18-45	
Place		
Urban	260	65.0
Rural	140	35.0
Co-morbidity: yes		
Diabetes	8	2.0
Anaemia	21	5.25
Obesity	7	1.7
Hypertensive disease/preeclampsia	23	5.7

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Variables	Frequency	Percent
Hypothyroidism	1	0.2
Hypoproteinemia	1	0.2
Tuberculosis (TBC)	1	0.2
Previous C-section		
Yes	60	15.0
Preoperative antibiotics		
Yes	262 /400	65.5/100
Postoperative antibiotics		
Yes	400	100
Anaesthesia		
Regional	365/395	91.5
General	35/ 5	8.7
Days in hospital – postoperatively	4.2±2	29
SSI/groupb	11.2	7.8
without SSI/groupc	3.4	0.6
Duration of operation		
> 1 h	164	41.0
< 1 h	236	59.0
Emergency (labored) / Elective (scheduled) C-section		
Emergency	127	31.7
Elective	273	68.3

[a] Mann-Whitney U test (U = 1061.5, Z = 70,969,348, p = 0.000).

[b] Group with Surgical Site Infection (SSI) c Group without surgical site infection.

A total of 1200 cases, 400 cases were included in our study that were followed for 30-postoperative days and analyzed. The mean age of the patients was 31.3 ± 5.5 years, with a range from 17 to 46 years. More than half, 260 patients (65.0%) were from urban areas and 140 patients (35.0%) were from rural areas. The average length of stay was 4.2 ± 3.4 days. The leading procedure was C-section for the first time in 85.9% of cases, while repeated C-section for the second or more times was found in 15.0% of the study subjects. Among 400 cases 395 (98.7%) underwent spinal anaesthesia procedure and only five (1.3%) had general anaesthesia.Here all patient had one or more co-morbidity namely, hypertensive disease 23 (5.7%), anemia 21 (5.25%), diabetes 8 (2.0%), tuberculosis 1 (0.2%) and Seven patients (1.7%) were obese. Preoperative antibiotic prophylaxis was identified in patients 262 (65.5%) Table I.

Table II Univariate logistic regression analysis on predictors for SSI at BBMH, Hospital for Obstetrics and Gynaecology (n=400)

Variables [a]	B	Exp(B)	95% C.I. for	EXP(B)
			Lower	Upper
Age < 35	0.856	0.425	0.199	0.906
Place of living	0.206	0.814	0.371	1.784
Co-morbidity (Yes)	2.132	8.428	3.681	19.3
Antibiotics (Yes)	1.46	0.232	0.107	0.502
Duration of surgery (< 1 h)	2.005	0.135	0.054	0.338
Previous C- section (Yes)	2.009	7.457	3.392	16.395
Elective C-section	0.594	1.812	0.863	3.804

[a]Variable(s) entered on step 1: age, place of living, co-morbidity, antibiotic use, duration of surgery, previous C-section, elective C-section.

Age less than 35 years, reduces the chance for SSI development compared to the patients in the age-group 35 years and over > 35 years (RR 0.425, 95% CI, 0.199– 0.906 and p = 0.027). Patients with repeated C-section were 7.4 times more likely to develop SSIs compared to the patients with no history of previous C-section (RR 7.457, 95% CI, 3.392–16.3395 and p was 0.000). Postoperative wound infection was identified in 32 patients comprising 9.85% of the studied subjects (Overall SSI rate 9.85%). From this number superficial primary incisional surgical site infection was predominant with 30 cases (93.75%) and deep primary incisional surgical site infection was present in 2 cases (6.25%) while no Organ/Space SSI was identified. We found statistically significant associations between SSI versus co-morbidity, preoperative antibiotic use, duration of operation, age and history of previous C-section (p = 0.000, 0.000, 0.0001, 0.023, 0.000, respectively using chi-square test) (Table II).

Table III Multivariable logistic regression analysis for risk factors associated with SSI at BBMH, Hospital for Obstetrics and Gynaecology (n=400)

Variables [a]	B	Exp(B)	95% C.I. for	EXP(B)
			Lower	Upper
Age < 35	0.815	2.26	0.901	5.667
Co-morbidity (Yes)	1.995	7.354	2.761	19.593
Antibiotics (Yes)	1.509	0.221	0.091	0.539
Duration of surgery (< 1 h)	– 1.31	0.27	0.092	0.793
Previous C-section (Yes)	1.296	3.654	1.351	9.887

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Multivariable logistic regression analysis confirmed that one or more co-morbidity, previous C-section, preoperative antibiotics and duration of the surgery < 1 h are predictors of SSI

[a]Variable (s) entered on step 1: age, co-morbidity, antibiotics, duration of surgery, previous C-section.Shows the 77.5% of the patients were administered cefazolin/ceftriaxone and gentamycin postoperatively whereas 14.5% received a combination with cefazolin/ceftriaxone, gentamycin and metronidazole as per hospital protocol, postoperatively (Data not shown). Multivariable logistic regression analysis confirmed that one or more co-morbidity, previous C- section, preoperative antibiotics and duration of the surgery < 1 h were predictors of SSI (Table III).

Table IV Microbiological profile in patients diagnosed with SSIa (n=400)

Wound swab- bacteriological profile	Count	Percent
Coagulase negative staphylococci spp.(CoNS)	3	7.5
Staphylococcus aureus	12	30
Serratia marcescens	1	2.5
Enterococcus faecalis	7	17.5
Negative culture (Sterile)	3	7.5
Klebsiella pneumoniae	1	2.5
Missing (Not taken)	5	12.5
Bacillus spp.	1	2.5
Pseudomonas aeruginosa	1	2.5
Escherichia coli, Proteus mirabilis	1	2.5
Escherichia coli	3	7.5
Escherichia coli, serratia marcescens	1	2.5
Klebsiella spp.	1	2.5
Total	40	100

The mean day, in which SSI was diagnosed, was 10.3 ± 5.7 postoperative day, minimum 4 days and maximum 25 days while the median time to SSI was 7th postoperative day.

The microbiological profile revealed Staphylococcus aureus as the most frequent isolated pathogen in 30% (n =12) followed by the second most common agent Enterococcus faecalis in 17.5% (n = 7) and Escherichia coli/CoNS isolated in 7.5% (n = 3). There were 2 cases or 7.5% of clinical infection with negative (Sterile) culture and in 2 cases combined microbial infection was identified, namely one case with Escherichia coli and Serratia marcescens and another case with Escherichia coli and Proteus mirabilis (Table IV).

Discussion

Surgical site infection is an important outcome after surgery. 7–12% of hospitalized patients end up with hospital acquired infections globally with more than 1.4 million people suffering from infectious complications acquired in the hospital.[12] Reported rates for SSI after C-section varied from 3 to 15%causing substantially high maternal morbidity and mortality.[13] Overall, the SSI rate in our current study (9.85%) was noticeably high. There is a wide range globally of reported SSI after C-sections varying from a SSI rate of 2.7% in a retrospective study conducted in Nova Scotia to 5.5% in the USA followed by high incidence rate of SSI up to 48% in low-resource settings in a Tanzanian tertiary hospital 23.5% in Brazil 18.8% in Malaysia and 14.4% in Jordan.[14-19] A study from Saudi Arabia reported a SSI rate of 9.5% after caesarean delivery.[20] While in a cross-sectional survey conducted in the Estonian University Hospital reported a SSI rate after C-section of 6.2%.[21] There are conflicting results regarding the relationship between age and increased risk for SSI.[22] In a study conducted by Kaye et al. age was identified as a strong predictor for SSI. [23]In the current study, age less than 35 years, reduced the chance for SSI development compared to the patients in the age-group 35 years and over > 35 years.

Our data confirmed that the patients with a history of previous caesarean section were 7.4 times more likely to develop SSI compared to the group without prior caesarean surgery. Additionally, we found that duration of surgery less than 1 h had a protective effect for SSI prevention. Data from the present study were in accord with a study conducted by Killian et al. in which duration of operation > 1 h posed increased the risk for SSI development after C-Section and that is an independent risk factor for the development SSI.[24,25] Furthermore, prolonged surgery, lasting more than 3 h, was associated with a 4-fold increased risk for SSI occurrence.[26,27] Most of the infections in our study sample were superficial infections 93.75% whereas 6.25% were deep primary incisional surgical site infections. Organ/Space SSI or endometritis based on patient-reported criteria (uterine tenderness, abdominal pain and purulent discharge from the uterus) as defined by Wloch et al. were not identified in the study subjects.[28] The median time to SSI for all

infections was 7th postoperative day and the mean day in which SSI was diagnosed was 10.3±5.7 postoperative day. The major explanations for these correlations include anaesthesia-related stress, extensive tissue trauma and inadequate serum and tissue concentration of the antibiotics in prolonged surgical procedures.[26] As previously reported, there is an increased risk for SSI in the presence of other co-morbiditiesexplicitly: anaemia, obesity, hypertension, diabetes mellitus as well as other associated morbidities in the patient.[29, 30,31] There is strong evidence of the protective role of antibiotic prophylaxis to reduce the SSI rate with remarkable low SSI incidence rate among the patients with antibiotic administration prior to surgery.[32] Differences in our hospital policy regarding the antibiotic prophylaxis before C-section with other clinical guidelines, are mainly caused by the lack of adequate prenatal care in pregnant women, absent or insufficient screening for common bacterial infections in pregnancy and urinary tract infection, low socioeconomic status of the patients and importantly by our local list of essential medicines. Additional doses of antibiotics are given postoperatively without Microbiological advice up to the third postoperative day. In the current study, isolation of the gram-negative pathogens commonly observed in wound class II, should increase our awareness of the potential sources of infection, exogenous contamination, medical staff carriers and environmental factors.[31] Our study demonstrated that in 65.5% of the operated patients, Cefazolin/Ceftriaxone was used prophylactically, and that preoperative use of antibiotics reduced the chance for SSI development compared to the patients without antibiotic administration. However, data from this study revealed serious weaknesses in the current internal hospital protocols regarding the preoperative prophylaxis with antibiotics as well as postoperative treatment. Considering this issue, 77.5% of our patients received a combination of Cefazolin/ Ceftriaxone and gentamycin postoperatively for 3 days, whereas 14.5% received a combination with Cefazolin/Ceftriaxone, gentamycin and metronidazole postoperatively as per hospital protocol. While all patients received antibiotics for more than 24h after surgery, this practice showed no protective effect, therefore prolonged use of antibiotics did not reduce SSI incidence rate and can further add to microbial resistance in our setting. Similar to the study conducted by Kaplan et al. which exposed Staphylococcus aureus in 42% of positive samples after caesarean delivery the bacteriological profile in patients with SSI in our study sample, showed predominance of the skin microflora mostly Staphylococcus aureus (28.1%) and Coagulase negative staphylococci spp. (CoNS) to a lesser extent (6.25%) which is expected for the wound class I.[32] Similar to our results, in a prospective evaluation for wound infection in more than 2000 cases after C-section, authors reported Enterococcus faecalis (17%) as the second most prevalent pathogen.[33] Dissimilarity seen in Mahfouz Me et al. the most detected bacterial pathogens among patients who experienced SSI were Escherichia coli, followed by Staphylococcus aureus (n=11, 44% and n=7, 25%, respectively). Meanwhile, the remaining 40 (61.5%) samples of patients with SSI showed no bacterial growth.[34]

Limitations

This study could not be done in a large scale due to proper availability of the resources.

Conclusion

The high incidence rate of the SSIs in the current study highlights the need for prioritizing SSI control by creating methods for clear post discharge surveillance at a national level by developing patient and physician-based valid measures for SSI evaluation after discharge. Programs for wound surveillance can decrease the rate of infection which in turn may decrease costs of surveillance and treatment.

Recommendations

The study can be done on a large scale so that SSI can be prevented effectively.

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Original Article

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Role of Ultrasound in Diagnosis Bladder Outlet Obstruction: A Clinical Study

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Abstract

Background: Bladder Outlet Obstruction (BOO) is a common urological condition, especially in older adults, often leading to significant morbidity. Early and accurate diagnosis is crucial for effective management, but invasive procedures like urodynamic studies are the gold standard. Ultrasound, a non-invasive and widely accessible tool, may offer an alternative for diagnosing BOO. This study aims to evaluate the diagnostic accuracy of ultrasound in diagnosing bladder outlet obstruction by comparing it to urodynamic studies, the gold standard.

Materials and methods: A diagnostic accuracy study was conducted at East West Medical College, Dhaka, Bangladesh from January 2022 to December 2023. A total of 62 patients presenting with symptoms suggestive of BOO, such as weak urine stream, urinary hesitancy and incomplete bladder emptying, were included in the study. All participants underwent a detailed clinical evaluation followed by ultrasound and urodynamic studies. Ultrasound measurements were compared to urodynamic findings, including post-void residual urine volume and bladder wall thickness. The sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of ultrasound in diagnosing BOO were calculated. The statistical significance of the findings was determined using a Chi-square test, with a p-value of <0.05 considered significant.

Results: Ultrasound showed a sensitivity of 85.7%, specificity of 75.0%, PPV of 84.2% and NPV of 77.8%, with an overall diagnostic accuracy of 80.6%. The association between ultrasound findings and urodynamic diagnoses was statistically significant ($p < 0.05$), confirming the reliability of ultrasound for BOO diagnosis.

Conclusion: Ultrasound is a valuable non-invasive tool for diagnosing bladder outlet obstruction, offering high sensitivity and moderate specificity. Its use could reduce the need for invasive urodynamic studies in clinical practice.

Key words: Bladder outlet obstruction; Diagnostic accuracy; Ultrasound; Urodynamic studies.

Introduction

Bladder Outlet Obstruction (BOO) is a significant urological issue, especially in elderly men, and is commonly associated with Lower Urinary Tract Symptoms (LUTS) such as reduced urinary flow rate, felling of incomplete evacuation of bladder, and nocturia.[1] Traditionally, urodynamic pressure-flow studies have been recognized as the gold standard for diagnosing BOO.[2] However, this technique requires urethral catheterization, which can partially obstruct micturition and affect diagnostic results. Furthermore, its invasive nature often causes discomfort and pain, and may result in infections, making it less favorable for patients.[3]

Due to these limitations, there is a growing need for the development of a non-invasive yet accurate method for diagnosing BOO. Ultrasound (US) imaging has emerged as a promising alternative. A decorrelation-based technique has been introduced

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to quantify urinary flow velocity and turbulence in the urethra, leveraging small scattering particles in urine, such as calcium oxalate and uric acid crystals, to enhance US imaging.[4] The degree of obstruction correlates with the increase in decorrelation, indicating that ultrasound decorrelation can be used to estimate the severity of BOO.[5]

The objective of this study is to assess the role of ultrasound as a non-invasive tool for diagnosing BOO. By focusing on male patients with lower urinary tract symptoms, this study aims to determine whether ultrasound decorrelation provides a reliable and patient-friendly alternative to traditional urodynamic studies.[6]

Materials and methods

This diagnostic accuracy study will be conducted at East West Medical College from January 2022 to December 2023. A total of 62 patients with clinical symptoms suggestive of Bladder Outlet Obstruction (BOO) such as Poor flow of urine, weak urine stream, hesitancy and incomplete bladder emptying, will be included in the study. The patients will be selected through purposive sampling to ensure that only those with suspected BOO are enrolled.

Data collection will involve a two-step process. First, patients will undergo a thorough clinical evaluation, including medical history and physical examination. Following this, ultrasound will be performed using a standardized protocol by experienced radiologists. The ultrasound will assess key parameters such as post-void residual urine volume, bladder wall thickness and bladder capacity. These findings will then be compared to results from urodynamic studies, which will serve as the gold standard for diagnosing BOO.

All participants will provide informed written consent before being enrolled in the study. The consent process will ensure that patients understand the study's purpose, procedures, and potential risks and benefits. Confidentiality of patient information will be strictly maintained throughout the study, with data being used solely for research purposes. Ethical approval for the study will be obtained from the institutional ethics committee before the start of data collection.

The collected data will be analyzed using appropriate statistical methods to determine the diagnostic accuracy of ultrasound, including sensitivity, specificity, positive predictive value and negative predictive value. These metrics will help establish the effectiveness of ultrasound as a non-invasive tool for diagnosing bladder outlet obstruction.

Results

The study included a total of 62 patients with symptoms suggestive of Bladder Outlet Obstruction (BOO). The patient's demographic and clinical characteristics, along with ultrasound and urodynamic findings, were analyzed to assess the diagnostic accuracy of ultrasound in diagnosing BOO.

Table I Baseline Characteristics of Patients with Suspected BOO (n = 62)

Variable	Frequency (n)		Percentage (%)	
Age (Years)				
- 40-49	18		29.0	
- 50-59	28		45.2	
- 60 and above	16		25.8	
Gender				
- Male	45		72.6	
- Female	17		27.4	
Symptoms				
- Urinary hesitancy	Present		Absent	
	48	77.4	14	22.6
- Weak urine stream	54	87.1	8	12.9
- Incomplete bladder emptying	44	71.0	18	29.0
- Increased frequency	35	56.5	27	43.5
Comorbidities				
- Diabetes mellitus	20	32.3		
- Hypertension	26	41.9		
- Previous urinary tract infection	15	24.2		

Table I shows the baseline characteristics of the study population. Most patients (45.2%) were between 50-59 years old, and males constituted 72.6% of the sample. The most common symptom was a weak urine stream, reported by 87.1% of patients, followed by urinary hesitancy in 77.4%. Comorbid conditions such as hypertension and diabetes mellitus were also prevalent among the study participants.

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Table II Ultrasound and Urodynamic Findings (n = 62)

Variable	Frequency (n)	Percentage (%)
Ultrasound findings		
- Post-void residual volume (> 100 mL)	40	64.5
- Bladder wall thickening (> 5 mm)	36	58.1
- Increased bladder capacity (> 600 mL)	25	40.3
Urodynamic diagnosis of BOO (Gold standard)	42	67.7
Ultrasound diagnosis of BOO		
- Positive for BOO	38	61.3
- Negative for BOO	24	38.7

Table II Presents the findings from the ultrasound examinations and urodynamic studies. Post-void residual volume greater than 100 mL was found in 64.5% of patients, and bladder wall thickening was observed in 58.1%. Urodynamic studies confirmed BOO in 67.7% of patients, whereas ultrasound detected BOO in 61.3% of the cases.

Table III Diagnostic Accuracy of Ultrasound for BOO (n = 62)

Parameter	Value	95% Confidence Interval (CI)
Sensitivity	85.7%	72.7% - 93.4%
Specificity	75.0%	55.1% - 88.0%
Positive Predictive Value (PPV)	84.2%	70.1% - 92.3%
Negative Predictive Value (NPV)	77.8%	58.6% - 89.2%
Accuracy	80.6%	69.1% - 88.9%
p-value (Chi-square test)	< 0.05	Significant

Table III outlines the diagnostic accuracy of ultrasound compared to urodynamic studies. Ultrasound demonstrated a sensitivity of 85.7% and a specificity of 75.0%. The Positive Predictive Value (PPV) was 84.2% and the Negative Predictive Value (NPV) was 77.8%, indicating that ultrasound is a relatively accurate tool for diagnosing bladder outlet obstruction. The overall accuracy of ultrasound was 80.6%. A Chi-square test revealed a statistically significant association between ultrasound findings and urodynamic diagnoses ($p < 0.05$) confirming the reliability of ultrasound as a diagnostic method for BOO.

Discussion

The present study investigated the role of ultrasound in diagnosing Bladder Outlet Obstruction (BOO) as a non-invasive alternative to traditional urodynamic studies. In our study, 62 patients with Lower Urinary Tract Symptoms (LUTS) were examined, with a mean age of 58.3 years. The prevalence of BOO, as determined by ultrasound decorrelation techniques, was 56.5% (n=35). This finding aligns with similar studies that suggest the widespread occurrence of BOO in aging male populations.[7,8] The use of ultrasound for Post-Void Residual (PVR) volume was also highly significant, with 70% (n=43) of patients showing elevated PVR, which is consistent with findings from previous literature that indicate PVR as a key indicator of BOO.[9,10]

The study demonstrated a strong correlation between ultrasound measurements of bladder wall thickness and flow velocity. Our results indicated that 51.6% (n=32) of patients had bladder wall thickness greater than 5 mm, which is supported by previous studies that have also reported bladder wall thickness as a marker of obstruction.[11] The statistical significance of ultrasound-detected BOO, with a p-value <0.05, reinforces the potential of this non-invasive method in clinical settings.

Our findings are consistent with other studies that have evaluated the utility of ultrasound in diagnosing BOO. For instance, Arif et al. demonstrated that ultrasound decorrelation effectively quantifies flow turbulence and urethral obstruction.[5] Additionally, the non-invasive nature of the ultrasound method is a significant advantage over traditional urodynamics, which can cause discomfort and infection, and alter diagnostic accuracy.[12]

Conclusion

This study highlights the effectiveness of ultrasound as a non-invasive diagnostic tool for bladder outlet obstruction. Ultrasound decorrelation techniques successfully identified BOO in 56.5% of patients with lower urinary tract symptoms. Post-void residual volume and bladder wall thickness were also key indicators of obstruction, aligning with findings from previous studies. Given its patient-friendly nature and diagnostic accuracy, ultrasound could serve as an alternative to invasive urodynamic studies. Future research should focus on larger sample sizes to further validate these findings and explore broader clinical applications.

Disclosure

All the authors declared to have no conflicts of interest.

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Case Report

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A Rare Complication Associated with Ventriculo-Peritoneal Shunt in A Child : Case Report

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Abstract

Ventriculoperitoneal (VP) shunt is a common surgical procedure for congenital hydrocephalus. Complications can arise following VP shunt placement commonly obstruction, infection and rarely peritoneal pseudocyst, bowel perforation. Here, I am reporting a 7 months old boy presented with the history of intestinal obstruction with past history of VP shunt for congenital hydrocephalus and repair of myelomeningocele. Exploratory laparotomy performed, there was multiple bands compressing the gut, and VP shunt perforating the small bowel and finally penetrate the large bowel without any clinical manifestation of peritonitis. Excision of bands, removal of shunt tube, repair of perforating & penetrating wound of bowel. Post-surgical hospital course was smooth and baby was discharged on 5th postoperative day.

Key words: Bowel perforation; Complication; Ventriculoperitoneal shunt.

Introduction

Hydrocephalus is a common association of myelomeningocele, which may be present at birth or develop after repair of myelomeningocele.[1] Ventriculoperitoneal (VP) shunt placement is a common and effective therapy for congenital hydrocephalus.[2] VP shunt involves a catheter connecting the cerebral ventricles to the peritoneal cavity, diverting excess Cerebrospinal Fluid (CSF) from the ventricles into the peritoneal cavity.[3] Unfortunately, complications related to VP shunt placement are common. Shunt malfunction may be attributed to multiple causes, including obstruction, infection, pseudocyst formation and bowel perforation.[4] Bowel perforation is a rare complication of VP shunt placement.[5] We report a cases of a post VP shunt complication.

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Case Report

A 7 months old boy had undergone right sided medium pressure VP shunt for congenital hydrocephalus with simultaneous repair of Myelomeningocele 6 months 20 days back. He presented on 30th July 2023, at Chattagram International Medical College Hospital (CIMCH) Chattogram with bilious vomiting with abdominal distention for 2 days. On examination baby was febrile, lethargic, distended abdomen tympanitic on percussion. Rectum was empty on DRE. Abdominal X-ray showed huge air fluid level on upper abdomen with distal paucity of gas (Figure-1). Exploratory laparotomy were performed there were multiple bands that compressing the gut was found, shunt tube was wrapped with omentum and perforating the small intestine and the tip of the shunt penetrate the descending colon (Figure 2). We excised the bands and ligation, removal of the shunt, repair the perforating and penetrating wound of intestine. Reposition of the gut and a pelvic drain kept in situ, then wound closed in layers. Oral feeding starts at 4th POD and removal of drain tube. Baby discharged on 5th POD and advised with a planned redo VP shunt.

Figure 1 Huge air fluid level on upper abdomen with paucity of gas in lower abdomen with a VP shun in situ

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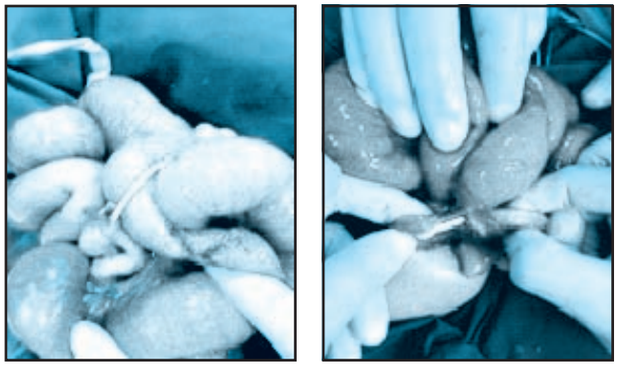

Figure 2 Peroperative picture of band and adhesion, VP shunt perforating the small intestine, VP shunt penetrating the large intestine

Discussion

VP shunt placement associated complications can present within a few weeks or several years after the time of surgery.[6] Common complications like ventriculitis, meningitis, sepsis, rare complications such as intestinal obstruction, spontaneous knotting in the peritoneal end, extrusion through the anus, vagina, and umbilicus.[7] Spontaneous bowel perforation only 0.01% to 0.07% of patients, most commonly in children.[8] Perforation can occur in any segment of the GI tract but the colon is the most commonly reported site. The etiology of the bowel perforation is unclear and several mechanisms have been suggested. The formation of a local inflammatory reaction or fibrosis around the distal catheter is thought to have an anchoring effect on the tube resulting in pressure on an area of the bowel which finally causes perforation of the wall.[9] The type of catheter or the length of the abdominal part of the catheter may also be implicated in the bowel perforation and finally silicon allergy may result in a foreign body-like reaction.[10]

Conclusion

Though intestinal obstruction and or bowel perforation is very rare complications of VP shunt, the surgeons must be familiar with its possible consequence and prompt treatment should be given.

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Disclosure

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