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Editorial

Marine City Medical College Journal

Strength and Weakness of Undergraduate Medical Education and Curriculum in Bangladesh

Pradip Kumar Dutta[1*]

Undergraduate medical education in Bangladesh faces several significant defects, primarily rooted in its traditional, lecture-based approach. The curriculum often prioritizes rote memorization over the development of critical thinking and practical skills, leaving graduates ill-prepared for the demands of modern medical practice. These issues are compounded by a lack of resources, teacher-centered methodologies, and an outdated assessment system. The undergraduate medical curriculum in Bangladesh is regulated by the Bangladesh Medical & Dental Council (BMDC). It serves as the foundation for producing the nation's medical workforce. It follows a structured, discipline-based approach with a five-year academic program followed by a one-year internship. While the curriculum has notable strengths, it also faces significant challenges in meeting the demands of modern healthcare and aligning with global standards.[1,2]

Evaluation of curriculum

The medical curriculum in Bangladesh is often criticized for being rigid, discipline-oriented and not adequately clinically-focused. It has been described as a "Teacher-centered" and "Information-gathering" system where lectures dominate, leading to passive learning and low receptivity among students. While curriculum reforms were attempted in 2002 to create a more foundational and need-based education, their implementation has been largely ineffective.[3] Updated curriculum in 2021 has included some soft skills like behavioural science, medical ethics, communication skill and leadership quality to keep alignment with global standard.

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Assessment and Evaluation in Medical Education

The current examination system is heavily focused on memorization, with little to no evaluation of critical thinking, clinical reasoning or problem-solving abilities. While there have been changes to incorporate formative assessments and structured oral exams, the implementation of these new methods is often inconsistent and their reliability is questionable. The traditional oral examination, in particular, is a major source of stress for students and can be unreliable due to variations in questioning and scoring among examiners.

Resources and Infrastructure

Many medical colleges, particularly non-government ones, suffer from a shortage of qualified and well-trained teachers. This issue is a major barrier to providing quality education. Furthermore, there is a general lack of infrastructure, funding, and modern technologies. The absence of a uniform national standard for curriculum delivery and assessment across institutions leads to disparities in the quality of teaching and infrastructure.

Lack of Research and Professional Development

Opportunities for undergraduate medical students to engage in research and innovation are extremely limited. This deficiency hinders the development of analytical and scientific inquiry skills, which are crucial for evidence-based medicine. The lack of training and mentorship in research is a significant defect that impacts the quality and quantity of publications from Bangladeshi institutions. Additionally, there is a need for better training and continuous professional development for medical educators themselves to improve teaching methodologies.[4,5]

Strength of Medical Curriculum

Structured and Standardized Framework: The BMDC curriculum ensures uniformity in content and assessment across all medical colleges.[1]

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Strong Basic Science Foundation: Early years emphasize anatomy, physiology and biochemistry, building a solid theoretical base.[6]

Mandatory Internship Year: One year of supervised clinical practice allows transition from student to practitioner.[7]

Regulatory Oversight: Regular curriculum revisions aim to incorporate evolving medical knowledge.[2]

Community-Oriented Focus: The curriculum, in principle, aims to produce "community-oriented" doctors who can address the primary healthcare needs of the population. This is a crucial goal given the country's healthcare landscape.[8]

Cost Effective Medical Education : Medical education in Bangladesh is relatively affordable compared to many Western countries, making it accessible to a larger population, including international students, particularly from neighboring countries.[7]

Weakness of Medical Curriculum

Overemphasis on Rote learning : The system rewards memorization over problem-solving and critical thinking.[6] This often results in a gap between theoretical knowledge and practical application.[9]

Inadequate Clinical Exposures : In non-government Medical colleges it is due to lack of patients. In Public medical colleges it is due to large class sizes and limited supervision hindering hands-on learning.[1]

Outdated Curriculum Content: Slow adaptation to emerging fields like telemedicine, health informatics and evidence-based practice.[2,8]

Limited Interdisciplinary Integration: Subjects taught in silos, reducing holistic patient-care understanding.[6] In 2021 curriculum this disadvantage was tried to overcome by inserting integrated teaching programme.

Assessment Misalignment :The assessment system often focuses on evaluating factual knowledge through examinations, with less emphasis on practical skills, attitudes and professional behavior. However in 2021 curriculum it was partially overcome by inclusion of OSCEs and OSPEs.[7]

Insufficient Research Training : Many medical colleges, especially non-government institutions, lack modern infrastructure and advanced technology. There is also a general lack of emphasis on research, which can limit students' exposure to the latest medical advancements and hinder their ability to engage in evidence-based medicine.[8]

Faculty Development Gaps : A shortage of experienced and well-trained faculty is a persistent issue, particularly in non-government medical colleges. This can lead to a lack of adequate mentorship and a strained learning environment, which can negatively impact the quality of education.[10]

High Academic Stress: The demanding nature of the curriculum, combined with a highly competitive environment, often leads to high levels of academic stress among students. A study found that over half of Bangladeshi medical students suffer from measurable academic stress.[9]

Suggested Way Out

Reform requires coordinated action from policymakers, educators, and healthcare institutions:

- To Modernize curricular content to align with global standards while addressing local needs.
- To Enhance clinical skills training through simulation labs (Already adopted in certain medical colleges) standardized patients and bedside teaching.
- To Adopt competency-based assessments including OSCEs and workplace evaluations.
- To Invest in faculty development for modern teaching and assessment methods.
- To Integrate research training and elective opportunities to encourage lifelong learning.
- To Embed ethics, professionalism, and community medicine in the core curriculum.

Medical education is the foundation of healthcare delivery. Without urgent, evidence-informed reform, Bangladesh risks producing graduates who are qualified in name but underprepared for the realities of patient care in both national and global contexts. The undergraduate medical curriculum in Bangladesh has commendable strengths in structure, accessibility, and basic science education. However, to align with global competency-based standards and meet local healthcare demands, reforms are needed in clinical exposure, assessment, methods, curriculum integration and faculty development. A balanced approach will ensure graduates are well-prepared for modern medical practice.

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Review Article

Marine City Medical College Journal

Cardiac Troponin in Acute Ischemic Stroke

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ABSTRACT

Background: Cardiac troponin is a highly accurate and sensitive biomarker used to detect and measure damage to the heart muscle. Concomitant acute coronary syndrome is just one of several potential differential diagnoses that might result in an increase in cardiac troponin levels following a stroke. Stroke-heart syndrome subsumes a clinical spectrum of cardiac complications after stroke including cardiac injury, dysfunction, and arrhythmia which may relate to disturbances of autonomic function and the brain–heart axis. These complications may be caused by disruptions in autonomic function and the connection between the brain and the heart. Regarding its significant predictive value, global guidelines advocate for the assessment of troponin levels in all individuals who exhibit symptoms of acute ischemic stroke. The care of stroke patients presenting with increased troponin levels is a frequently discussed topic of dispute between neurologists and cardiologists in critical care centres.This review is focused on the clinical significance and possible correlation of troponin in patients with acute ischemic stroke.

This study provides an insight review of some available studies regarding therelevancy of increased Cardiac Troponin (cTn) in stroke patients.

Methodology: The current study is a systemic review of published studies and articles by searching PubMed, Google scholar, AHA Journal and Journal of European Stroke Organization with strategy using appropriate key words and titles.

Conclusion: A sudden increases in cTN levels should be promptly evaluated for diagnosis and can be caused by "Stoke-Heart-Syndrome".

Key words: Myocardial infarction; Neurogenic heart syndrome; Troponin; Stroke.

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INTRODUCTION

Stroke-heart syndrome" refers to a condition in which myocardial damage, detected by cardiac Troponin (cTn) can manifest directly after infarction.[1] Acute Coronary Syndrome (ACS) may manifest in an atypical manner following a stroke and the administration of treatment for suspected ACS may involve a significant risk of haemorrhage. However, no specific guidelines exist regarding the interpretation and management of stroke patients whose cTn is elevated. Recent findings indicate that cTn elevation following stroke may be caused by multiple factors, with concomitant or preceding ACS.[1,2] The incidence of elevated troponin in acute stroke patients has been the subject of numerous studies, with estimates ranging from 5% to 10%.The TRELAS (Troponin Elevation in Acute Ischemic Stroke) study has examined whether the elevation of troponin is a suitable predictor of ACS in patients who have suffered a stroke or not. TRELAS study is comprised of a cohort of 2123 consecutive patients who presented with acute ischemic stroke and have been ruled out to have ST-segment-elevation myocardial infarction.[4] The prevalence of coronary lesions on angiography was 24% and 21% of patients underwent revascularization.[4] Acute brain injury, such as a hemorrhagic or ischemic stroke, can initiate neurocardiogenic syndromes, which are conditions characterized by myocardial damage. These syndromes may include symptomatic myocardial ischemic injury, symptomatic heart failure (e.g. Takotsubo cardiomyopathy) or asymptomatic troponin elevations.[5] As a consequence of hypoperfusion of the posterior hypothalamus, catecholamine increases, leading to an imbalance in the autonomic nervous system and heightened sympathetic output.[6,7] Increased troponin I

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level is associated with elevation of circulating epinephrine in acute ischemic stroke.[8] Stroke patients frequently exhibit elevated levels of catecholamines, which can contribute to the occurrence of cardiac arrhythmias and abnormalities in Electrocardiogram (ECG) readings. The presence of catecholamine leads to cardiac necrosis.[9] After a stroke, there is a presence of autonomic imbalance characterized by increased sympathetic activity. Therefore, the excessive release of catecholamines causes sudden damage to the central autonomic system leading to immediate disruption in sympathetic and parasympathetic activity.[10] Data from observational studies on acute ischemic stroke-demonstrate that 30–60% of patients have elevated cTn levels upon hospital admission.[11,12] In approximately 15% of patients, cTn elevation even exceeds cut-offs in patients presenting with "Suspected myocardial infarction" in the emergency department.[13]

Several studies provide consistent evidence that myocardial injury in acute ischemic stroke is strongly associated with poor functional outcomes and a more than 2-fold increase in mortality.[4,14]

In this review, we provide an up-to-date overview of the frequency, prognostic utility and potential mechanisms, of elevated cTn levels in patients with acute ischemic stroke.

SEARCH STRATEGY

Available studies and abstract were identified through Pubmed, Google Scholar, AHA journals and the journal of ESO (European Stroke Organization), Medline and the Cochrane Library using the following key words: "Myocardial infarction; Neurogenic heart syndrome; Stroke; Troponin".

This systematic review includes 33 articles that has been identified. Filter was applied and relevant articles from the reference lists of the reviewed articles from 2007 to 2020 were sought out.

DISCUSSION

Relation between Cardiac troponin, myocardial injury and myocardial infarction

Cardiac muscle contraction is an intricate process where the stimulation of cardiomyocytes, caused by the depolarization of the cell membrane and the subsequent rise in intracellular Ca^{2+} concentration, is linked with the production of mechanical force. Troponin complex plays a crucial function in regulating muscle contraction. This protein is composed of three subunits: troponin C (TnC) which has the ability to bind to Calcium ions (Ca^{2+}) Troponin I (TnI) which acts to limit the ATPase activity of the actomyosin complex and troponin T (TnT) which interacts with tropomyosin.[15] Since 2010, with advances in assay technologies, high-sensitivity cTn assays (hs-cTn) were introduced.[16] Cardiac troponin T (cTnT) and cardiac troponin I (-I) are exclusive structural proteins found in the heart. Thereby, cTnT and -I are organ-specific, but not disease-specific markers. High-sensitivity tests for cardiac troponin T and I accurately measure the extent of damage to cardiomyocytes.[17-20]

Troponin tests are considered "High-sensitivity" when they can detect cardiac Troponin (cTn) in more than 50% of a sample of healthy persons, with a coefficient of variation of less than 10% at the 99th percentile Upper Reference Limit (URL) in this group.[21] High-sensitivity cardiac troponin (hs-cTn) tests have enhanced sensitivity and can detect a significant number of individuals who previously had undetected cardiac Troponin (cTn) levels using traditional cTn testing. This results in an increased precision in the early identification of acute myocardial infarction.[22,23]

Prognostic implications of Cardiac troponin in stroke

As highly-sensitive cTn measures are being used more often in emergency situations, it is becoming more apparent that myocardial damage, indicated by elevated cTn levels, is common in individuals who have various medical emergencies, including acute stroke.[24] Observational studies including consecutive patients with acute ischemic stroke indicate that 30-60% of patients have increased levels of cardiac Troponin (cTn) upon admission to the hospital, when using modern high sensitivity cardiac Troponin (hs-cTn) tests.[25,12] Multiple studies consistently demonstrate that myocardial damage in cases of acute ischemic stroke is highly correlated with poor functional outcomes and a more than 2-fold increase in mortality.[1,14] Recent research indicates that people who have suffered a stroke are more likely to have greater levels of hs-cTn, which is related with higher rates of severe cardiovascular events.[26,27] An association has also been shown between the levels of Hs-cTn and the severity of cerebral small vessel disease as well as decreased cognitive performance.[28,29] In a prospective group of people who had their first mild to moderate stroke, those with hs-cTn levels in the highest quartile were 1.8 times more likely to have cognitive impairment as measured by the Mini-Mental State Examination than

those with levels in the lowest quartile. This association was maintained within the first three years after the index event.[29]

Previous research has shown that cTn levels don't change significantly over time in 85–95% of all stroke patients and in about two thirds of stroke patients who had high levels of cTn when they arrived at the hospital.[12,30] In the Stroke (TRELAS) study, coronary angiography showed acute coronary "Culprit" lesions that pointed to type 1 MI in about 25% of stroke patients whose cTn levels were higher than or equal to 4 times the URL.[31]

In the clinical setting of ischemic stroke, distinct pathophysiological considerations have to be made. Stroke related autonomic dysregulation with systemic and local cardiac release of catecholamines as well as an enhanced stroke-related systemic inflammatory response may facilitate and perpetuate cardiac damage.[1]

Myocardial injury can be acute or chronic. In case of evidence of cardiac ischemia (Clinical symptoms, ischemic ECG alterations, evidence of new wall motion abnormalities) myocardial infarction can be suspected (See Info-Box for definitions). Stroke-associated alterations in the central autonomic network lead to autonomic imbalance with activation of the Sympathetic Nervous System (SNS) and Hypothalamic– Pituitary–Adrenal axis (HPA). In addition, stroke results in a pro-inflammatory response. Thereby, stroke can trigger both ischemic and non-ischemic myocardial injury.

This conceptual framework that brain–heart signals contribute to cTn elevation after stroke is supported by several experimental and clinical studies. Myocardial dysfunction and injury can be induced in murine models of stroke and are associated with cardiac inflammation and fibrosis, especially after selective injury of the murine correlate of the insular cortex.[32,33]

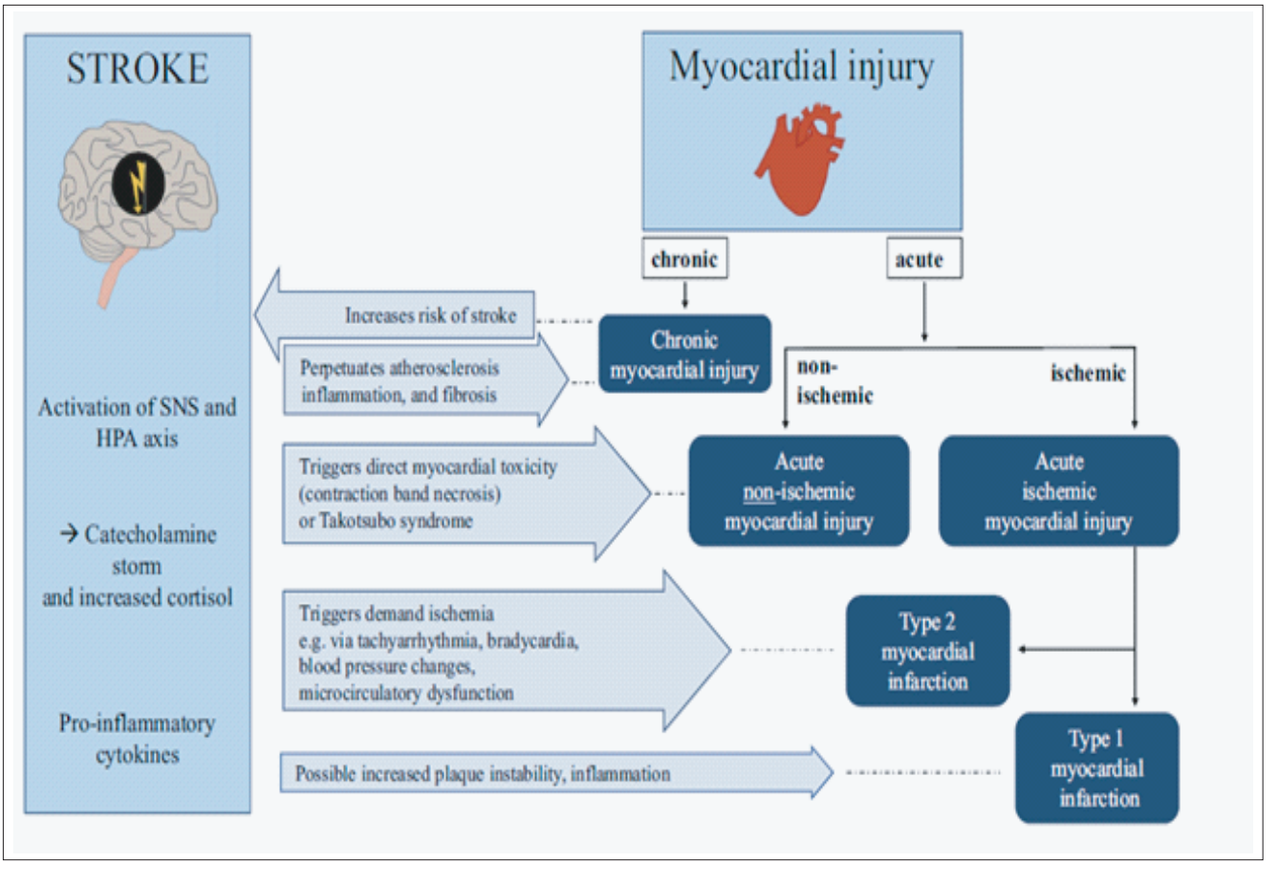

Figure 1 Taxonomy of myocardial injury and possible impact of stroke

Table I Different trials demonstrate the significance of elevated troponin in acute stroke

Study	Study design	n	Frequency/incidence	Prognosis/Significance
Jensen et al.[34,35]	Prospective study August 2003 to October 2004	244	Elevated levels of TnT (>0.03 lg/L) and creatine kinase-MB (_10 lg/L) was observed in 25 patients (10%) and 21 patients (9%) of patients respectively.	7 patients (3%) had elevations of TnT or creatine kinase-MB and electrocardiographic changes suggesting acute myocardial infarctions.
Raza et al.[36]	Retrospective study (2008–2010)	212	17 patients had positive troponins	Patients with positive troponin was found to have a higher risk for nonfatal myocardial infarction 41.2%, major adverse cardiovascular events 41.2%, and death from any cause 41.2% compared to 3.3%, 14.2% and 14.5% respectively in the normal troponin group.
Thorleif Etgen et al.[37]	Prospective study 2004	174	Elevated cTnT or cTnI concentration without evident myocardial lesion is found	The highest proportion of raised parameters was found at day 2 for cTnI in 8 of 103 (7.8%), at day 3 for cTnT in 8 of 174 (4.6%)
Darki et al.[38]	Single center retrospective study	137	Twenty-four of 137 patients (17.5%) had a positive troponin level. Sixteen of 24 (67%) patients with a positive troponin level had a new wall motion abnormality on echocardiogram	On statistical analysis, significant association between troponin and brain natriuretic peptide elevation with positive segmental wall motion abnormality on echocardiogram

LIMITATION

Sources have been expansively assessed to see the comparability of participants or populations, factors other than the intervention or exposure of interest that influence the effect estimate and any missing information.

CONCLUSIONS

The occurrence of high troponin levels after acute stroke is a very common issue and it seems to be caused by a distinct pathogenic mechanism when compared to raised troponin levels resulting from a complete blockage of the coronary artery. Stroke patients who have increased levels of troponin experience a more unfavorable prognosis and result in comparison to those who do not have elevated levels. A sudden increase in cTn levels should be promptly evaluated for diagnosis and can be caused by 'Stroke-Heart Syndrome'. Collaborations between neurologists and cardiologists are necessary to provide guidance for the appropriate care of stroke patients with increased levels of cardiac Troponin (cTn).

AUTHORS CONTRIBUTION

Contribution to Concept, Design and Data - NC, AAK
Accountability - NC, AAK, SRA
Drafting and Critical revision - NC, AAK
Final approval - NC, AAK, SRA.

DISCLOSURE

All the authors declared no conflicts of interest.

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Original Article

Marine City Medical College Journal

Prevalence of Depression and Anxiety among Medical Students and Associated Risk Factors

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ABSTRACT

Background: Depression and anxiety are prevalent mental health issues that significantly impact the well-being and academic performance of medical students worldwide. Despite their profound implications, the mental health of medical students in Bangladesh, particularly in Khulna, has received relatively little attention. This study aims to assess the prevalence of depression and anxiety among medical students in Khulna, Bangladesh, and to identify the associated risk factors contributing to these conditions.

Materials and methods: A cross-sectional study was conducted among 300 MBBS students from three medical colleges in Khulna, Bangladesh, from January to December 2022. A stratified random sampling method ensured proportional representation from each academic year. Data were collected using a structured questionnaire, including sociodemographic information and the Hospital Anxiety and Depression Scale (HADS) to measure the severity of anxiety and depression symptoms. Descriptive statistics summarized the demographic characteristics, while chi-square tests and logistic regression analyses identified significant risk factors.

Results: The study found that 40.0% of the medical students experienced depression, and 46.7% experienced anxiety. Mild, moderate, and severe depression were reported by 20.0%, 15.0%, and 5.0% of the students, respectively. Mild, moderate and severe anxiety were reported by 23.3%, 16.7% and 6.7% of the students, respectively. Male students had a higher prevalence of depression (40.6%) compared to female students (39.3%) with a statistically significant difference ($p = 0.04$). The highest prevalence of anxiety was observed among 1st-year students (53.3%) ($p = 0.01$). Logistic regression analysis revealed that male gender (OR = 1.5, $p = 0.03$) and lower socioeconomic status (OR = 0.8, $p = 0.05$) were significant risk factors for depression, while increasing age was significantly associated with a higher risk of anxiety (OR = 1.2, $p = 0.04$).

Conclusion: The study highlights a high prevalence of depression and anxiety among medical students in Khulna, Bangladesh. Male gender and lower socioeconomic status were significant risk factors for depression while increasing age was a significant risk factor for anxiety. These findings underscore the need for targeted interventions to support the mental health of medical students.

Key words: Anxiety; Depression; Mental Health; Medical students; Risk factors.

INTRODUCTION

Depression and anxiety are prevalent mental health issues that significantly affect the well-being and academic performance of medical students worldwide. The rigorous demands of medical education, coupled with the high expectations and stress associated with clinical training, place medical students at an increased risk for mental health disorders. These mental health issues can manifest as persistent feelings of sadness, hopelessness, and loss of interest in activities (Depression) or excessive worry, nervousness, and fear (Anxiety). The prevalence of depression and anxiety among medical students has been reported to be higher than in the general population, and these conditions can have profound implications for their professional development and patient care abilities.[1-3]

In addition to academic and clinical pressures, medical students often face unique challenges such as long study hours, high-stakes examinations, and the emotional toll of patient interactions. These stressors

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can lead to burnout, a state of emotional, physical and mental exhaustion caused by prolonged stress, which further exacerbates mental health issues. Studies have shown that untreated depression and anxiety in medical students can lead to a decrease in academic performance, impaired judgment and a higher risk of medical errors, which ultimately affects patient care and safety.[4,5]

Medical college employ a thorough selection process to identify intelligent and altruistic individuals with a strong dedication to these goals and then spend four years preparing these individuals to achieve them.[6]

In addition to selecting individuals with the necessary aptitude and dedication to pursue a career in medicine, this process aims to identify those who choose to pursue a medical career based on a significant understanding of the profession's demands, challenges and rewards. However, studies suggest that the current educational process may inadvertently negatively affect students' mental health, with a high frequency of depression, anxiety and stress among medical students. It has also been suggested that burnout, a measure of distress common among residents and practicing physicians, has its origin in medical school.[7]

Several factors-including academic pressure, workload, financial concerns, sleep deprivation, exposure to patients' suffering and deaths, student abuse and a "Hidden curriculum" of cynicism-have been hypothesized to contribute to this decline in students' mental health.[1,2]

In Bangladesh, the mental health of medical students has received relatively little attention despite the growing concerns about their psychological well-being. This study aims to assess the prevalence of depression and anxiety among medical students in Khulna and identify the key risk factors contributing to these conditions. By focusing on a sample of 300 students from three medical colleges in Khulna, this research seeks to provide comprehensive insights into the mental health challenges faced by medical students in this region.

MATERIALS AND METHODS

This cross-sectional study was conducted to assess the prevalence of depression and anxiety among medical students in Khulna, Bangladesh, and to identify the associated risk factors. The study population was 300 MBBS students from three medical colleges in Khulna. Data collection spanned one year, from January to December 2022.

A stratified random sampling method was used to ensure proportional representation from each academic year. Participants were stratified into four groups based on their year of study, and students were randomly selected from each stratum to reach the desired sample size.

Data were collected using a structured questionnaire divided into two main sections. The first section gathered sociodemographic information, including age, gender, academic year, socioeconomic status and living conditions. The second section assessed depression and anxiety levels using the Hospital Anxiety and Depression Scale (HADS) a validated tool commonly used in clinical settings to measure the severity of anxiety and depression symptoms.

Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose and their right to withdraw at any time.

Data analysis was performed using SPSS software (Version 25). Descriptive statistics summarized the demographic characteristics of the participants, while prevalence rates of depression and anxiety were calculated. Chi-square tests were employed to examine the associations between categorical variables, and logistic regression analysis was conducted to identify significant risk factors associated with depression and anxiety. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table I Basic Line Characteristics of the Study Population (n=300)

Variable	Frequency (n)	Percentage (%)
Age (Years)		
18-19	100	33.3
20-21	150	50.0
22-23	50	16.7
Gender		
Male	160	53.3
Female	140	46.7
Academic Year		
1st Year	75	25.0
2nd Year	75	25.0
3rd Year	75	25.0
4th Year	75	25.0

Variable	Frequency (n)	Percentage (%)
Socioeconomic Status		
Low	90	30.0
Middle	150	50.0
High	60	20.0
Depression (HADS)		
Mild	60	20.0
Moderate	45	15.0
Severe	15	5.0
Anxiety (HADS)		
Mild	70	23.3
Moderate	50	16.7
Severe	20	6.7

Table 1 shows the Baseline characteristics of the study population. The majority of the students were between 20 and 21 years old (50.0%) with Male predominance (53.3%). Each academic year was equally represented, with 25.0% of students from each year, majority being middle socioeconomic status (50.0%).Mild depression was reported in 20.0% of the students, while moderate and severe depression were reported by 15.0% and 5.0% of students, respectively. Mild anxiety was prevalent in 23.3% of the students, with moderate and severe anxiety reported by 16.7% and 6.7% of the students, respectively.

Table II Association of Gender, socioeconomic status and Age with Prevalence of Depression (n=300)

Variables	Depression (n)	No Depression (n)	Total (n) (%)	Prevalence	p-value
Gender					
Male	65	95	160	40.6	0.04
Female	55	85	140	39.3	
Socioeconomic Status					
Low	50	40	90	55.6	0.02
Middle	55	95	150	36.7	
High	15	45	60	25.0	
Age (Years)					
18-19	35	65	100	35.0	0.04
20-21	65	85	150	43.3	
22-23	20	30	50	40.0	

Table II shows that the prevalence of depression among male students (40.6%) was higher than female students (39.3%) which was statistically significant (p = 0.04). Students from a low socioeconomic status had the highest prevalence of depression at 55.6%, (p = 0.02).

The highest prevalence of depression was observed among students aged 20-21 years (43.3%) followed by those aged 22-23 years (40.0%) and 18-19 years (35.0%) with the differences being statistically significant (p = 0.04).

Table III Association between Socioeconomic Status, Age and Prevalence of Anxiety (n=300)

Socioeconomic Status	Anxiety (n)	No Anxiety (n)	Total (n)	Prevalence (%)	p-value
Low	45	45	90	50.0	0.03
Middle	70	80	150	46.7	
High	25	35	60	41.7	
Age (Years)	**Anxiety (n)**	**No Anxiety (n)**	**Total (n)**	**Prevalence (%)**	**p-value**
18-19	40	60	100	40.0	0.02
20-21	80	70	150	53.3	
22-23	25	25	50	50.0	

Table III demonstrates the prevalence of anxiety among medical students. Students from a low socioeconomic status had the highest prevalence of anxiety at 50.0%, which was significantly higher compared to those from middle (46.7%) and high (41.7%) socioeconomic statuses (p = 0.03).The highest prevalence of anxiety was observed among students aged 20-21 years (53.3%) followed by those aged 22-23 years (50.0%) and 18-19 years (40.0%), with the differences being statistically significant (p = 0.02).

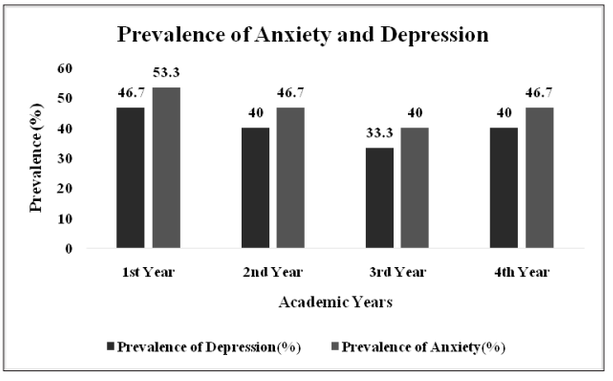

Figure 1 Association between Academic Year and Prevalence of Depression and Anxiety

Figure 1 demonstrates the highest prevalence of depression (46.7%) and Anxiety (53.3%) among 1st-year students which was significantly higher than other years (p = 0.01).

Table IV Logistic Regression Analysis of Risk Factors for Depression

Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Age (Years)	1.1	0.9-1.3	0.15
Gender (Male vs Female)	1.5	1.1-2.0	0.03
Socioeconomic Status	0.8	0.6-1.0	0.05

Table IV presents the results of the logistic regression analysis of risk factors for depression. Male gender was significantly associated with a higher risk of depression (OR = 1.5, p = 0.03). Lower socioeconomic status also showed a borderline significant association with depression (OR = 0.8, p = 0.05).

Table V Logistic Regression Analysis of Risk Factors for Anxiety

Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Age (Years)	1.2	1.0-1.4	0.04
Gender (Male vs Female)	1.3	1.0-1.7	0.06
Academic Year	0.9	0.7-1.1	0.08

Table V presents the logistic regression analysis for risk factors associated with anxiety. Increasing age was significantly associated with a higher risk of anxiety (OR = 1.2, p = 0.04). Male gender and academic year showed a non-significant trend towards higher anxiety (OR = 1.3, p = 0.06 and OR = 0.9, p = 0.08, respectively)

DISCUSSION

Our study found that 40.0% of medical students experienced depression, with 20.0% reporting mild depression, 15.0% moderate depression, and 5.0% severe depression. Anxiety was even more prevalent, with 46.7% of students affected, including 23.3% with mild anxiety, 16.7% with moderate anxiety, and 6.7% with severe anxiety. These rates are higher than those reported in some previous studies conducted in other regions. For instance, a meta-analysis by Rotenstein et al. found that the global prevalence of depression among medical students was 27.2%, while the prevalence of anxiety was 33.8%. The higher rates in our study may be attributed to specific local stressors, such as the intense academic and clinical demands faced by students in Bangladesh.[1]

The association between gender and the prevalence of depression and anxiety revealed significant findings. Male students had a higher prevalence of depression (40.6%) compared to female students (39.3%), with the difference being statistically significant (p = 0.04). Logistic regression analysis further confirmed that being male was significantly associated with an increased risk of depression (OR = 1.5, p = 0.03). For anxiety, while males also showed a higher prevalence (though not statistically significant), it is worth noting that the general literature often reports higher anxiety levels among females. This discrepancy might be influenced by cultural factors and societal expectations in Bangladesh, where male students may face unique pressures.

Socioeconomic status was a significant factor associated with both depression and anxiety. Students from a low socioeconomic background had the highest prevalence of depression (55.6%) and anxiety (50.0%), compared to those from the middle (depression: 36.7%, anxiety: 46.7%) and high (depression: 25.0%, anxiety: 41.7%) socioeconomic statuses. These findings are consistent with previous research indicating that lower socioeconomic status is linked to higher levels of mental health issues due to increased financial stress, limited access to resources, and other socioeconomic challenges.[2,3]

Age was another important determinant, with the highest prevalence of depression and anxiety observed among students aged 20-21 years (Depression: 43.3%, anxiety: 53.3%). This age group, typically comprising students in their second and third years, is often the most challenging period in medical education due to the transition from basic sciences to clinical training. Similarly, the prevalence of mental health issues varied across academic years. First-year students reported the highest prevalence of depression (46.7%) and anxiety (53.3%), which may reflect the initial adjustment to the demanding environment of medical school. These findings are in line with other studies that have highlighted the particular vulnerability of first-year and mid-program students to mental health problems.[4,5]

Logistic regression analysis identified several significant risk factors for depression and anxiety. Male gender and lower socioeconomic status were significant predictors of depression while increasing age was associated with a higher risk of anxiety. These findings emphasize the multifaceted nature of mental health issues among medical students and highlight the need for a comprehensive approach to address these problems.

LIMITATIONS

This study has several limitations. The cross-sectional design limits the ability to infer causality between risk factors and mental health outcomes. Self-reported data may also be subject to response bias. Future longitudinal studies are needed to better understand the dynamics of mental health among medical students over time and to evaluate the effectiveness of interventions.

CONCLUSION

In conclusion, this study highlights the significant burden of depression and anxiety among medical students in Khulna, Bangladesh, and identifies key risk factors contributing to these conditions. The findings underscore the urgent need for targeted mental health interventions to support the well-being of medical students and ensure their successful professional development. By addressing the identified risk factors and implementing comprehensive mental health support systems, educational institutions can play a crucial role in enhancing the mental health and overall quality of life for medical students.

RECOMMENDATIONS

The high prevalence of depression and anxiety among medical students in Khulna necessitates immediate attention from educational institutions and policymakers. Strategies to support students' mental health should include regular mental health screenings, counseling services, stress management programs and peer support groups. Additionally, efforts should be made to address socioeconomic disparities by providing financial aid and other resources to students from lower socioeconomic backgrounds.

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AUTHORS CONTRIBUTIONS

Contribution to Concept, Design and Data - KP, MNS
Accountability - KP, MNS, MP, UTJ
Drafting and Critical revision - KP, MNS
Final Approval - KP, MNS, MP, UTJ.

DISCLOSURE

All the authors declared no conflicts of interest.

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Original Article

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Mental Health Status and Stress Factors Among Junior Doctors in Public Hospitals in Bangladesh: A Cross-Sectional Analysis

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ABSTRACT

Background: Junior doctors are often subjected to high levels of workplace stress, contributing to poor mental health outcomes. In resource-limited settings like Bangladesh, the compounded challenges of excessive work hours, night shifts, and systemic inadequacies further exacerbate these issues. This study aimed to assess the mental health status of junior doctors and identify key stress factors influencing their psychological well-being in public hospitals in Khulna, Bangladesh.

Materials and methods: This cross-sectional study was conducted from January to June 2023, involving 120 intern doctors and 36 medical officers from three private medical colleges in Khulna. Data were collected using a structured questionnaire incorporating the General Health Questionnaire (GHQ-12) to assess mental health. Statistical analyses, including chi-square tests, independent t-tests and logistic regression, were performed to identify associations and predictors of psychological distress.

Results: Half of the participants (50.0%) exhibited normal mental health, while 30.1% had mild psychological distress and 19.9% experienced severe distress. Key stressors included high patient load (83.3%), poor work-life balance (70.5%), lack of supervision (73.7%) and limited resources (62.8%). Longer work hours (≥60 hours/week) were significantly associated with higher GHQ-12 scores (mean: 10.4 ± 3.1, p=0.002). Night shifts ≥5 per month were a strong predictor of severe distress (OR=4.8, p<0.001) alongside poor work-life balance (OR=2.9, p=0.008). Coping mechanisms such as peer support (65.4%) were commonly adopted.

Conclusion: The study highlights a significant prevalence of psychological distress among junior doctors, emphasizing the impact of prolonged work hours, frequent night shifts and systemic challenges. Addressing these issues through policy reforms and mental health support programs is crucial to improving junior doctors' well-being and healthcare delivery.

Key words: Junior doctors; Mental health; Stress factors; Workplace stress.

INTRODUCTION

Mental health is a positive state characterized by responsibility, self-awareness, self-direction and the ability to cope with daily challenges. Individuals with good mental health are generally worry-free, function well in society and find life satisfaction.[1] They can solve problems, handle crises and maintain a sense of well-being by enjoying life, setting realistic goals, and adapting to situations as needed without permanently losing their independence.[2]

Physicians working in healthcare settings, particularly in medical college hospitals, face significant stress due to heavy workloads, professional responsibilities and the demands of maintaining strong patient-doctor relationships.[3] Often, they operate with limited administrative support, further intensifying their challenges. Such stressful environments inevitably affect their physical and mental health.[4] Unfortunately, mental health issues are frequently underestimated and often overshadowed by stigma. Unlike physical illnesses, where patients primarily suffer from the disease itself, individuals with mental health conditions face an added burden of stigma. This stigma manifests

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in two forms: public stigma, which refers to society's negative reactions toward individuals with mental illness and self-stigma, where individuals internalize these prejudices.[5] The impact of stigma is profound. People with mental illness must contend not only with their symptoms but also with societal misconceptions and stereotypes. This stigma extends even to well-trained professionals, including those in mental health disciplines, who may unknowingly harbor biased attitudes. Physicians, despite being healthcare providers, are often reluctant to address their mental health issues, such as depression-a leading cause of morbidity and mortality that disproportionately affects them.[6] Mental health issues among healthcare professionals, especially junior doctors, are a growing concern worldwide.[7] The demanding nature of the medical profession, coupled with long working hours, inadequate resources and high patient load, places junior doctors at significant risk of psychological distress. This is particularly alarming given the critical role they play in the healthcare system, often serving as the first point of contact for patients.[8] In Bangladesh, the challenges faced by junior doctors are further amplified by systemic inadequacies, including resource limitations, high patient-to-doctor ratios and the lack of mental health support services in most healthcare institutions.[9,10] These factors not only compromise the mental well-being of healthcare workers but also affect the quality of care they provide. Studies in low- and middle-income countries have consistently highlighted a high prevalence of stress, anxiety and burnout among junior doctors. For instance, prolonged work hours and frequent night shifts have been identified as significant contributors to psychological distress.[9,11] Despite the critical nature of this issue, there is a paucity of research focusing on the mental health of junior doctors in Bangladesh. Understanding the extent of psychological distress and its associated stress factors is essential for developing targeted interventions and fostering a supportive work environment.[12] This study aims to assess the mental health status of junior doctors in public hospitals in Khulna, Bangladesh and identify the key work-related stressors influencing their well-being. By addressing these gaps in knowledge, the findings can inform policy recommendations and institutional reforms to improve the mental health outcomes of junior doctors, ultimately enhancing the quality of healthcare delivery.

MATERIALS AND METHODS

This was a cross-sectional study conducted among junior doctors working in three private medical colleges in Khulna, Bangladesh. The study population consisted of 120 intern doctors and 36 medical officers, making a total sample size of 156 participants. Data collection took place over six months, from January to June 2023. The data were collected using a structured questionnaire designed to assess mental health status and stress factors. The questionnaire included sections on sociodemographic information, work-related stressors, and mental health indicators. Tools such as the General Health Questionnaire (GHQ-12) and a validated stress assessment scale were employed to ensure accurate measurement of psychological well-being and stress levels. Participants were recruited through purposive sampling and written informed consent was obtained from each respondent before participation. Data collection was conducted through face-to-face interviews and self-administered questionnaires, depending on participant availability. Strict confidentiality was maintained throughout the study to protect participants' identities and personal information. Ethical clearance was obtained from the Institutional Review Board (IRB) of the respective medical colleges before initiating the study.

RESULTS

Table I Baseline Characteristics of Study Participants (n=156)

Variables	Categories	Frequency (n)	Percentage (%)
Age (Years)	24–26	88	56.4
	27–30	68	43.6
Gender	Male	78	50.0
	Female	78	50.0
Marital Status	Single	116	74.4
	Married	40	25.6
Monthly Income (BDT)	<30,000	92	59.0
	≥30,000	64	41.0
Average Weekly Work Hours	<60 hours	54	34.6
	≥60 hours	102	65.4
Night Shifts per Month	<5	62	39.7
	≥5	94	60.3
Frequency of Breaks During Shift	Regular Breaks	47	30.1
	Irregular/No Breaks	109	69.9
GHQ-12 Score Categories	Normal	78	50.0
	Mild Psychological Distress	47	30.1
	Severe Psychological Distress	31	19.9

Table I shows the distribution of sociodemographic characteristics. The majority of participants (56.4%) were aged between 24–26 years, with an equal distribution of male and female participants. Most (74.4%) were single and 59% had a monthly income of less than 30,000 BDT. 65% of participants worked over 60 hours weekly and 60.3% had five or more-night shifts per month. Half of the participants had normal GHQ-12 scores, while 19.9% experienced severe psychological distress.

Table II Common Stress Factors among Participants

Stress Factors	Yes (n, %)	No (n, %)
High Patient Load	130 (83.3)	26 (16.7)
Lack of Proper Supervision	115 (73.7)	41 (26.3)
Job Insecurity	72 (46.2)	84 (53.8)
Limited Access to Resources	98 (62.8)	58 (37.2)
Poor Work-Life Balance	110 (70.5)	46 (29.5)

Table II highlights the prevalence of stress factors. High patient load (83.3%) and poor work-life balance (70.5%) were the most frequently reported stressors.

Table III Coping Mechanisms Adopted by Participants

Coping Mechanism	Frequency (n)	Percentage (%)
Talking with Colleagues/Friends	102	65.4
Exercise or Physical Activity	39	25.0
Meditation/Relaxation	15	9.6

Table III summarizes the coping mechanisms used by participants. Talking with colleagues or friends was the most common method (65.4%).

Table IV Association between Work Hours and Mental Health

Work Hours	GHQ-12 Score (Mean ± SD)	t-value	p-value
<60 hours	8.2 ± 2.3		
60 hours	10.4 ± 3.1	3.21	0.002**

Table IV presents the association between weekly work hours and mental health. Those working ≥60 hours had significantly higher GHQ-12 scores (p=0.002).

Table V Association between Night Shifts and Psychological Distress

Night Shifts/Month	Psychological Distress (n, %)	χ^2-value	p-value
<5	18 (29.0)		
≥5	60 (63.8)	18.92	<0.001**

Table V shows that participants with ≥5 night shifts per month experienced significantly more psychological distress (p<0.001).

Table VI Logistic Regression Analysis for Predictors of Severe Psychological Distress

Variables	Odds Ratio (OR)	95% CI	p-value
Weekly Work Hours ≥60	3.5	1.6–7.8	0.002**
Night Shifts ≥5	4.8	2.1–10.9	<0.001**
Poor Work-Life Balance	2.9	1.3–6.5	0.008**

Table VI outlines the logistic regression results. Night shifts ≥5 (OR=4.8, p<0.001) and weekly work hours ≥60 (OR=3.5, p=0.002) were strong predictors of severe psychological distress.

DISCUSSION

The findings revealed critical insights into the psychological challenges faced by this population.Half of the participants (50.0%) exhibited normal mental health according to the GHQ-12, while 30.1% showed mild psychological distress, and 19.9% experienced severe psychological distress. These findings align with studies conducted in other countries, such as Nigeria, where 42.5% of junior doctors reported psychological distress due to workplace stress.[1] Similarly, a study in India found that 25% of junior doctors faced severe psychological stress.[2]

Work hours and night shifts significantly influenced the mental health of participants. Over two-thirds (65.4%) of participants worked ≥60 hours per week and 60.3% had five or more-night shifts per month. A significant association was found between longer work hours and higher GHQ-12 scores (p=0.002) with those working ≥60 hours reporting a mean score of 10.4 ± 3.1 compared to 8.2 ± 2.3 for those working fewer hours. This is consistent with a systematic review that reported prolonged work hours as a major contributor to burnout and psychological distress among healthcare workers.[3]

Additionally, participants with five or more-night shifts per month were significantly more likely to experience psychological distress (p<0.001). This finding aligns with a study conducted in Pakistan, which found that frequent night shifts increased stress and disrupted work-life balance among junior doctors.[4]

High patient load was the most frequently reported stressor, affecting 83.3% of participants. Poor work-life

balance (70.5%), lack of supervision (73.7%) and limited access to resources (62.8%) were also prominent stress factors. These stressors reflect systemic challenges in healthcare systems in resource-limited settings like Bangladesh. Similar findings were reported in a Malaysian study where 75% of junior doctors cited high patient load as a primary stressor.[5] Talking with colleagues or friends was the most commonly adopted coping mechanism (65.4%), followed by exercise (25.0%) and meditation (9.6%). These strategies reflect the importance of peer support and social networks in mitigating stress. Studies from other countries have also highlighted the efficacy of social support in reducing workplace stress among healthcare professionals.[6]

Logistic regression analysis identified key predictors of severe psychological distress. Night shifts ≥5 (OR=4.8, p<0.001) and weekly work hours ≥60 (OR=3.5, p=0.002) emerged as the strongest predictors. Poor work-life balance (OR=2.9, p=0.008) also significantly increased the risk of distress. These findings echo a study conducted in the UK, which found that excessive work hours and poor work-life integration were significant contributors to burnout and depression among junior doctors.[7]

The high prevalence of psychological distress among junior doctors underscores the need for systemic interventions. Recommendations include optimizing work schedules, limiting night shifts and providing mental health support services. Incorporating wellness programs and promoting stress management strategies can also improve the overall well-being of junior doctors.

LIMITATIONS

This study is not without limitations. The cross-sectional design prevents causal inferences and the sample was limited to three medical colleges in Khulna, which may limit generalizability.

CONCLUSION

This study highlights the significant burden of mental health challenges among junior doctors in Bangladesh. Addressing work-related stressors and fostering a supportive work environment is crucial to improving their mental well-being and ultimately, the quality of healthcare delivery.

RECOMMENDATION

Future research should include larger, more diverse populations and longitudinal designs to better understand the mental health dynamics among junior doctors.

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AUTHORS CONTRIBUTIONS

Contribution to Concept, Design and Data - SM, MNA
Accountability - SM, MNA, KHA, IJR
Drafting and Critical revision - SM, MNA
Final approval - SM, KHA, IJR, MNA.

DISCLOSURE

All the authors declared no conflicts of interest.

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Original Article

Marine City Medical College Journal

Diagnostic Value of Color Doppler Sonography and Its Correlation with Perinatal Outcome in Severe Pre-Eclampsia Patients

Ayesha Siddiqua[1*] Silvia Paroi[2] Gayetri Rani[3] Anjuman Ara[4] Nafisa Jafreen[5]

ABSTRACT

Background: One of the most frequent pregnancy problems that raises mother and fetal mortality and morbidity is preeclampsia. In patients with preeclampsia, Doppler ultrasonography can be a helpful tool to evaluate fetal outcome since preeclampsia is characterized by aberrant placenta formation that results in inadequate uteroplacental blood flow. To identify fetuses at risk for perinatal morbidity and mortality. Assessment of fetal wellbeing by color Doppler ultrasonography in severe pre-eclamptic patient because pre-eclampsia in pregnancy is the leading cause of maternal and fetal morbidity and mortality.

Materials and methods: This prospective study was carried out in 50 randomly selected patients from 16-35 years of ages whose uterine artery, middle cerebral artery and umbilical artery Doppler sonography was done between 29-40 weeks of gestation.This study was conducted in the Department of Obstetrics and Gynecology, Dhaka Medical College Hospital (DMCH) Dhaka, from 22nd December 2022 to 21st June 2023 six months.

Results: The majority of these patients had abnormal blood flow, with 70%, 68%, and 62% of them having adverse perinatal outcomes and 15 (30%) of those patients had normal outcomes. The relationship was statistically examined and the results showed a favorable association between the perinatal outcome and the color Doppler findings of the uterine, umbilical, and middle cerebral artery blood flow indices.

Conclusion: Our study's findings suggest that pregnant individuals with pre-eclampsia who have aberrant blood vessel Doppler indices will have poor perinatal outcomes. As a result, Doppler ultrasonography can be used to monitor and treat the patients appropriately.

Key words: Color doppler; Pre-eclampsia; Perinatal outcome.

INTRODUCTION

Prenatal testing's primary objective is to identify fetuses who are at risk for perinatal morbidity and mortality. Because they cannot identify fetal distress in its early stages, the classic methods of fetal surveillance, including as the nonstress test, fetal cardiac monitoring, and fetal biophysical profile, are no longer adequate. Poor fetoplacental perfusion has long been known to be linked to pre-eclampsia and, later, Intrauterine Growth Retardation (IUGR). Pregnancy-related problems contribute significantly to perinatal morbidity and mortality.[1]It is believed that the failure of trophoblastic invasion of spiral arteries in the early second trimester is the cause of the high impedance in the fetoplacental circulation and the decrease in flow volume observed in pre-eclamptic pregnancies. Doppler ultrasound has been used to quantify impedance indices as an early screening tool for high-risk pregnancies because it can detect fetal-placental vascular resistance. The most prevalent cause of growth retardation, placental insufficiency, is brought on by pre-eclampsia. Growth retardation is a serious obstetric issue because of its strong correlation with perinatal morbidity and mortality. When the weight of all fetuses at that

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gestational age grows to the 10th or lower percentile, it is known as intrauterine growth retardation.[2] The fetus's inability to develop to its full potential is a hallmark of IUGR. The second most common cause of perinatal mortality is intrauterine growth retardation.[3] Severe morbidity, such as elevated rates of meconium aspiration, hypoglycemia, respiratory distress syndrome, intrapartum developmental delay and stillbirth, is linked to IUGR. Increased perinatal mortality and morbidity as well as impaired neurodevelopment are linked to intrauterine growth retardation.[4]

One of the primary goals of prenatal treatment is to accurately identify the impaired 1UGR fetus so that prompt intervention can take place. Of all the noninvasive tests for prenatal health, the color Doppler is the most exacting. Fetal hemodynamics can be evaluated noninvasively with Doppler ultrasonography. IUGR-affected newborns are more likely to develop diabetes, heart disease and hypertension in the future. Doppler ultrasound of the uterine artery can be used to evaluate uteroplacental circulation. The most common cause of intrauterine growth retardation, which is a significant obstetric issue due to its strong correlation with perinatal mortality and morbidity, is placental insufficiency, whether it is primary or secondary to maternal conditions like hypertension, poor nutrition etc. Early detection of placental insufficiency is crucial for minimizing its risks.[5] The umbilical artery, fetal middle cerebral artery and maternal uterine artery are used to get Doppler data. The Pulsatility Index (PI) Resistance Index (RI) and Systolic/Diastolic ratio (S/D) are calculated. There is a correlation between the indices and the fetal outcome. The usual reference value states that Doppler indices are abnormal if the S/D, PI, and RI of each artery are greater than 2SD for the gestational age.[6] All three indicators gradually decrease with increasing gestational age in a typical pregnancy. However, there is elevated spiral artery resistance in pre-eclampsia. This causes the uterine artery's blood flow impedance to rise. This is demonstrated by increased uterine artery S/D, PI, and RI readings. To anticipate PIH, the aberrant waveforms are distinguished by a persisting diastolic notch, a lower diastole and a higher systole.[7,8] Blood flow from unnecessary organs is redistributed to the brain and myocardium in IUGR in response to persistent hypoxia. The brain-sparing effect is the name given to this adaptation. To predict the perinatal outcome in high-risk pregnancies, several observational studies have investigated cerebral redistribution, abnormal MCA Doppler indices, and/or abnormal UA/MCA Doppler ratios.[9,10] In hypertensive pregnancies, Doppler velocimetry has been shown to accurately predict any unfavorable fetal outcome and help determine the best time to deliver. It assists us in planning treatments, acting promptly, and advising patients about future pregnancies.

MATERIALS AND METHODS

This prospective study was carried out in 50 randomly selected patients from 16-35 years of ages whose uterine artery, middle cerebral artery & umbilical artery Doppler sonography was done between 29-40 weeks of gestation. Before that, informed consent was obtained from every patient. Then all the patients were evaluated by detailed history and clinical examination. This study has been conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital (DMCH) Dhaka, from 22nd December 2022 to 21st June 2023 six months. A total of 50 subjects were included in this study. Before the commencement of this study, the respective authority approved the research protocol. Proper permission was taken from the concerned department for this study. All the patients included in this study were informed about the nature of risk and benefits of the study. These were explained to the included patients in an easily understandable local language. Proper written consent was taken from the patients for the study. They were assured that all the information and records would be kept confidential. Clinically diagnosed as a case of severe pre-eclampsia in 3rd trimester (29 to 40 wks) DMCH referred to the department of Radiology and Imaging of Dhaka Medical College were included by convenient sampling method in this study. Patients who are very sick with medical disorders other than Pre eclampsia, multiple pregnancies, patients refusing the procedure were excluded for this study.

Doppler velocimetry indices include

- >Pulsatility Index (PI)
- >resistance Index (RI)
- >Sytolic/Dystolic velocity ratio (S/D ratio)

In this study we are going to use

- Uterine artery Doppler to study uteroplacental circulation
- Umbilical artery Doppler to study fetoplacental circulation

- Middle cerebral artery Doppler to study fetal circulation

Doppler indices were considered abnormal when S/D ratio, Pl and Rl of each artery > 2SD for the gestational age according to the standard reference values.

Appropriate data were collected using a preformed data sheet.

All the findings were analyzed by appropriate standard statistical method.

To determine the utility of color Doppler sonography of the fetoplacental circulation in predicting the outcome in early pregnancies. To examine the diagnostic value or the umbilical artery velocity waveforms for the early detection of pregnancy induced hypertension and intrauterine growth retardation. To determine the accuracy, sensitivity, specificity, positive predictive value and negative predictive value of the study.

RESULTS

Table I Distribution of respondents according to normal and abnormal Blood Flow Indices (S/D, PI, RI) of uterine artery, umbilical artery, middle cerebral artery in doppler sonography (n=50)

Blood flow indices (S/D ratio, PI, RI)	Normal flow	Abnormal flow	Total
Uterine artery	15(30%)	35(70%)	50(100%)
Umbilical artery	16(32%)	34(68%)	50(100%)
Middle cerebral artery	19(38%)	31(62%)	50(100%)

50 patients admitted in DMCH with severe pre-eclampsia were evaluated by color doppler to see the blood flow indices(S/D PI, Rl) of uterine artery, umbilical artery, and middle cerebral artery where most of them found abnormal blood flow accordingly 70%, 68%, 62% in my study (Table-I).

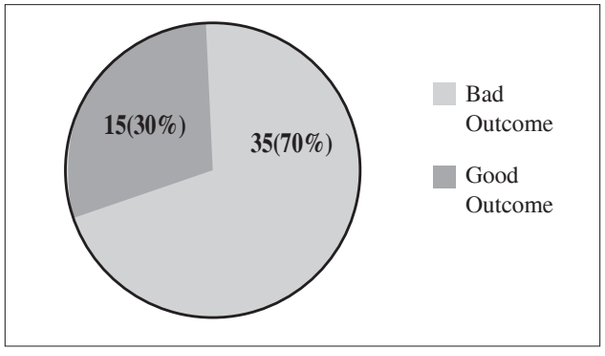

Figure 1 Distribution of Adverse Perinatal Outcome (n=50)

Bad outcome=Adverse Perinatal Outcome present.

Good outcome=Adverse Perinatal Outcome absent.

Out of 50 patients 35 (70%) baby had adverse perinatal outcome and 15 (30%) had normal outcome (Figure-1).

Table II Correlation of uterine artery blood flow with adverse perinatal outcome (n=50)

Uterine Artery Blood Flow Indices	Adverse Perinatal outcome Present	Absent	Total	Inferences
Abnormal 35	35 (True Positive)	0 (False positive)	35	$\chi^2 = 131.5$ df =2, p< 0.05
Normal 15	0 (False Negative)	15 (True Negative)	15	
Total	35	15	50	

Color Doppler evaluation of uterine artery done on 50 patients admitted in DMCH. Perinatal follow up of those patients and reports were collected and validity of the tests were confirmed by calculating sensitivity, specificity, positive and negative predictive value and accuracy by using standard formula (Table II). This relation statistically tested which revealed that there was positive correlation between abnormal color doppler findings of uterine artery blood flow indices with adverse perinatal outcome.

Table III Correlation of umbilical artery blood flow with adverse perinatal outcome (n=50)

Umbilical Artery Blood Flow Indices	Adverse Perinatal outcome Present	Absent	Total	Inferences
Abnormal 34	34 (True Positive)	0 (False positive)	34	$\chi^2 = 45.43$ df =2, p< 0.05
Normal 16	1 (False Negative)	15 (True Negative)	16	
Total	35	15	50	

Color Doppler evaluation of Umbilical Artery done on 50 patients admitted in DMCH. Perinatal follow up of those patients and reports were collected and validity of the tests were confirmed by calculating sensitivity, specificity, positive and negative predictive value and accuracy by using standard formula The results were shown in (Table III). This relation statistically tested which revealed that there was positive correlation between abnormal color doppler findings of umbilical artery blood flow indices with adverse perinatal outcome.

Table IV Correlation of middle cerebral artery blood flow with adverse perinatal outcome (n=50)

Middle cerebral Artery Blood Flow Indices	Adverse Perinatal outcome		Total	Inferences
	Present	Absent		
Abnormal 31	31 (True Positive)	0 (False positive)	34 31	$\chi^2 = 34.05$ df =2, p< 0.05
Normal 19	4 (False Negative)	15 (True Negative)	19	
Total	35	15	50	

Color Doppler evaluation of Middle Cerebral Artery done on 50 patients admitted in DMCH. Perinatal follow up of those patients and reports were collected and validity of the tests were confirmed by calculating sensitivity, specificity, positive and negative predictive value and accuracy by using standard formula (Table-IV). This relation statistically tested which revealed that there was positive correlation between abnormal color doppler findings of middle cerebral artery blood flow indices with adverse perinatal outcome.

DISCUSSION

In a healthy pregnancy, trophoblastic invasion converts high resistance spiral arteries into low impedance uteroplacental circulation, resulting in pre-eclampsia, a multisystem illness. In IUGR and pre-eclampsia, this uteroplacental circulation is still unfinished. The purpose of this study is to link the fetal outcome in patients with pre-eclampsia with the doppler findings.

Obstetricians have been dealing with preeclampsia and eclampsia, two potentially fatal pregnancy complications, for over a century. In the low-risk group, the Systolic/Diastolic ratio (SD), Resistive Index (RI) and Pulsatility Index (PI) all reduced with gestation length, while in the high-risk group, these values rose in the uterine and umbilical arteries.[11]

According to a different study, pre-eclampsia causes a significant amount of maternal and neonatal morbidity and mortality and complicates 3–10% of pregnancies.[12] A placental function test called the UA Doppler offers crucial diagnostic and prognostic data in cases of preterm IUGR. Regardless of the UA waveform, DV (Doppler velocimetry) successfully detects preterm IUGR pregnancies that are at high risk for a negative outcome, including stillbirth, at least one week before to delivery.[13]

Rahul Khatri conducted a study in 2021 and discovered that approximately 11 people had faulty umbilical artery doppler. The 11 infants were all admitted to the NICU for longer than 48 hours. Jaundice, convulsions, IUGR and the need for ventilatory assistance were the primary problems observed in this group of babies. Despite the small study group, the results show that umbilical velocimetry has a decent specificity when it comes to neonatal morbidity. Regardless of the flow velocity waveforms in the umbilical artery, all patients with diastolic notching experienced adverse pregnancy outcomes. Furthermore, the incidence of fetal growth limitation rose when this pattern in the uterine artery was linked to an increased flow impedance in the umbilical artery. Additionally, they discovered that eight individuals with severe IUGR had elevated middle cerebral artery pulsatility indices. Among these six patients, the umbilical artery flow velocity waveforms also showed a concurrently elevated resistance pattern. Abnormal cerebral artery velocimetry suggests that hypoxia has occurred, putting the fetus at risk for chronic hypoxia of placental origin. Indeed, he stated that 60% of fetuses were SGA and had a stormy perinatal fate when both umbilical and brain velocities were aberrant.[14]

Hypoxemia at steady state is linked to elevated umbilical artery doppler indices when positive end diastolic flow is present. Significant worsening of hypoxemia and acidemia is linked to absent end diastolic flow in the umbilical artery. Yoon and Lee's 1994 study, which was published in the American Journal of Obstetrics and Gynecology, showed that women with anomalous umbilical artery waveforms had a higher risk of poor perinatal outcomes than those with normal waveforms.[15] In fact, patients with an aberrant waveform had significantly greater odds of preterm delivery, fetal distress caesarean sections, intensive care unit admissions, major newborn morbidity, and perinatal deaths.

An aberrant umbilical artery waveform was found in 65% of preeclampsia patients, according to Ducey et al. They proposed that patients with aberrant Doppler velocirnetry have worse outcomes and that the degree of placental ischemia in preeclamptic patients is correlated with the severity of the condition.[16] As a result, it may be concluded that in high-risk pregnant women with preeclampsia and suspected fetal growth restriction, umbilical artery doppler should be made

available as the primary and best method of evaluating the fetoplacental circulation. In 2002, Vergani P et al. also discovered that a four-fold increase in the likelihood of a poor infant outcome is linked to aberrant doppler waveforms at the uterine arteries.[17]

In our research, 50 patients with severe pre-eclampsia who were admitted to DMCH were assessed using color doppler to measure the blood flow indices (S/D PI, Rl) of the middle cerebral artery, umbilical artery, and uterine artery. The majority of these patients had abnormal blood flow, with 70%, 68% and 62% of them having adverse perinatal outcomes and 15 (30%) of those patients had normal outcomes.

In our investigation, we performed a color Doppler evaluation of the middle cerebral artery, umbilical artery, and uterine artery. These patients underwent perinatal follow-up, reports were gathered and the accuracy, sensitivity, specificity and positive and negative predictive value of the tests were calculated using a conventional formula to ensure their validity. This relationship was statistically examined and the results showed a favorable association between the perinatal outcome and the color doppler findings of the uterine, umbilical and middle cerebral artery blood flow indices.

LIMITATION

Single centre study with small sample size.

CONCLUSION

From the result of my study indicate that abnormal Doppler indices of the blood vessels in pre-eclampsia pregnant patients will result in adverse perinatal outcomes. Therefore, continuous monitoring and evaluation of color doppler ultrasonography findings of blood flow indices required to better management of those high risk patients and minimize the perinatal adverse outcome.

RECOMMENDATION

Study on different tertiary level hospital involving a large population size will be more representative of entire country. Further prospective multicentre study in large scale is necessary.

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AUTHORS CONTRIBUTION

Contribution to Concept, Design and Data - AS, SP
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DISCLOSURE

All the authors declared no conflicts of interest.

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Case Report

Marine City Medical College Journal

A 16-month Case of Glycogen Storage Disorder (Possibly von Gierke Disease) Diagnostic Challenges and Treatment Outcome

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ABSTRACT

Background: Glycogen Storage Disorder are inherited metabolic disorders where defects in enzymes or transport proteins impair glycogen synthesis or breakdown, leading to abnormal glycogen accumulation in the liver, muscles or other tissues. The purpose of the study to disseminated our knowledge and experience of clinical characteristic, presentation and treatment about this issue for the readers as future references.

Case Presentation: This is a case of a 1-year and 4-month-old male child Master 'S' who presented on 23.6.2024 with abdominal distension and systemic signs. He had abnormal liver function tests and ultrasound findings. FibroScan revealed advanced fibrosis and moderate steatosis. Elevated plasma ammonia raised concern for hepatic encephalopathy. The child was managed with hormonal and nutritional support.

Conclusion: This case highlights the importance of non-invasive imaging and plasma ammonia monitoring in paediatric liver disease. Early diagnosis and multidisciplinary management are crucial for preventing complications and supporting growth and development.

Key words: Glycogen Storage Disorder; FibroScan; Plasma ammonia.

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INTRODUCTION

Glycogen Storage Diseases (GSDs) are a broad group of inherited metabolic disorders that occur because of enzyme deficiencies involved in glycogen synthesis or breakdown. Glycogen, a key polysaccharide mainly stored in the liver and muscles, functions as a rapid reserve of glucose when the body requires energy. The proper release of this stored glucose is essential for maintaining blood sugar levels and supplying energy during fasting or physical exertion.[1]

The pathway of glycogen formation, called glycogenesis, involves multiple steps. Glucose is first converted into glucose-6-phosphate, then into glucose-1-phosphate and later into Uridine Diphosphate (UDP)-glucose. This activated glucose is utilized by glycogen synthase to extend the glycogen chain. In addition, branching enzymes restructure the growing molecule, increasing its solubility and enhancing its capacity for storage.[2,3]

In patients with GSDs, genetic mutations cause enzyme deficiencies that interfere with these metabolic pathways.[4,5] As a result, glycogen may accumulate in an abnormal form or stored glycogen cannot be properly released. This disruption can produce a spectrum of clinical features, including hypoglycemia, hepatomegaly (Enlarged liver) muscle weakness and impaired growth. Since each GSD type is linked to a different enzyme defect, every condition has its own clinical presentation, requiring a specific diagnostic and therapeutic approach.[6,7]

To date, more than 20 types of GSDs have been described, each associated with defects in enzymes of glycogen metabolism and each presenting with distinct symptoms. While many types primarily affect the liver, others involve muscles, the heart and the nervous system. For instance, GSD type IV (Andersen disease) can cause progressive liver cirrhosis and if untreated, lead to life-threatening complications. GSD types II

(Pompe disease) and III (Cori disease) are notable for their muscle-related manifestations, such as myopathy and cardiomyopathy, due to glycogen accumulation in muscle fibers. Moreover, in infantile Pompe disease (Type II) glycogen buildup can also impact the nervous system, leading to neurological symptoms. Therefore, GSDs represent a clinically diverse group of metabolic disorders with multi-organ involvement, each requiring carefully tailored strategies for diagnosis and management.[1-4] This study aims to share our knowledge and experience on the clinical characteristics, presentation and treatment of this issue, so that it may serve as a useful reference for readers in the future.

CASE PRESENTATION

Shaifan, a 1-year and 4-month-old male child, immunized and born to non-consanguineous parents, presented to Marine City Medical College & Hospital on 23rd June 2024 with progressive abdominal distension, irritability since 3 months of age. The child belonged to a low socio-economic background and had no prior history of liver disease in family. On examination, he had doll like face, he was pale, irritable and had visible abdominal distension. Hepatosplenomegaly was noted, span was 10.5 cm and both kidneys were ballotable. He had history of faulty feeding since 8 months of age. Patient's Z score was -2.5 (According to weight for age). He also had a history of early morning sweating with convulsion for 1 episode with history of no fever. Initial suspicion included mucopolysaccharide syndrome.

Investigations revealed

- CBC: Mild anemia, no leukocytosis
- SGPT: 772 U/L (Normal range 10-40 U/L)
- S. Cholesterol: 257 mg/dL (Normal range 130-200 mg/dL)
- TSH: 5.161 uIU/mL (Slightly higher)
- Fasting Blood Glucose: 105 mg/dL (Normal range 65-110 mg/dL)
- Plasma Ammonia: 198µmol/L (Normal range 11-35µmol/L)
- Plasma Lactate: 21.1 mg/dL (Normal range 4.5-19.8 mg/dL)
- Urine Analysis: Acidic, clear, no protein or sugar
- Peripheral Blood Film: Microcytic Hypochromic Anaemia
- Ultrasound: Marked Hepatomegaly.

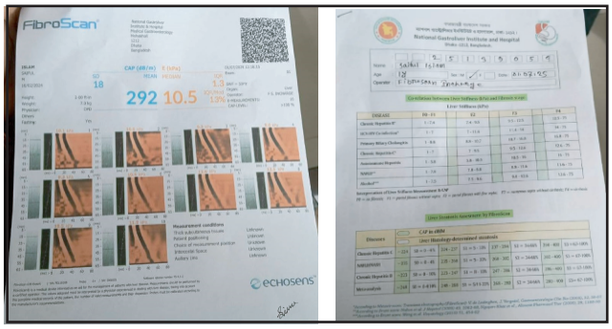

Figure 1 FibroScan: Liver stiffness: 10.5 kPa→Advanced fibrosis (F3), CAPscore (Controlled Attenuation Parameter): 292 dB/m→Moderate steatosis (S2)

FibroScan confirmed significant liver pathology. The child was diagnosed with Glycogen Storage Disorder finally. Now he is treated with high carbohydrate diet, nutritional support and tablet Levothyroxine Sodium with regular follow up.

Figure 2 Situation of the patient during treatment

DISCUSSION

GSD Type I (Von Gierke Disease): Glucose-6-phosphatase (Ia) or glucose-6-phosphate transporter (Ib) including rarer subtypes Ic and Id.[8] Autosomal recessive is the mode of inheritance.[9] Clinical characteristics include hepatomegaly, hyperlipidaemia, hyperuricemia, lactic acidosis, severe fasting hypoglycaemia and renal enlargement before the age of one year.[9] Complications over time can include kidney problems, gout, growth retardation, hepatic adenomas,

and in rare cases, malignant transformation.[10] Clinical symptoms, laboratory results, hypoglycemia, lactic acidosis, hepatic enzyme assay or genetic testing are used to make the diagnosis.[8] If patient is untreated, death and developmental problems are common, results significantly improve with early diagnosis and regular carbohydrate therapy.[9]

CONCLUSION

According to a recent summary, the total frequency of GSD varies from 1 in 20,000 to 43,000 live births. FibroScan and plasma ammonia levels are essential for early diagnosis. Prompt treatment and regular follow-up can significantly improve outcomes and prevent long-term complications.

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AUTHORS CONTRIBUTION

Contribution to Concept, Design and Data - BRM, MSU
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DISCLOSURE

All the authors declared no conflicts of interest.

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Name of Reviewers (October 2023)

Editorial Review

- **Professor Dr. Pradip Kumar Dutta**
  Head, Department of Nephrology
  Marine City Medical College, Chattogram.

- **Dr. Farhad Hussain**
  Associate Professor of Biochemistry
  Marine City Medical College, Chattogram.

Peer Review

- **Professor Dr. Prabir Kumar Das**
  Head, Department of Cardiology (Retired)
  Chittagong Medical College, Chattogram.

- **Professor Dr. Sayeed Mahmud**
  Deaprtment of Community Medicine & Public Health
  Institute of Applied Health Sciences (IAHS) Chattogram.

- **Professor Dr. Serajun Noor**
  Head, Department of Obstetrics & Gynaecology
  Chattagram Maa-O-Shishu Hospital Medical College, Chattogram.

- **Professor M Jalal Uddin**
  Head, Department of Community Medicien & Public Health
  Chattagram Maa-O-Shishu Hospital Medical College, Chattogram.

- **Professor (cc) Dr. Zabeen Choudhury**
  Department of Paediatrics
  Chittagong Medical College, Chattogram.

(List is not according to seneority)

MARINE CITY MEDICAL COLLEGE

Marine City Medical College Journal (MCMCJ)

Information to Authors

Marine City Medical College (MCMC) started its historical and memorable journey in the year 2013. MCMC is one of the famous and reputed Medical College among the Private Medical Colleges in Bangladesh. It is situated in port city, Chattogram. The aim of the MCMC is to attain a standard level in Health & Medical education at home and abroad.

Marine City Medical College is affiliated under Chittagong Medical University & approved by the Ministry of Health & Family Welfare, Government of People's Republic of Bangladesh. A very good number of academicians, researchers and skill professionals are performing in this institute.

Marine City Medical College inaugurated to publish a double blinded, peer reviewed scientific journal from April 2022.

The "Marine City Medical College Journal (MCMCJ)" is a half yearly published eg. April & October accorded with a view to translation of current research into clinical practice. It is the official publication of the Marine City Medical College - having ISSN : 3080-1257.

MCMCJ 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) article, Special article, Review article, Short communication, Case report and Letters on new findings of Medical Science.

MCMCJ follows the recommendations made by International Committee of Medical Journal Editors (ICJME) (http://icmje.org/).

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Manuscript (Papers) are submitted to the Managing Editor or authorised persons or by Email at any time. Papers accepted for publication are subjected to peer review and editorial revision. Manuscript should be typed in English (Font size and style: 10, 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. With full title (Title should be concise and informative) accompanied by a cover 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 6 (Six) authors will be accepted for all manuscripts.

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A structured abstract should not be of more than 250 words. It should be a factual description of the study (Includes aim or Objectives) Methods (Includes patient population, procedures and data analysis) Results 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:- CHD (Coronary Heart Disease). Please do not cite any references in the abstract.

3 (Three) to 10 (Ten) key words may be provided below the abstract.

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Single digit numbers used in the text should be in words except datas and reference numbers. Maximum length of text may be with in 2000-2500 words (Excluding references). The total number of reference should not be less than 15 (Fifteen) for the original article.

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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.

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Book reference : Bucholz RW and Heckman JD. *Rock wood and Green's Fractures in Adult.* In : Kinzler KW, editors. 8th ed. Philadelphia : Lippincott Williams & Wilkins. 2020;3:2639-2688.

Journal reference : Riddel V, Watkinson J, Gazet M. Thyroidectomy : Preventation of bilateral recurrent nerve palsy. *British Journal of Surgery.* 2021;57(2):8-12.

Citation from a website : Ardehali MM, Irani S, Firouzifar M. A unique intraluminal growth of juvenile nasopharyngeal angiofibroma : A Case report. *BioMedicine.* 2020;10(3):41-44.

DOI : 10.37796/211-8039.1019.

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