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A Timely Revolution: Reflecting on the Promise and Challenges of a New Diagnostic Tool for Medical Emergencies

Md. Zakiur Rahman^{1*}

Medical emergencies demand speed, precision and clarity qualities that are not always guaranteed in the dynamic and high-pressure context of emergency care. In recent years, technological advancements have attempted to bridge the gap between time-critical diagnosis and optimal outcomes. The recent approval of a new diagnostic tool aimed at rapidly identifying life-threatening conditions marks a potential inflection point. As this device enters clinical practice, it invites not just clinical enthusiasm but also reflection: How might this tool reshape the landscape of acute care? What are the broader implications for patient safety, clinical workflows and health equity?

A New Era in Emergency Diagnostics

The newly approved device—designed to detect key biomarkers associated with critical emergencies such as myocardial infarction, stroke, sepsis and traumatic brain injury—offers near-instantaneous results at the point of care. Its portability, speed and integration with electronic health records represent a leap forward in diagnostic capacity. Unlike previous iterations of emergency diagnostics, this device offers not only accuracy but immediacy—two pillars of life-saving intervention.

In the management of medical emergencies, time is the most unforgiving variable. “Time is brain” and “Time is muscle” are mantras that reflect the irreversible damage that accrues with diagnostic delays in stroke and myocardial infarction. The new diagnostic tool, by providing results in less than five minutes at the bedside, effectively compresses the traditional timeline for diagnosis.

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For example, in suspected sepsis cases, early detection and intervention can reduce mortality by up to 50%. With this device, emergency clinicians can bypass delays associated with centralized lab processing, initiating antimicrobial therapy or advanced imaging based on immediate results. In trauma settings, the device’s ability to detect biomarkers of intracranial hemorrhage could radically reduce the time to neurosurgical consultation and intervention, especially in rural or resource-limited settings.^{1,2}

In these contexts, the tool is not just diagnostic—it is prognostic. The implications for triage, resource allocation and even emergency department overcrowding are profound.

Despite its promise, integrating a new technology into clinical workflows is rarely frictionless. Early adopters have reported a learning curve—not necessarily in how the device is used, but in how its findings are interpreted in conjunction with existing protocols.³

Moreover, diagnostic tools do not operate in isolation. This device’s integration with electronic medical records allows real-time documentation and alerts, but it also raises the challenge of data overload. Clinicians must avoid the temptation of over-reliance, ensuring that this tool supports—rather than replaces—clinical reasoning.

Training, too, must be emphasized. While the device’s design is user-friendly, frontline healthcare workers must be equipped to understand the scope and limitations of its readings. Overdiagnosis and false positives, if not addressed with clear guidelines, could undermine its credibility and utility.

Health Equity: Bridging or Widening the Gap?

A critical dimension of any medical innovation is its accessibility. While this device holds immense potential for underserved populations—especially in rural or prehospital settings—questions remain about cost, distribution, and support infrastructure.⁴

Will safety-net hospitals and community clinics be early beneficiaries, or will they lag behind larger systems with more robust purchasing power? The answers to

these questions will influence whether this tool reduces health disparities or exacerbates them.

Similarly, its use in mobile emergency settings-ambulances, urgent care units, field hospitals-could democratize advanced diagnostics. However, without sustained investment in training and maintenance, such benefits may be short-lived.

Ethical Considerations

With great speed comes great responsibility. The acceleration of diagnostics can create ethical dilemmas-particularly when decisions about life-sustaining treatments must be made rapidly. Clinicians may feel pressured to act on early results before confirmatory testing, especially when family members are unavailable or unprepared to make informed decisions.⁵ Moreover, diagnostic certainty is never absolute. A tool that offers “Probable” diagnoses must be framed appropriately to avoid overconfidence or therapeutic missteps. Protocols must reflect the nuanced reality that even rapid diagnostics are one piece of a complex clinical puzzle.

A Broader Perspective: Technology and the Human Element

While technology advances, the human element remains essential. No device can replace clinical intuition, empathetic communication or the capacity to comfort in moments of crisis. As we celebrate the advent of this diagnostic tool, we must guard against technophilia-an uncritical embrace of innovation that ignores unintended consequences.⁶

The true measure of this device’s impact will lie not only in survival statistics but in how it reshapes the clinical encounter. Does it free clinicians to spend more time at the bedside, or does it tether them further to screens and devices? Does it empower nurses and paramedics to make quicker decisions, or does it burden them with new responsibilities without adequate support ?

Looking Forward

As the device is rolled out across diverse healthcare settings, ongoing research will be critical. Post-market surveillance, real-world efficacy studies and comparative effectiveness trials will inform how this technology evolves.

Regulatory bodies must remain agile, updating guidelines to reflect emerging data and ensuring that safety standards are maintained. Furthermore, public and professional education will be vital in managing expectations-neither overpromising nor undervaluing the tool’s potential.

The approval of this diagnostic device marks a significant milestone in emergency medicine. Its potential to transform care-saving lives through faster, more accurate diagnoses-is not in question. But with every innovation comes a responsibility to reflect, on how we adopt new tools, how we train our colleagues, how we ensure equity and how we preserve the human core of medicine.

In embracing this technology, the medical community must balance innovation with introspection, speed with deliberation and optimism with humility. If we do so, we may find that this device not only diagnoses crises-it helps us redefine what it means to respond wisely and well in the most urgent moments of care.

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Analysis of Nasofrontal and Nasal Tip Angles between Bengali and Manipuri Adult Males of Bangladesh: A Photo-Anthropometric Study

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ABSTRACT

Background: Photo anthropometry is a scientific method that involves using photographs to analyze the proportions of various body parts and to obtain measurements, which can vary significantly across different racial groups. This study aimed to explore photo-anthropometric variations by evaluating the nasofrontal and nasal tip angles of the external nose in Bengali and Manipuri adult males residing in Bangladesh.

Materials and methods: This cross-sectional analytical study was carried out in the Department of Anatomy at Sylhet MAG Osmani Medical College, Sylhet, between January 2022 and December 2022. Fifty (50) Bengali and fifty (50) Manipuri adult males, aged 25 to 59 years, were chosen through convenient sampling. Photo-anthropometric methods were used to collect data from the Sylhet region. The results were presented as mean $\pm$ standard deviation, and the two-sample mean "Z" test was employed to compare findings between the groups.

Results: The angular measurements of the external nose, the nasofrontal and nasal tip angles, were significantly higher in Manipuri adult males compared to Bengali adult males ($p \leq 0.05$).

Conclusion: The findings of this study will be valuable in the fields of Anatomy, Plastic Surgery, Forensic Medicine, Genetics, and Anthropology for purposes such as identification, planning corrective surgical procedures, and designing nasal models for different ethnic groups.

KEY WORDS

External nose; Nasofrontal angle; Nasal tip angle; Photo-anthropometry.

INTRODUCTION

The term 'Anthropometry' executed from the Greek word Anthropos: A man and Metron: Collective measurement synonymized as measurement of the human. Anthropometry is gold standard technique that

trades with the study of body proportion and absolute dimensions that differ widely among racial groups.¹ Nasal anthropometry refers to the study of the size, shape, and proportions of the human nose across various populations.² Nasal measurements also play a key role in assessing and diagnosing craniofacial abnormalities.³ Nasal parameters are considered as one of the most important variables to racial and ethnic origin among the different parameters of cephalometry.¹ Anthropometry based on photographs is called photo-anthropometry which is a new field developing in Bangladesh. The midline of the midface features includes the pyramidal-shaped external nose.⁴ The dimensions of the nose vary from person to person, depending on its size, shape and the proportion of the face it occupies. Nose offers a visual cue about their personality, ethnicity and other racial identity.⁵ External nose shapes differ significantly between individuals. The morphometric analysis of the external nose provides a foundation for identifying racial and ethnic differences. The external nose is one of the anatomical structure that provide a look to an persons face.⁶ The knowledge of the nasal anthropometry is essential for the rhino plastic surgeon for proper preoperative decision making.¹ Photo-Anthropometry is not difficult to conduct and is not invasive and inexpensive. As a result, photo-anthropometry of the craniofacial region

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can be used to get various angular and linear measurements of the nose.⁷ The shape of the external nose and its relationship with the face are quite different among races in both anatomically and morphologically. Various types of nasal surgery are performed recently on the basis of nasal anthropometry for aesthetic refinement and reconstruction in patients of different nationalities.⁸ Though Bangladesh is a relatively small country, people of different ethnic groups live here and these different groups have differences in their physical characteristics. There are some major tribe in Bangladesh, Manipuri community is one of them. The people from the Manipuri tribe have different physical characteristics from those of the Bengali population.⁹ So the main objective of the study to founded the Photo-anthropometry of external nose between Bengali and Manipuri adult males of Bangladesh.

MATERIALS AND METHODS

This cross-sectional analytic study was done in the Department of Anatomy, Sylhet MAG Osmani Medical College, Sylhet from January 2022 to December 2022 after getting written clearance from the Ethical committee to avoid any medicolegal questions during collection of digital photograph of face from the subjects. About fifty (50) Bengali and fifty (50) Manipuri adult males (Age 25 to 59 years) were selected by convenient sampling technique. However any congenital facial abnormalities, nasal surgery or trauma subjects are excluded from inclusion criteria. A pre-designed data collection sheet used to collect data. Data was collected fom Sylhet zone and Photo-anthropometric methods were used for collecting data. Moreover, an informed written consent was taken from the subjects. The ossification process of all facial bones is completed by the age of twenty five years and that was the basis of selecting of sample.¹⁰ For data collection digital camera, computer programmed with MB ruler were used. The procedure of the work was narrated to the participants. With the help of a questionnaire information was collected from all the participants. Age of the participant was filed from birth certificate and/or national identity card. Digital photography of face-lateral view was taken. This procedure was an alternative of manual anthropometry provided that the images was captured in a standardized fashion.¹¹ Participant was guided to follow the instruction that was neutral, relaxed facial expression and all facial jewelry was removed from the subject if present. The participants were seated comfortably on a chair looking straight forward.¹¹ The camera was set up on a stand. Lateral facial photographs was taken with a

digital camera, using flash mode from a fixed distance (4 feet) using zoom function.¹¹ The participants head was at the same level as the camera for providing a good image of face and also kept the distortion of face to a minimum. The lateral facial photographs was captured at a fixed time between 9 AM and 2 PM to avoid diurnal variations. All the photographic measurements of the subjects was taken by same researcher in a computer programme named Adobe Photoshop.¹¹ The “nose height” was measured from nasion to subnasale by slide caliper before taking lateral facial photograph of each subject. Then the “nose height” of individual photograph was transformed into physically measured value by using the transform option of Adobe Photoshop. Then MB ruler software was used to measure the variables from the photograph.¹² A line was drawn from the glabella to nasion line and another line was drawn from nasion to tip line for measuring nasofrontal angle and to get the nasal tip angle, a line was drawn from nasion to pronasale and another line from pronasale to subnasale.^{13,14} Then this angles were measured by using the ‘MB Ruler’ software and was recorded on data sheet.¹⁵

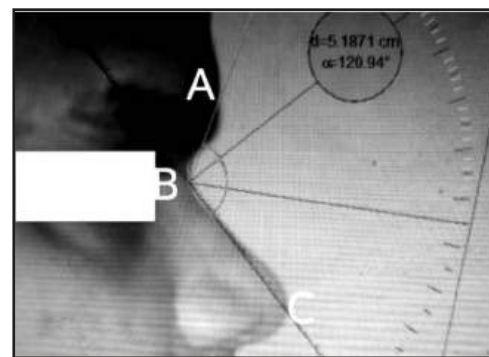


Image 1 Right lateral view of face with head in standardized position showing nasofrontal angle (ABC). A-glabella, B-nasion, C-pronasale

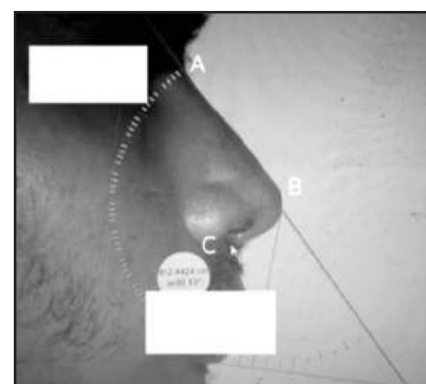


Image 2 Right lateral view of face with head in standard position showing nasal tip angle (ABC). A-nasion, B-pronasale. (B-C)-line from pronasale to subnasale

Values of the study were measured as mean $\pm$ standard deviation. Two sample mean "Z" test was used for comparison the results of this two groups.

RESULTS

Nasofrontal angle in Bengali adult male, the mean $\pm$ SD was $121.06^\circ \pm 4.04$. The nasofrontal angle ranged from 111.00° to 129.43° . In Manipuri adult male, the mean $\pm$ SD of nasofrontal angle was $131.22^\circ \pm 6.10$. The nasofrontal angle ranged from 115.47° to 145.70° . From Table I it is evident that the mean nasofrontal angle was significantly higher ($p < 0.001$) in the Manipuri adult male than in the Bengali adult male (Fig 1).

Table I Nasofrontal angle in Bengali and Manipuri adult male

Variables	Adult male (n = 100)		p-Value
	Bengali	Manipuri	
	(n = 50)	(n = 50)	
Nasofrontal angle ($^\circ$)	121.06 ± 4.04	131.22 ± 6.10	<0.001**
(Mean $\pm$ SD)	(111.00-129.43)	(115.47 - 145.70)	

Figure in parentheses indicate range, Comparison between Bengali and Manipuri adult male was done by two sample Z-test. * = Significant at $p < 0.05$ (2 tailed) ** = Significant at $p < 0.01$ (2 tailed) n = Total number of sample, n = Sample size, SD = Standard Deviation.

Nasal tip angle in Bengali adult male, the mean $\pm$ SD of was $83.57^\circ \pm 2.12$. The nasal tip angle ranged from 80.00° to 89.00° . In Manipuri adult male, the mean $\pm$ SD of nasal tip angle was $91.08^\circ \pm 2.88$. The nasal tip angle ranged from 82.90° to 98.90° . From Table II, it is evident that the mean nasal tip angle was significantly higher ($p < 0.001$) in the Manipuri adult male than in the Bengali adult male (Fig 1).

Table II Nasofacial angle in Bengali and Manipuri adult male

Variables	Adult male (n = 100)		p-Value
	Bengali	Manipuri	
	(n = 50)	(n = 50)	
Nasofacial angle ($^\circ$)	83.57 ± 2.12	91.08 ± 2.88	< 0.001**
(Mean $\pm$ SD)	(80.00 - 89.00)	(82.90 - 98.90)	

Figure in parentheses indicate range, Comparison between Bengali and Manipuri adult male was done by two sample Z-test. * = Significant at $p < 0.05$ (2 tailed) ** = Significant at $p < 0.01$ (2 tailed) n = Total number of sample, n = Sample size, SD = Standard Deviation.

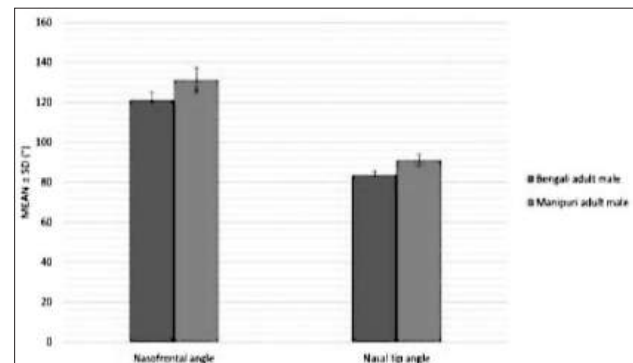


Figure 1 Bar diagram showing nasofrontal angle ($^\circ$) and nasal tip angle ($^\circ$) in Bengali and Manipuri adult male

DISCUSSION

Nose is the most protruding part of the face of human. Morphometry of nose is identical and differs from person to person, tribe to tribe and also different in various environmental region. Nasomental angle and nasal tip angle were measured in this study from digital photograph of face in lateral view. Results of different photographic variables of this study and the photographic variables of other studies of Bangladesh and different countries like India, Nigeria, Iran, Turkey, Nepal, China, Brazil were discussed.

In the present study, we have shown that the mean nasofrontal angle of Bengali adult was 121.06° and Manipuri adult male was 131.22° . The mean nasofacial angle of this present study was statistically significant and it was greater in Manipuri adult male compared with Bengali adult male. The mean nasal tip angle of Bengali adult male was 83.57° and Manipuri adult male was 91.08° of this present study. The mean nasal tip angle was statistically significant and it is also higher in Manipuri adult male compared with Bengali adult male of this present study. A study on nasofrontal angle measurement conducted by Uzan et al. in adult males of Turkey where the mean nasofrontal angle was 134.96° .¹⁶ Another study by Ferdousi et al. in Garo people of Bangladesh where mean value of nasomental angle was 129.56° .⁷ Study on nasomental angle find that study conducted by Uzan et al. on Turkish adult male where the mean value of nasomental angle was greater than Bengali and Manipuri adult male of present study. In the another study conducted by Ferdousi et al. 2013 on Garo adult male of Bangladesh where the mean value of nasomental angle was greater than Bengali adult male of present study but the mean value of nasomental angle was lesser than Manipuri adult male of present study.⁷ There have also observed a study on nasal tip angle measurement by Akter T. in adult males of medical students of Dhaka city where

the mean nasal tip angle was 81.09°. ¹² Akter T. found the mean value of nasal tip angle in medical students of Dhaka city was lower than the Manipuri and Bengali adult male of present study. ¹²

LIMITATIONS

- i) The sample size was not very large (Some study subjects were unable to be cognized and to include as participants for the study and some of them didn't permit to give facial photographs).
- ii) Study subjects were chosen from the Sylhet area which may not illustrate the accurate scenario of the Bengali and Manipuri adult males of Bangladesh.
- iii) During selecting of study subjects, the assessment of exclusion criteria were based totally on information gathered through verbal enquiry and on visual impression.

CONCLUSION

Results of this present study showed that nasofrontal angle measurements was significantly higher in Manipuri adult males than in Bengali adult males and nasal tip angle measurement was also significantly higher in Manipuri adult males than Bengali adult males of Bangladesh.

RECOMMENDATION

Study subjects should be selected from different region of Bangladesh for further studies and also from different sets of people to represent the actual information of the country. More research is needed to get more precise data on different anthropometric measurements of external nose and use of more sample size to investigate the variations on morphometry of external nose. Research should be done on others tribal population to find out morphological differentiation. Studies can be done on different age groups to find out age related changes on anthropometry of nose. There are further scopes for studying variables that were not included in this study.

DISCLOSURE

All of the authors declared no competing interests.

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Antibiotic Resistance is a Global Threat: How It Affected in Chronic Otitis Media

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ABSTRACT

Background: Due to widespread use of antibiotics, the types of pathogenic microorganisms and their resistance to antibiotics have changed. Knowledge of the specific micro-organisms and resistance rates of current pathogens is important for determining the appropriate antibiotics for patients with chronic suppurative otitis media. This study was carried out to examine the current local bacteriological profile and antibiotic sensitivity in case of CSOM.

Materials and methods: This was a prospective study. We carried out analysis of ear swab cultures from 100 CSOM cases seen at the OPD in NIENT in period June 2023 to December 2023. Sensitivities to eleven locally available antibiotics were analyzed.

Results: We analyzed 100 ear swab culture from 100 patients and 118 organisms were detected and there were no organism in 2 cultures. Patients with age ranging from 3 years to 65 years and mean age is 37.06 years. Pseudomonas was the most common isolated bacteria (36.44% [43/118]) followed by Staphylococcus (22.9% [27/118]) and Proteus (11.86% [14/118]). The most effective antibiotics were ciprofloxacin followed by gentamycin, linezolid, clindamycin.

Conclusion: Though organisms and antibiotic sensitivity in different types of infection has changed over time but in case of CSOM conventional antibiotic (Ciprofloxacin) is effective still now against pseudomonas, most common organism in CSOM.

KEY WORDS

CSOM; Infection; Sensitivity.

INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is a permanent abnormality of tympanic membrane, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion. It is one of the most common causes of preventable hearing loss especially in developing countries. CSOM is characterized by persistent or recurrent discharge for

three months or more through a perforation of the tympanic membrane.^{1,2} The incidence of CSOM is increasing in the developing countries due to poor nutrition, poor hygienic practices and lack of health education.³ According to World Health Organization (WHO) global burden of CSOM accounts for 28,000 deaths and a disease burden of over 2 million DALYs (Disability-Adjusted Life Year) and if appropriate treatment is not given at the right time it leads to irreversible local destruction of middle ear structures resulting in complications such as labyrinthitis, facial nerve paralysis, lateral sinus thrombosis, mastoiditis, meningitis and intracranial abscess.⁴ Usually Gram negative bacterias (Pseudomonas aeruginosa, Escherichia coli, Proteus species, Klebsiella species) are involved in the pathogenesis of CSOM. The aim of the present study was to determine the microbiological profile and antibiotic sensitivity pattern.

MATERIALS AND METHODS

We conducted a prospective analysis of clinically diagnosed CSOM seen in the National Institute of ENT(NIENT) Tejgaon, Dhaka from January 23 to December 2023. Those included had active ear discharge in one or both ears for at least 3 months and from whom ear swab specimens were sent for culture

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and sensitivity. Patients with recent history of ear trauma and diabetic patients, as well as those found to have attico-antral disease were excluded from this study. Details history and relevant findings were collected from the patients which included otoscopic examination findings. Collection of specimen swab samples were collected from the discharging ears by inserting a sterile specimen stick deep in the canal. The collected samples were enclosed in airtight plastic tubing and then sent to the microbiology test laboratory. The samples were always taken before cleaning/suctioning the ear canals of the excess purulent exudates. Culture for anaerobic organisms was not performed in this present study. The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 16 was used for analysis. Chi-square test was used to test the statistical significance of the association between potential variables.

RESULTS

The age ranged from 3 years to 69 years with a mean of 35.9 years. The males accounted for 62% (62/100) of the patients with a male to female ratio of 1.63:1. Among the 100 CSOM cases studied, 89 cases were unilateral while 9 cases were bilateral. Among the 100 cultures, there were no organism in 2 cases. Among 98 cultures 118 organisms were identified.

Pseudomonas was the most common isolated bacteria (36.4% [43/120]), followed by *Staphylococcus* (27% [22.9/120]), *Proteus* (11.9% [14/120]) and *Klebsiella* (9.3% [11/120]).

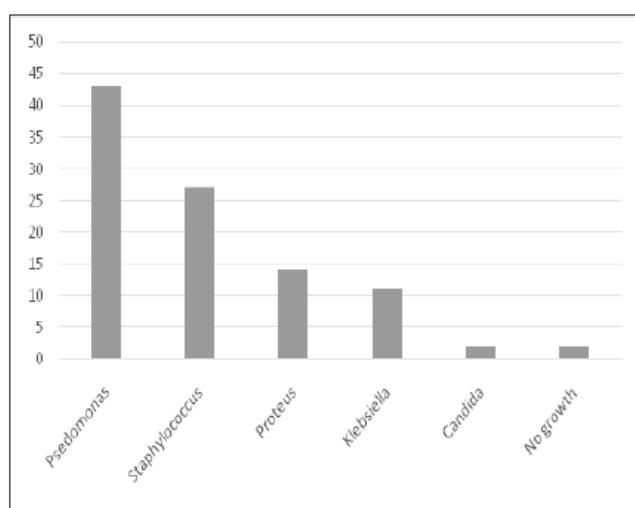


Figure 1 Bar diagram reveals isolated organisms from CSOM

Overall, The most effective antibiotics were ciprofloxacin (50.83%) followed by gentamicin (50%)

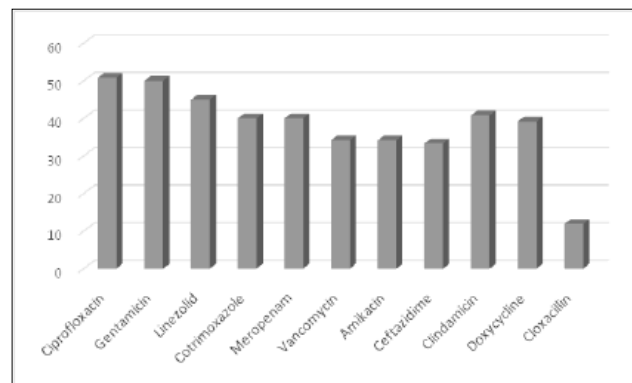


Figure 2 Bar diagram reveals different antibiotics according to sensitivity

As the most common organism is *Pseudomonas* and most sensitive antibiotic is ciprofloxacin. But in significant cases ciprofloxacin is less sensitive. In these particular cases antibiotic sensitivity was tested to other antibiotic. In 60% cases ciprofloxacin is highly sensitive, intermediately sensitive in 38% cases and resistant in 2% cases.

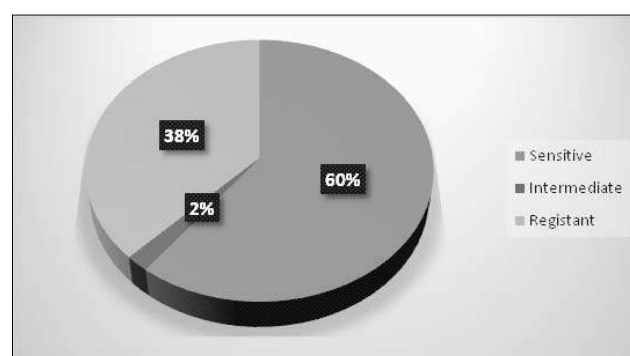


Figure 3 Sensitivity status to ciprofloxacin which is most commonly used antibiotic in CSOM

It is important to assess the sensitivity of other antibiotics where ciprofloxacin is less sensitive or intermediately sensitive. In these cases sensitivity of clindamycin-78.9%, linezolid-78.9%, doxycycline-73.7%, vancomycin-68.4% and gentamicin-39.5%.

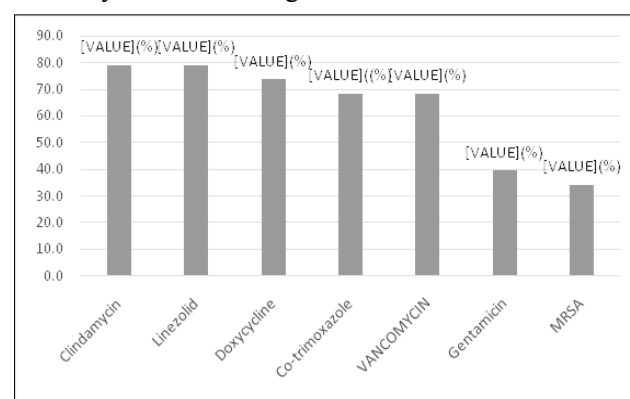


Figure 4 Sensitivity status to other antibiotic where Ciprofloxacin is resistant

DISCUSSION

Chronic suppurative otitis media are a common disease with approximately 5% global incidence.¹ It is characterised by chronic inflammation of the middle ear cleft with recurrent ear discharge through a persistent perforated ear drum. The susceptibility of organisms causing CSOM to antibiotics changes considerably from time to time and this variation is even worsened by misuse of antibiotics, which tend to create multidrug resistance among the organisms, thereby making the management of CSOM more difficult.⁵⁻⁷ Often, it is common in the otologic practice to see actively discharging ears yielding sterile cultures in view of previous antibiotic therapy which had modified the bacterial making treatment problematic.^{8,9} For rational antibiotic use and successful of treatment of CSOM, an appropriate knowledge of antibacterial susceptibility of causative microorganisms essential. The results of this study showed that overall *Pseudomonas* was the most common isolate in CSOM followed by *Staphylococcus* which is in agreement with the reports of some other investigators in different parts of the worlds.^{6,9,10} Madana et al. similarly documented *P. mirabilis* as the second most common bacteria isolate in their series.⁵ In one study, however, *S. aureus* was reported as the most common isolated microorganism in 117 CSOM cases.⁸ This, therefore, implies that sole reliance on empirical antibiotic therapy is not appropriate for effective treatment of CSOM. As a policy, bacteriological study and antibiotic sensitivity should be obtained for every CSOM patient so that specific antibiotic therapy will be applied to the individual cases. In our study, 2% of the cultures did not yield any microbial growths which is compatible with the findings in other reports in which negative cultures were also documented.^{11,8,9} Such negative cultures may have been as a result of the modification of the bacterial flora in the affected ears by prior empirical antibiotic therapy.

Our study also showed that 9% of the patients had bilateral CSOM, which agrees with other investigators from a developing country.¹² The sensitivities of most bacteria isolated in this study are comparable to the reports of most investigators. Most of the investigators reported high sensitivity rate for *Pseudomonas* and *Staphylococci* to ciprofloxacin, though emergence of ciprofloxacin-resistant *Pseudomonas* in CSOM is being reported.^{11,7,10} Overall, we found that the most effective antibiotics tested was ciprofloxacin followed by Gentamicin, which is in agreement with the report of other investigators in which the sensitivities to aminoglycosides (Amikacin and Gentamicin) approach

100%.^{11,6} However, in other reports, ciprofloxacin was found to be the most effective antibiotics.^{8,9} Since *pseudomonas* is by far the predominant bacteria isolated in most CSOM and is mostly highly sensitive to ciprofloxacin which has none of the ototoxic risks of aminoglycosides, it may be beneficial to concluded that ciprofloxacin ear drops be adopted as a first line antimicrobial treatment for CSOM. Ciprofloxacin resistant rate in not negligible. Ciprofloxacin is sensitive in 60 percent cases. Intermediate sensitive in 38% cases and resistant in 2% cases. This agrees with results of other investigators.^{11,8,12}

So where the ciprofloxacin less sensitive or intermediately sensitive, it was important to assess the sensitivity of other antibiotics in those particular microbes. In this cases clindamycin, linezolid, doxycycline, vancomycin and gentamicin are sensitive.

CONCLUSION

Pseudomonas was the most common isolated bacteria in CSOM and was highly sensitive to gentamicin and ciprofloxacin antibiotics. In this era of increasing resistance to antimicrobial agents by bacteria, a periodic surveillance of bacteriological profile is essential for effective management of CSOM.

RECOMMENDATION

Large sample size with multicenter study needs to be conducted to get actual results.

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DISCLOSURE

All of the authors declared no competing interests.

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Post-Operative Neurological Complication after Congenital Heart Surgery (ASD, VSD, TOF) Operation in Pediatric Patients at Bangladesh Shishu Hospital

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ABSTRACT

Background: Congenital Heart Disease (CHD) is becoming more frequently identified, which could be attributed to improvements in diagnostic technologies and the availability of skilled labour. There is a lack of information on the aetiology and outcome of the numerous research that have been carried out in Bangladesh to determine the prevalence and pattern of CHD. To examine the post-operative neurological consequence following Congenital Heart Surgery.

Materials and methods: It was a cross-sectional study conducted in cardiac intensive care unit, Bangladesh Shishu Hospital between June 2021 and June 2024. The data of all children less than 15 years old of either gender who underwent open-heart surgery for congenital heart defects, admitted in cardiac intensive care unit and had CT brain secondary to CNS insult were extracted from hospital record. Children who had bleeding disorder and normal Glasgow coma scale 15/15 were excluded. EEG is done for the patients who had clinical seizures, and its not routinely done for all patients.

Results: Most common neurological complication was seizure (11.63%) followed by late consciousness 9.30% and absent brain stem reflexes 2.33%, abnormal movement 4.65%, epilepsy 2.33% and Behavioral changes 3.26% respectively. Figure II shows mortality was found 14(4%). The children with neurological complication after surgery had significantly longer ICU stay ($p=0.006$) hospital stay ($p=0.04$), mortality after surgery ($p=0.002$).

Conclusion: The most prevalent neurological complications were seizure, late consciousness, absent brainstem reflexes, aberrant movement, epilepsy and behavioural abnormalities. Children who experienced neurological complications following surgery had considerably higher ICU stays, hospital stays and mortality rates.

KEY WORDS

Congenital heart surgery; ICU stays; Mortality rates; Neurological complications.

INTRODUCTION

Congenital Heart Disease (CHD) is among the most common congenital anomalies, occurring in approximately nine out of 1000 live births.¹ Survival rates for individuals with Congenital Heart Disease

(CHD) have significantly increased in recent decades, largely due to progress in medical therapies and surgical interventions.¹

In Saudi Arabia, the incidence of Congenital Heart Defects (CHDs) varies between 2.1 and 10.7 per 1,000 live births, with severe cases occurring at a rate of approximately 5.4 per 1,000. Depending on the nature and severity of the defect, nearly half of these infants require corrective or palliative surgery early in life, placing them at increased risk for various postoperative complications.²

Congenital heart surgery admissions comprise approximately 20% of all Adult Congenital Heart (ACH) disease hospitalizations. It is not uncommon for these admissions to occur in pediatric hospitals, where there is surgical expertise in congenital heart disease. Despite the central role pediatric hospitals play in the surgical treatment of congenital heart disease, little is known about the outcomes of ACH surgical care in these hospitals.³

Because of improvements in prenatal identification, perioperative care and the improvement of bypass procedures, the mortality rates among children

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underwent cardiac surgery have decreased over the last ten years. Despite this, it has led to an increase in the morbidities like neurological complications.^{4,5} Complications occurred in 43 % of pediatric cardiac surgeries performed both with and without cardiopulmonary bypass.⁶

Seizures are the most frequent neurological complication, representing approximately 70% of all neurological sequelae cases.⁷ Other neurological complications include hemiparesis and gaze palsies, peripheral nerve injury as phrenic nerve or brachial plexus, dyskinesia and changes in personality.⁷ It has been ascertained that neurological impairment can lead to neurodevelopmental delays and cognition impairments affecting the quality of life markedly.⁸

The aims of this study are to examine the independent association of a complication, as defined by a complication screening method, on risk of death during congenital heart surgery admissions.

MATERIALS AND METHODS

It was a cross-sectional study conducted in cardiac intensive care unit, Bangladesh Shishu Hospital, Dhaka between June 2021 and June 2024. The data of all children less than 15 years old of either gender who underwent open-heart surgery for congenital heart defects, admitted in cardiac intensive care unit and had CT brain secondary to CNS insult were extracted from hospital record. Children who had bleeding disorder and normal Glasgow coma scale 15/15 were excluded. EEG is done for the patients who had clinical seizures and its nor routinely done for all patients. The samples were included in the study using non-random purposive sampling. The data regarding demographics, the appropriate perioperative and operative data including use of heparin dose, pre and post coagulation profile, the clamp time, pump time, pre and post-operated labs, extubation failure and dayson ventilator were extracted. Primary outcome was incidence of CNS insult in form of clinical or subclinical symptoms evident radiologically. Secondary outcomes were death after surgery or before hospital discharge for the index hospitalization, length of stay in ICU and hospital. Data was collected using a pre-designed form that indicated the patients' identification number only. The database and all computer files relevant to this research were password protected and known only to the investigators and research coordinator. Statistical Package for Social Sciences (SPSS) version 25 was used to analyze data. Missing and incomplete data were pretermitted from analyses. Qualitative variables were presented as count and percentage.

RESULTS

Table shows maximum age group was found 1yr-5 yrs and 5-10 years with were 46.51% and 23.26% respectively. Majority of the children were males (56.0%), Out of 215 cases 12.09% had syndrome, 5.58% were premature and 10.70 % had previous CNS insult (Table I). Figure I shows majority of the children were males (55.06 %). Table II found that the most common neurological complication was seizure (11.63%) followed by late consciousness 9.30%, and absent brainstem reflexes 2.33%, abnormal movement 4.65%, epilepsy 2.33% and Behavioral changes 3.26% respectively. Figure II shows mortality was found 14(4%). Table III shows the children with neurological complication after surgery had significantly longer ICU stay ($p=0.006$), hospital stay ($p=0.04$), mortality after surgery ($p=0.002$).

Table I Characteristics of Admissions (n=215)

Demographic characteristics	Number	Percentage (%)
Age group		
6m-1yr	45	20.93
1-5yrs	100	46.51
5-10yrs	50	23.26
>10yrs	20	9.30
Syndrome		
Yes	26	12.09
No	189	87.91
Prematurity		
Yes	12	5.58
No	203	94.42
Previous CNS insult		
Yes	23	10.70
No	192	89.30

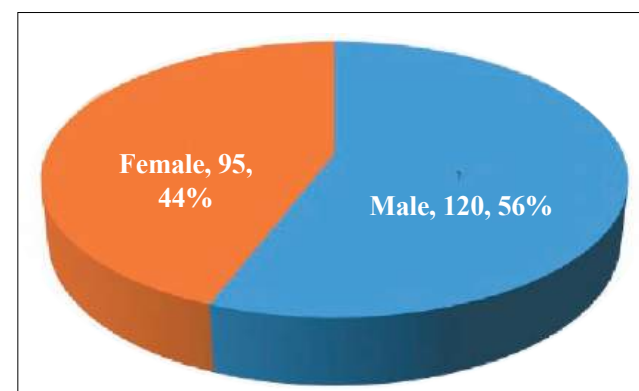
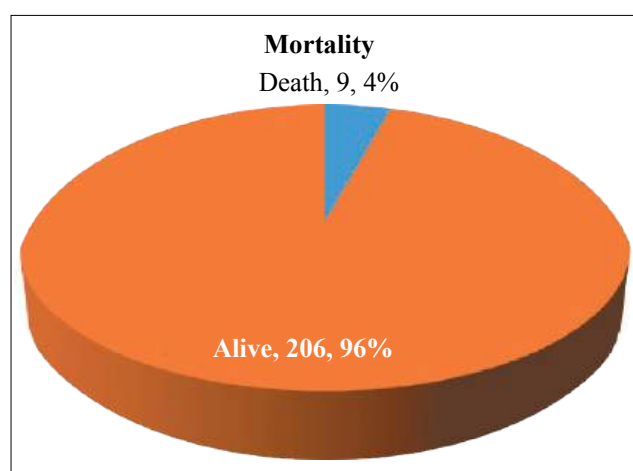


Figure 1 Gender distribution of the study subject (n=215)

Table II Post operative neurological complication of the study subjects (n=215)

Post operative neurological complication	Number	Percentage
Neurological complication found	67	31.16
Seizure	25	11.63
Late consciousness	20	9.30
Absent brain stem reflexes	05	2.33
Abnormal movement	10	4.65
Epilepsy	05	2.33
Behavioral changes	07	3.26
ICU length of stay (3-11 days)	08	3.72
Hospital length of stay (6-35 days)	10	4.65

**Figure 2** Mortality after surgery**Table III** Comparison of neurological complication with ICU and hospital length of stay and mortality

	Neurological complication		Total	p value
	Yes	No		
	n=67	n=148		
ICU length of stay (3-11 days)	6 (8.96)	2 (1.35)	08	0.006
Hospital length of stay (6-35 days)	6 (8.96)	4 (2.70)	10	0.04
Mortality after surgery	7 (10.45)	2 (1.35)	09	0.002

DISCUSSION

In this study observed that that maximum age group was found 1yr-5yrs and 5-10 years with were 46.51% and 23.26% respectively. Majority of the children were males (56.0 %), Out of 215 cases 12.09% had syndrome, 5.58 % were premature and 10.70 % had previous CNS insult. Similar observation was found Shahzad et al. they showed median age of the children was 5 months ranging from 0 to 46 months. Majority of the children were males (55.06%).⁹ 10.09% had

syndrome of 208, 2.9% were premature and 9.1% had previous CNS insult. Another An l et al. study also agreement with our observation they showed that the median patient age at operation was 14 months (range, 5-51.75 months). Among the patients, 348 (50.3%) were male.¹⁰

In the current study, we found that the most common neurological complication was seizure (11.63%), followed by late consciousness 9.30% and absent brainstem reflexes 2.33%, abnormal movement 4.65%, epilepsy 2.33% and Behavioral changes 3.26% respectively. Several studies have also reported the high frequency of neurological complications after pediatric cardiac surgery. Elnaggar et al. found that 15.2 % of children who underwent cardiac surgery had neurological complications, including seizures (n=11) disturbed conscious level and stroke (n=3).¹¹ Chrysostomou et al. reported that 12 % of the ECMO runs had neurological complications, but it does not provide specific information about seizures or strokes.¹² In a review by Walsh et al. suggested that cardiopulmonary bypass, deep hypothermia and circulatory arrest during congenital heart disease surgery can lead to neurological complications, including stroke, seizures, and cognitive deficits.¹³ In another study by Avila-Alvarez et al. found that acute neurological complications was developed in 38 children out of 900, of which 44.7 % were in central nervous system and 55.3 % were in the peripheral nervous system. The most complications were seizures (n=8) hypoxic-ischemic encephalopathy events (n=4) cerebrovascular accidents (n=4) and reversible neurological deficit (n=1) respectively.¹⁴ Hence, the high frequency of neurological complications emphasizes the need for careful monitoring and early intervention in this high-risk population.

Present study observed that the children with neurological complication after surgery had significantly longer ICU stay (p=0.006) hospital stay (p=0.04) mortality after surgery (p=0.002). In the Shahzad study, they found higher ICU stay, hospital stay, mortality after surgery and mortality within 2 weeks of surgery in children with CNS insult. Mortality was related with multi-organ failure, not solely related to CNS complications. Arslanoglu et al. found that 33.3% of the children who developed neurological complications expired and 66.7% were discharged.⁴ They found that presence of CNS insult soon after surgery was significantly associated with mortality among children after cardiac surgery (p = 0.001). In another study by Elnaggar et al. 86% of the children with congenital heart defects who underwent cardiac

surgery discharged from ICU and 14% of the children died during the ICU stay having mean duration of hospital stay as 15 days.¹¹ Thus, prevention of CNS insults is an important goal in the management of pediatric cardiac surgery patients. Strategies that have been shown to reduce the incidence of CNS insults include optimizing perioperative oxygenation, maintaining blood pressure within a narrow range and minimizing the cardiopulmonary bypass time.

CONCLUSION

The significance of appropriate evaluation and management in this population is highlighted by the large percentage of patients who have experienced a prior CNS trauma. The need for focused measures to lower the risk of neurological complications following congenital heart surgery is highlighted by the observation that these complications are linked to noticeably worse outcomes, such as longer hospital and intensive care unit admissions and higher mortality. All things considered, these findings imply that improving outcomes for patients underwent heart surgery and those with a history of CNS damage requires close observation and care.

RECOMMENDATION

Further research is needed to better understand the mechanisms underlying this association and to develop effective prevention and management strategies.

DISCLOSURE

All of the authors declared no competing interests.

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Corelationship of PEFR, MMF, FEF_{25%}, FEF_{50%}, FEF_{75%} with Age, Height and Weight among Non Smoker Apparently Healthy Adult Male

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ABSTRACT

Background: Pulmonary functions may vary due to variations in individual age, height, weight, BMI and some other factors. Spirometric pulmonary function test is an important clinical test to assess the condition of the lung. Some previous study observed the relationship between lung functions with anthropometric parameters. So this study is aimed to find out the relation of PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} with age, height and weight of adult apparently healthy non smoker male within normal BMI.

Materials and methods: This study was conducted in the Department of Physiology, Chittagong Medical College, Chattogram, during January 2019 to December 2019 in collaboration with Continental Group Private Limited (Abu Baqar Ciddique) Chattogram and EPV (Energypac Power Venture) Chittagong Limited, Patiya, Chattogram. 35 apparently healthy adult non smoker males between the ages 20-40 years, working in air conditioned environment were taken in this study. A questionnaire along with general information about previous diseases, medication and family history was filled up. Anthropometric measurements like height, weight were measured and BMI was calculated. Lung function test parameters like PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} were measured by digital spirometer (Chestgraph HI-101, Japan). Pearson correlation coefficient test was done by using SPSS-25 for statistical analysis to see the relation of PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} with age, height and weight within normal BMI.

Results: Significant negative correlation were observed between PEFR and MMF with age ($p < 0.05$) in this study. But a non significant negative correlation was observed between FEF_{25%}, FEF_{50%} and FEF_{75%} with age. Significant positive correlation were observed between MMF and FEF_{75%} with height ($p < 0.05$) in this study. PEFR, FEF_{25%} and FEF_{50%} showed non significant positive correlation with height ($p > 0.05$). Significant positive correlation were observed between MMF, FEF_{25%} and FEF_{75%} with weight ($p < 0.05$) in this study. PEFR and FEF_{50%} showed non significant positive correlation with weight ($p > 0.05$).

Conclusion: The result of this study suggest that pulmonary function is significantly decreased with advancement of age. Pulmonary function has positive correlation with height and weight within normal BMI.

KEY WORDS

FEF_{25%}, FEF_{50%}, FEF_{70%}; MMF; PEFR; Spirometer.

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INTRODUCTION

Pulmonary function test is important for assessment of lung diseases.¹ Different factors can contribute to poor lung function including cold dry environment, smoking, asthma, allergy, Chronic Obstructive Pulmonary Diseases (COPD) hypertension, obesity and stress.

Pulmonary function tests have opened a new era towards the scientific approach in diagnosis, prognosis and management of broncho-pulmonary disorders.¹ Physiological factors like age, gender, height, weight, BMI, physical activity, altitude, ethnicity and education level may affect lung functions.^{2,3}

A very common effective diagnostic test to determine the lung functions is spirometry. Through this process amount of air that in and out during respiration can be determined. It is a useful diagnostic tool for assessing lung condition in both diseased and healthy person.

As anthropometric measurements are non invasive, widely acceptable and inexpensive technique, so it is used as an important tool to determine of body size, proportion and composition.

Prevalence of respiratory symptoms were more in aged and smokers.⁴⁻⁶ Decrease in lung compliance, increase in airway resistance, weakness of respiratory muscle and decrease in elastic recoil of the lung with increased stiffness of thoracic cage might be the cause.⁷

Significant positive correlation of pulmonary functions with height and weight were evident in several previous studies.^{8,9} Negative correlation between BMI with pulmonary functions were also observed by other investigations.^{10,11}

Increased prevalence of respiratory illness were observed in air condition users those who had long history of smoking.⁶

Physical inactivity and low cardio-respiratory fitness are important cause of morbidity and mortality.¹²

The prevalence of obesity has been increased around the world.¹³ Ashvin proved that obesity had adverse effect on lung functions.¹³

As there is lack of study regarding the relationship between pulmonary functions and anthropometric indices, the study was designed to see the relationship of pulmonary functions like PEFr, MMF, FEF_{25%}, FEF_{50%} and FEF_{70%} with age, height and weight with in normal BMI.

MATERIALS AND METHODS

This quasi experimental study was conducted in the Department of Physiology, Chittagong Medical College, Chattogram, Bangladesh with collaboration of ABC private limited, Chattogram and EPV Chittagong, Patiya, Chattogram after ethical approval and permission of medical college authority. 35 apparently healthy, 20-45 years non smoker male, having normal BMI (18.5-22.9 kg/m²) were selected as subjects.

With the permission of authority, aims, objectives and procedure of the study was explained in details to all the employees. They were encouraged for voluntary participation and allowed freedom to withdraw from the study. They were ensured that all the data will be kept confidential and used for research purpose.

All employees of the selected organization were provided with a predesigned case record form. Information about age of employees, duration of job, site and position of workplace, information of general health, history of present or past disease, food habits and habits of smoking and alcohol consumption or tobacco chewing were collected and recorded in predesigned case record form.

For the purpose of exclusion we took history of respiratory distress, skin rash, chronic cough, fever and surgery in the recent past was taken. Recent history of taking paracetamol, antibiotics or any drugs such as bronchodilator, anti tubercular, sedative, antidepressant, beta blocker, ACE inhibitor, anticonvulsant, steroid, chemotherapeutic drug, aspirin and other NSAID were taken. Their contact number will be collected. ID number will be given to each subject.

General and systemic examination were done to see general physical condition of the subjects for inclusion and exclusion. For the purpose of exclusion anemia, jaundice, cyanosis, oedema were observed. Blood pressure and temperature were measured. Pulse and respiratory rate were counted. Auscultation of heart and lung was done to exclude any other cardio-respiratory abnormality.

Height was measured in centimeter by plotting a height measuring scale against the wall. Standing straightly on bare foot from the top of the vertex to the bottom of the foot height was recorded.^{14,15}

Weight was measured in kilogram on bare foot and avoiding excess clothing or any baggage by analogue standard weighing machine.^{14,15}

BMI was calculated by dividing weight in kg by the square of height in meters.

For the exclusion, blood sample were collected for estimation of Hb% and RBS.

Subjects were selected by quota sampling method on the basis of inclusion and exclusion criteria by analysing of case record form.

During data collection all subjects were described about the procedure and then were demonstrated about the performances.

Pulmonary function test parameters: PEFr, MMF, FEF_{25%}, FEF_{50%} and FEF_{70%} were measured by using digital spirometer in relaxed and upright sitting posture.

Data were analyzed by using SPSS-25 (Statistical Package for Social Science). Correlation analysis were done by Pearson's correlation-coefficient test for quantitative variables.

RESULTS

35 apparently healthy, 20-45 years non smoker male, having normal BMI (18.5-22.9 kg/m²) were selected as subjects from different offices.

Table I Age, height, weight, BMI, Hb, RBS, pulse rate, SBP and DBP of study subjects (n=35)

Attributes□	Mean ± SD□	Range
Age (Years)□	32.77 ± 3.82□	20 - 45
Height (cm)□	167.31 ± 6.21□	152 - 178
Weight (Kg)□	62.49 ± 4.804□	52 - 72
BMI (Kg/m ²)□	22.21 ± 0.613□	18.50 – 22.90
Hb level (gm/dl)□	14.01 ± 0.445□	13.2- 15.4
RBS (mmol/L)□	5.63 ± 0.452□	4.9-6.8
Pulse (Beats/min)□	72.342 ± 5.480□	60 - 85
SBP (mm of Hg)□	110.571 ± 11.868□	100 - 130
DBP (mm of Hg)□	70.428 ± 6.810□	60 – 80

Data expressed as Mean ± SD, n = number of the subjects, Figures in parenthesis indicate Range, BMI = Body Mass Index, Hb= Haemoglobin, RBS= Random Blood Sugar, SBP = Systolic Blood Pressure, DBP = Diastolic Blood Pressure

Table II Pulmonary functions of study subjects (n=35)

Attributes□	Mean ± SD□	Range
PEFR (Liter/sec)□	7.83 ± 1.187□	4.25 – 8.86
MMF (Liter/sec)□	4.19 ± 0.623□	2.40 – 6.36
FEF _{25%} (Liter/sec)□	7.52 ± 1.281□	3.64 – 8.61
FEF _{50%} (Liter/sec)□	4.52 ± .711□	1.72– 6.41
FEF _{75%} (Liter/sec)□	2.33 ± .531□	1.27 – 4.24

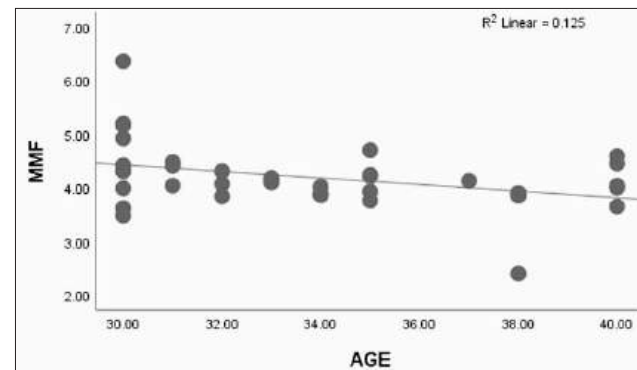
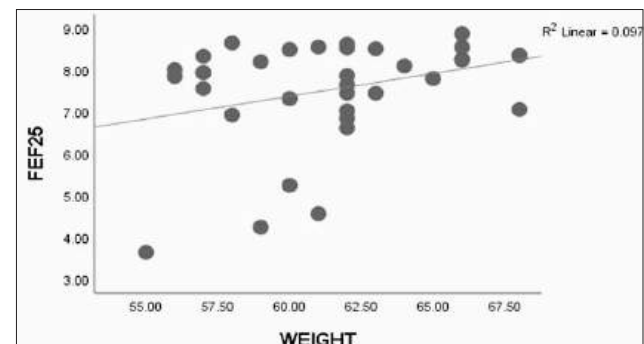
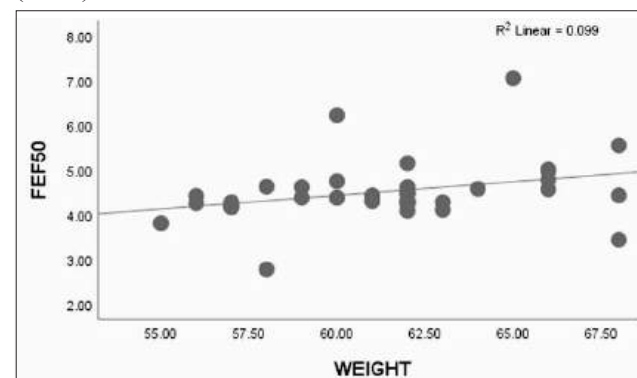
Data expressed as Mean ± SD, n = number of the subjects, Figures in parenthesis indicate Range, FVC = Forced Vital Capacity, PEFR= Peak Expiratory Flow Rate, MMF =Maximum Mid Expiratory Flow Rate, FEF_{25%} = Forced Expiratory Volume in 25% FVC, FEF_{50%} = Forced Expiratory Volume in 50% FVC, FEF_{75%} = Forced Expiratory Volume in 75% FVC

Table III Correlation of PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} with age, height and weight of subjects (n=35)

Variables□	PEFR□ (L/sec)□ p value□ (r value)□	MMF□ (L/sec)□ p value□ (r value)□	FEV _{25%} □ (L/sec)□ p value□ (r value)□	FEV _{50%} □ (L/sec)□ p value□ (r value)□	FEV _{75%} □ (L/sec)□ p value□ (r value)□
Age (Years)□	0.146 ^{ns} (-0.251)□	0.037* (-0.354)□	0.165 ^{ns} (-0.240)□	0.094 ^{ns} (-0.287)□	0.890 ^{ns} (-0.024)□
Height (cm)□	0.784 ^{ns} (0.048)□	0.002** (0.515)□	0.645 ^{ns} (0.081)□	0.016* (0.404)□	0.002** (0.514)□
Weight (Kg)□	0.143 ^{ns} (0.253)□	0.002** (0.498)□	0.068** (0.312)□	0.665 ^{ns} (0.315)□	0.003** (0.487)□

Statistical analysis was done by Pearson's Correlation Coefficient Test, r=Correlation Coefficient, n = number of the subjects, FVC = Forced Vital Capacity, PEFR=

Peak Expiratory flow rate, MMF=Maximum Mid Expiratory Flow Rate, FEF_{25%} = Forced Expiratory Volume in 25% FVC, FEF_{50%} = Forced Expiratory Volume in 50% FVC, FEF_{75%} = Forced Expiratory Volume in 75% FVC, ns = not significant (p>0.05), *indicates statistically significant (p<0.05), ** indicates statistically highly significant (p<0.001).

**Figure 1** Significant positive correlation of MMF with age of study subjects in the study (r= -0.354) (n=35)**Figure 2** Significant positive correlation (p < 0.05) of FEF_{25%} with weight of study subjects (r= 0.312) (n=35)**Figure 3** Significant positive correlation(p < 0.05) of FEF_{50%} with weight of the study subjects (n=35)

DISCUSSION

Age, height, weight, BMI, Hb, RBS, blood pressure and pulse rate of study subjects of study group were

measured (Table I). On the basis of general examination and inclusion and exclusion criteria 35 apparently healthy adult male were selected from non AC offices.

PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} were measured with a portable digital spirometer (Chestgraph, HI-101, Japan) from the study subjects in this group.

After getting data, statistical analysis was done by SPSS-25. Mean $\pm$ SD (Standard Deviation) were calculated and tabulated from the collected data. Attempts were done to see the relationship between the anthropometric measurements and respiratory parameters of the subjects by Pearson's correlation coefficient test. Results were expressed by using different tables and figures.

For exclusion purpose Hb level and random blood sugar were done. Patients were non diabetic, non anaemic and normotensive.

Lung functions of study subjects is shown Table II.

In this research work, age showed a strong negative correlation with PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} (Table III). These findings are consistent with the study of Taluza et al. Nepal GB et al. Golczewski T et al. Age showed a significant negative correlation with PEFR and MMF in study groups.^{8,14,15} Age showed a non significant negative correlation with FEF_{25%}, FEF_{50%} and FEF_{75%} in this study.

According to Taluza et al. Nepal GB et al. and Golczewski T et al. pulmonary functions were supposed to increase up to middle twenties and then decrease with age.^{8,14,15} According to them it might be due to decrease static recoil pressure of lung, decrease lung compliance, increase airway resistance. Also decrease elasticity of lung and increase stiffness of thoracic cage and reduced respiratory muscle strength.

In the present study, age showed negative correlation with pulmonary functions. It might be by the above mentioned factors.

In our study height showed a positive correlation with PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} (Table III). These findings are consistent with the study of Taluza et al. Bhatti et al. Ojoawo et al. and Nagpal et al.^{8,16-18} They supposed that increase height in experimental group causes increase length of thoracic cavity and lungs. Sovolumes, capacities and expansibility of lung may be more irrespective of age.^{8,16} Height showed a significant positive correlation with MMF, FEF_{50%} and FEF_{75%}. In our study height showed a positive non significant correlation with PEFR and FEF_{25%}. It might be due to height is proportionate to total surface area, volumes and capacities of lung.

Weight showed a positive correlation with PEFR, MMF, FEF_{25%}, FEF_{50%} and FEF_{75%} in the current study (Table-III). These findings are consistent with the study of Nagpal et al. Ojoawo et al. Cibella et al. and Taluza et al.^{8,17-20} Weight showed a significant positive correlation with MMF, FEF_{25%} and FEF_{75%} within normal BMI of study groups in current study.

The result of present study showed lung functions may vary due to variations in individual age, height, weight, BMI and some other factors.

LIMITATIONS

This study was conducted for academic purpose in short period of time. Although optimal care had been tried by the researcher in every step of the study but there were some limitations. The limitations were-

- ☐ Small sample size that might not represent the whole community.
- ☐ Study was done with limited age group.
- ☐ Short period of study.
- ☐ Facilities were limited.
- ☐ Blood pressure was measured only in left hand.
- ☐ Chest X-ray was not done due to not giving permission by office authority.
- ☐ Pre-employment data regarding lung functions were not available.
- ☐ Follow up of the subjects were not done.

CONCLUSION

The present study suggest that pulmonary function is significantly decreased with advancement of age. They supposed that increase height in experimental subjects causes increase length of thoracic cavity and lungs. It was suggested that the increase pulmonary function with weight may reflect increasing muscle strength. So pulmonary function is positively correlated with height and weight within normal range of BMI in adult healthy male.

RECOMMENDATIONS

From this study, the following recommendations can be made for further study:

- ☐ Similar study with different age groups and longer duration can be conducted.
- ☐ Chest X-ray should be done to ensure any pathological changes in lungs.
- ☐ Further study can be done by giving intervention with breathing exercise and proper facemask.
- ☐ Advice can be given to the authority of offices to do periodical medical check up of the employees at least once a year for early diagnosis of respiratory dysfunction. Periodic analysis of lung functions can be an effective measure for early diagnosis of

- respiratory impairment of subjects working in air conditioned environment which may help in initiating early treatment intervention and preventing different pulmonary complications.
- □ Authority can also advise to do mandatory pre-employment medical check up of the new employees.
- □ Advice can be given to the employees of that offices
 - about consumption of fresh fruit, fish, vegetables;
 - vitamin A,C,E supplementation and increase dietary
 - fibre intake for improvement of lung functions.

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DISCLOSURE

All the authors declared to no competing interests.

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The Pattern of Suicidal Cases in Sylhet Region

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ABSTRACT

Background: Suicide remains a major global public health concern, claiming 705000 lives per year. Understanding the pattern of suicide is crucial for effective prevention strategies. To highlight the importance of recognizing patterns for designing effective prevention strategies and intervention.

Materials and methods: This retrospective study was done at Department of Forensic Medicine of Sylhet MAG Osmani medical college to analysis the pattern of suicidal cases during the study period from January 2024 to January 2025. After reviewing all postmortem report 100 cases of death were found due to suicidal cases during the study period.

Results: The highest number of the victim 40 were from the age group 21 to 30 years followed by 30 from the age group of 11 to 20 years and 91 cases come from different rural areas where 64 cases were male and 36 cases were female. The commonest method was hanging (47) then poisoning (42) lastly through drowning (11).

Conclusion: A deeper understanding of these patterns can inform targeted intervention, promote mental health awareness and ultimately help to reduce the incidence of suicide globally.

KEY WORDS

Hanging; Drowning; Poisoning; Public health; Suicide.

INTRODUCTION

Suicide is a profound public health challenge claiming thousands of lives each year worldwide.¹ It is a complex phenomenon influenced by a range of psychological, social, economic and cultural factors. Recognizing the patterns of suicide-such as who is most at risk, when and how suicides occur and the underlying causes is crucial for developing effective prevention strategies.² Patterns often vary across different demographic groups with differences observed in age, gender, socioeconomic status and geographic region. Furthermore, certain

methods, timing trends and emerging societal influences such as the role of technology and global crises also shape suicide behavior.³ A deeper understanding of these patterns can inform targeted interventions, promote mental health awareness and ultimately help reduce the incidence of suicide globally.⁴ The people choose various methods for suicidal purpose. Among the different methods, hanging is more common and considered as easier method.⁵ Other methods are poisoning, jump over running rail, fall from height, gunshot, now a days commonly practiced in Bangladesh. This study focus on mainly three methods of suicide hanging, poisoning and drowning.⁶⁻⁸ The Bangladeshi people causes suicide by poisoning as it is available in rural area. Drowning is another method but it occurs accidentally comparative to suicidal purpose.

MATERIALS AND METHODS

This reports based on a retrospective study carried out in the Department of Forensic Medicine of Sylhet MAG Osmani Medical College to analysis of pattern of suicidal cases during the study period January 2024 to January 2025.

After reviewing all postmortem reports 100 cases of death were found due to suicide during the study period. Data were collected on detail information from following sources: Investigating police officer recognizance, postmortem entry register and postmortem findings from the postmortem reports.

The data analysis was carried out by using descriptive statistics and presented with frequency tables and charts.

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RESULTS

A total of 167 cases underwent autopsy between January 2024 to January 2025 among them 100 deaths were autopsied, were suicide. Therefore, we can conclude that one of the most frequent causes of unnatural death is suicide in this region. The results are shown in the following charts. Figure 1 shows gender distribution of the death bodies where out of 100, 64% were male and 36% were female. It was discovered that both male and female commit suicide at a young age but the number of victim is more in male. The following figure is given below in details:

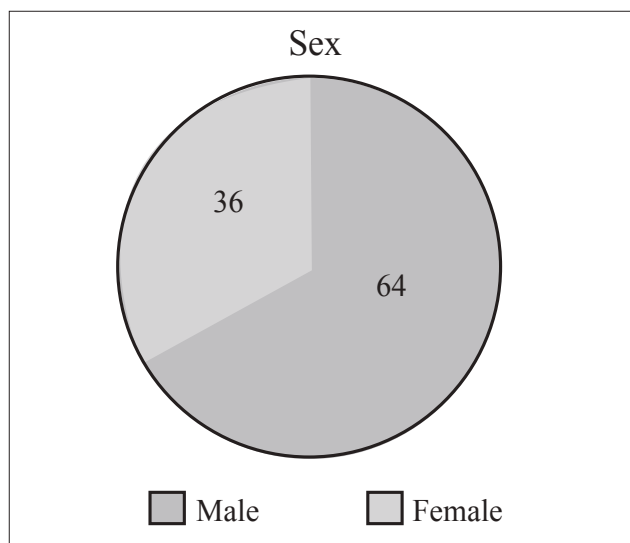


Figure 1 Gender distribution in the death bodies

Figure 2 shows residential distribution of the dead. Here 91 from different rural areas and 09 came from urban areas. The following figure is given below in details:

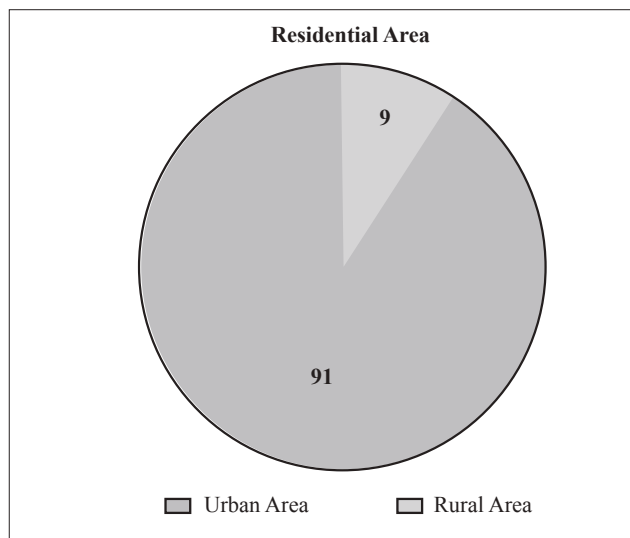


Figure 2 Residential distribution

In Figure 3, a bar chart showing the age ranges of victim in which suicidal tendency grows is from 11-20 years upto 51-60. In the present study the lowest age is 12 and highest is 56 years. Maximum victims 40% is from age group 21-30 followed by age group 11-20 years (30%) and 31-40 years (13%). Thus it is observed that more than 1/3rd of total victims are from the age group 21-30. However, victims above 71 years and below 10 years have lesser prevalence being 3% and 0% respectively.

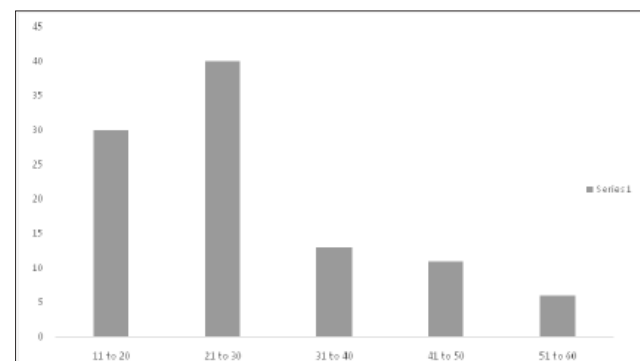


Figure 3 Age distribution

Table I shows the number of married female victim are more than male who are married. And the number of married victim are more than non married victim. That means family of a married person has a effect on the victims.

Table I Marrietal status

Sex	Married	Unmarried
Male	25(51.02%)	24(48.97%)
Female	37(72.54%)	14(27.45%)
Total	62	38

Table II shows, causes of death of the victim of present study. Here highest number of victim chosen hanging for suicide then poisoning lastly drowning in a little number of cases.

Table II Causes of death of victim

Cause of death	Frequency	Percentage (%)
Hanging	58	58%
Poisoning	33	33%
Drowning	09	09%
Total	100	

DISCUSSION

From the above study we come to know that married person are more than unmarried people become victim. Family caoas, financial instability, impotancy, sterility, extra marietal affair etc are the common causes for mental problems. These causes are common for both

urban-rural area, male-female people. From the Table I, married female (72.54%) are more victim than married male (51.02%). Similar study are observed by other authors. According to sex variation the tendency of suicide is more common in male compare to female.⁹⁻¹¹ In our findings Al-Azad MAS study mentioned Financial crisis, extra marietal affair, impotancy and sterility in both, dowry, less mental attachment with in law families are the common causes for the female victims. And unemployment, financial crisis, dowry, social harassment, having no children/only girl child etc are common incase of male victims. Hence, unmarried victims are suffering from bad results in exams, unemployment, ditching from mental attachment etc. What ever the causes are, people are becoming very much sensitive day by day. They do not want to tolerate any type of instabilities for long time. They try a little to share their problems with other, many don't try at all. They think they tolerate a lot or why should they do so, Suicide is the solution of their all problems. That's why they take these steps in various way. We should study more on this Suicidal ideas and the person who is suffering from frustrations. How they become relieved or get less stressed. Family and close relatives are helpful for getting their stress relived. Counseling can be helpful sometime. We also found that suicidal tendency is more prone to rural incomparison to urban because of lack of lifestyle, educational and behavioral issue. This study also shows that suicidal tendency observed more in muslim than hindus. On sex differentiation, study shows the victimized persons of high tendency is female than male. All of the methods of suicide, hanging is the most common method.

More studies should be done on this topic. And awareness socially, in the Mosque, Mandir, social medias can be more helpful. Everyone has crises in his/her life. No one is happy at utmost level. That's why we should, share ourselves and get mental help to get healthy personality, live a life and get a normal end.¹²⁻¹³ Similar observation are studied by other authors.

LIMITATION

It is a single center study with a small sample size conducted for a short period.

CONCLUSION

A deeper understanding of these patterns can inform targeted intervention, promote mental health awareness and ultimately help to reduce the incidence of suicide globally.

RECOMMENDATION

The analysis of study recommend that public awareness and proper counseling should be under concerned, it we want to prevent such unnatural death.

DISCLOSURE

All the authors declared no competing interest.

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Estimation of Serum Creatinine Level of Preeclamptic Patients in Bangladesh

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ABSTRACT

Background: Preeclampsia remains a major contributor to maternal and fetal morbidity and mortality. While its exact cause is not fully understood, changes in serum creatinine levels have been implicated in its development. This study aimed to assess serum creatinine levels in women with preeclampsia to support early diagnosis and prevent complications using accessible biochemical markers.

Materials and methods: A cross-sectional study was conducted in the Department of Biochemistry at Mymensingh Medical College, in collaboration with the Department of Obstetrics and Gynecology at Mymensingh Medical College and Hospital. A total of 120 pregnant women were enrolled through purposive (Non-random) sampling based on defined inclusion and exclusion criteria. Among them, 60 women diagnosed with preeclampsia were designated as the case group and 60 normotensive pregnant women served as controls. Serum creatinine levels were measured and reported as mean $\pm$ Standard Deviation (SD). The Serum Uric Acid-to-Creatinine (SUA/Scr) ratio was analyzed using logistic regression. Data were analyzed with SPSS version 21 and group comparisons were performed using Student's unpaired t-test.

Results: Serum creatinine levels were significantly higher in preeclamptic patients compared to controls ($p < 0.001$).

Conclusion: Elevated serum creatinine levels in preeclamptic women highlight its potential role as a simple, cost-effective biomarker for early detection and management of preeclampsia.

KEY WORDS

Preeclampsia; Serum creatinine; Pregnancy.

INTRODUCTION

Pregnancy represents a complex physiological state marked by the implantation and development of the embryo or fetus, typically within the uterus, though ectopic implantation can occasionally occur. This period concludes with childbirth or, in some cases, spontaneous or elective abortion. Throughout gestation,

the maternal body underwent significant physiological transformations across virtually every organ system to accommodate and support fetal growth. A thorough understanding of these systemic adaptations is crucial for healthcare professionals to provide effective care for both mother and fetus.¹

Preeclampsia (PE) is a pregnancy-specific hypertensive disorder that generally arises after the 20th week of gestation.² It is characterized by elevated blood pressure in conjunction with proteinuria and/or signs of organ dysfunction such as persistent headaches, visual disturbances, and hepatic or renal impairment. PE lies within a continuum of hypertensive disorders in pregnancy-ranging from gestational hypertension to severe complications like eclampsia and HELLP syndrome (Hemolysis, Elevated Liver enzymes, Low Platelet count).³ Clinically, it presents with hypertension, proteinuria, edema and rapid weight gain. Laboratory indicators often include thrombocytopenia, hyperuricemia, elevated liver enzymes and hemoconcentration.⁴

Globally, preeclampsia remains a significant contributor to maternal and perinatal morbidity and mortality. It can evolve rapidly and result in life-threatening complications if not identified and managed in a timely manner.⁵ The World Health Organization (WHO)

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estimates that preeclampsia affects approximately 2% to 10% of pregnancies worldwide. Its incidence is disproportionately higher in developing nations-ranging from 1.8% to 16.7%-in contrast to roughly 0.4% in more developed countries.⁶ Although the precise etiology of PE is not fully understood, it is widely believed to stem from abnormal placental development and insufficient trophoblastic invasion during early gestation. The molecular mechanisms underlying this disorder remain under investigation. Notably, elevated serum creatinine levels have been linked to increased disease severity and poor perinatal outcomes.⁷

Creatinine, a byproduct of muscle metabolism, is primarily filtered by the kidneys and is widely recognized as a reliable indicator of renal function. Pregnancy induces substantial changes in renal physiology, including increased glomerular filtration rate and renal plasma flow. However, in preeclampsia, these parameters are often reduced due to impaired renal perfusion and glomerular injury, leading to elevated serum creatinine concentrations.⁸ Given these associations, this study aims to explore the relationship between serum creatinine levels and the occurrence of preeclampsia, with a particular focus on its potential role in predicting maternal complications.⁹

MATERIALS AND METHODS

This cross sectional study was carried out at the Department of Biochemistry, Mymensingh Medical College and the subjects were collected from Department of Obstetrics & Gynecology, Mymensingh Medical College Hospital, Mymensingh, during the period from July 2018 to June 2019. A total of 120 subjects included in this studied. Out of them 60 were case (Group-II) and 60 were control (Group-I).

Inclusion criteria

Group-I (Control): 60 apparently normal healthy pregnant women aged between 20-40 years and gestational age more than 20 weeks selected as control in this study.

Group-II (Case): 60 diagnosed preeclamptic patients aged between 20-40 years and gestational age more than 20 weeks selected as case in this study.

Exclusion criteria

- Pre-existing hypertension before pregnancy- from history.
- Liver disease- from history and other clinical findings.
- Renal disease- from history and other clinical findings.
- Subjects taking any drugs that containing calcium, magnesium, phosphorus, zinc or iron for last 5 months- from history.

A survey questionnaire was designed. Data were collected through a preformed data collection sheet (Questionnaire). Measurements of height, weight were done with light clothes and without shoes. Blood pressure was taken after 10 minutes rest with standard cuffs for adults fitted with a mercury sphygmomanometer.

Data was collected after direct interview from patients or attendants. Informed consent was obtained from all participants. Blood was collected and analyzed for investigation. Structured case record forms were included.

For the purpose of the study, subjects both normal pregnant and preeclamptic patients were collected from the antenatal Obstetric ward of Mymensingh Medical College Hospital, Mymensingh. The study subjects were selected on the basis of inclusion and exclusion criteria. Their informed written consent was taken. Age, gestational age, occupation, socio-economic status, residential address, family history of diabetes, hypertension, drug history, height, weight and other relevant data were collected and recorded in a preformed data collection sheet. For laboratory investigations, required amount of blood was collected, processed and preserved for estimation of different biochemical parameters. Data were then processed, analyzed to draw a conclusion.

Anthropometric measurements including height in meter (m), body weight in kilogram (Kg) were measured using standardized techniques. Body Mass Indexes (BMI) of the subjects were calculated using standard formula, $BMI = \text{Weight (kg)} / [\text{Height (m)}]^2$.

Following study parameters was analyzed in the study subjects: Serum creatinine

Laboratory investigations:

The following laboratory investigations were done for each of the subjects:

Serum Uric acid: Serum uric acid was determined by colorimetric method by using the test kit
Serum Creatinine: Serum creatinine was estimated by colorimetric method by using the test kit

All biochemical values were expressed as mean $\pm$ SD (Standard Deviation). Statistical significance of difference between two groups were evaluated by using Student's unpaired 't' test. All statistical analysis were done by using SPSS (Statistical Package for Social Science) version 21 windows package.

The study was approved by the ethics committee of the Mymensingh Medical College.

RESULTS

In this study, a total number of 120 subjects were participated. Out of them 60 normal healthy pregnant women were as control group (Group-I) and another 60 preeclamptic patients were selected as case group (Group-II). Different variables of the subjects were being analyzed and compared between Group-I and Group-II. Serum uric acid, creatinine levels were estimated from blood samples collected from 120 subjects. Some physical aspects such as maternal age, BMI, Systolic (SBP) and Diastolic Blood Pressure (DBP) of the subjects were also analyzed.

Serum creatinine levels was expressed in mg/dl. Maternal age expressed in years, gestational age in weeks, BMI in Kg/m², Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) in mm of Hg. All the values were expressed as mean $\pm$ SD and statistical significance of difference between two groups were evaluated by Student's unpaired 't' test.

$p < 0.001$ considered as highly significant result.

$p < 0.05$ considered as significant result.

$p \geq 0.05$ considered as Not Significant (NS) result.

This study showed that serum creatinine levels were higher in case (Group-II) when compared with control (Group-I) group. It was observed that mean serum uric acid, and creatinine levels were 6.91 ± 0.58 mg/dl and 2.46 ± 0.51 mg/dl in Group-II (case) and 4.60 ± 0.47 mg/dl, 0.86 ± 0.10 mg/dl and in Group-I (Control) respectively. Statistical analysis of these parameter showed that the difference of mean values between case and control were significant (< 0.05) and highly significant ($p < 0.001$).

In this study mean maternal age of the Group-II (case) and Group-I (control) were 29.70 ± 4.02 and 27.23 ± 4.40 years. The difference of mean values was not significant ($p > 0.05$). Mean BMI, SBP and DBP of the subjects were higher in case than control. Mean BMI, SBP and DBP were 28.41 ± 1.25 kg/m², 148.50 ± 6.44 mm of Hg and 95.97 ± 4.80 mm of Hg in Group-II (Case) and 26.27 ± 1.11 kg/m², 112.3 ± 6.93 mm of Hg and 72.73 ± 5.32 mm of Hg in Group-I (Control) respectively. When case and control were compared the difference of mean values was highly significant ($p < 0.001$).

Analysis of Clinical Parameters in the Study Population

In this study, maternal age range was from 20 to 40 years for both case and control group. It was observed that the mean age of the Group-II (Case) and Group-I (Control) group were 29.70 ± 4.02 and 27.23 ± 4.40 years respectively and the level of significance was 0.002

($p < 0.05$). Thus, the difference in mean age was significant between preeclamptic patients (Case) and normal healthy pregnant women. In our study, it was observed that mean BMI of the Group-II (Case) and Group-I (Control) were 28.41 ± 1.25 and 26.27 ± 1.11 Kg/m² respectively. A highly significant ($p < 0.001$) increase in BMI was observed in preeclamptic patients (Case) compared to that of the healthy pregnant women. The study was revealed that the systolic blood pressure was higher in preeclamptic (Case) group than in normal healthy pregnant control group. The mean systolic blood pressure of the Group-II and Group-I were 148.50 ± 6.44 and 112.30 ± 6.93 mm of Hg respectively. A highly significant ($p < 0.001$) increase in systolic blood pressure was observed in preeclamptic patients (Case) compared to that of the healthy pregnant women. On the other hand, the diastolic blood pressure was higher in preeclamptic (Case) group than in normal healthy pregnant control group. The mean diastolic blood pressure of the Group-II and Group-I were 95.97 ± 4.80 and 72.73 ± 5.32 mm of Hg respectively. A highly significant ($p < 0.001$) increase in diastolic blood pressure was observed in preeclamptic patients (Case) compared to that of the healthy pregnant women.

The values of all the clinical and biochemical parameters of the study subjects (Case and Control) were presented in Table I

Table I Mean $\pm$ SD of clinical parameters of the study population

Variables	Group-I (Control)	Group-II (Case)	p value
	Mean $\pm$ SD	Mean $\pm$ SD	
Maternal age (Years)	27.23 ± 4.40	29.70 ± 4.02	0.002 ^{NS}
BMI (Kg/m ²)	26.27 ± 1.11	28.41 ± 1.25	$p < 0.001^{**}$
Systolic Blood Pressure (mm of Hg)	112.3 ± 6.93	148.50 ± 6.44	$p < 0.001^{**}$

p less than 0.05 taken as the level of significance.

$p < 0.001$ considered as highly significant result.

$p < 0.05$ considered as significant result.

$p \geq 0.05$ considered as Not Significant (NS) result.

SD= Standard Deviation.

Creatinine

In this study, it was observed that the mean values of serum creatinine levels were 1.63 ± 0.17 and 0.86 ± 0.10 mg/dl in Group-II (Case) and Group-I (Control) respectively. A highly significant ($p < 0.001$) increase in serum creatinine levels were observed in preeclamptic

patients (Case) when compared to that of the normal healthy pregnant women. Analysis of mean serum creatinine levels of study population were presented in Fig 1.

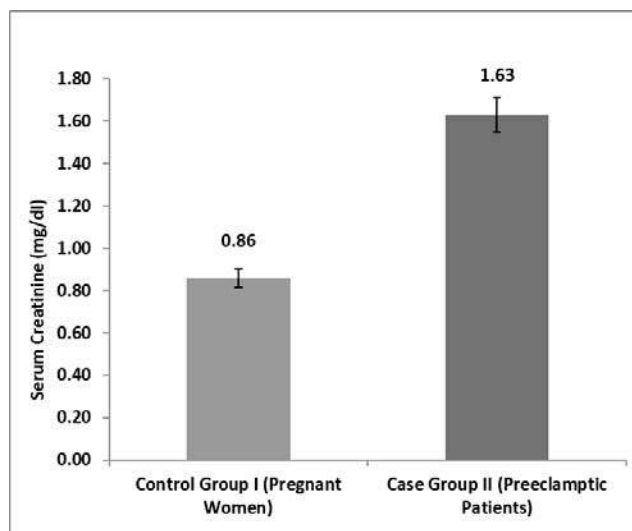


Figure 1 Comparison of mean serum creatinine levels in the study population

DISCUSSION

Preeclampsia remains a leading contributor to maternal and fetal morbidity and mortality, affecting approximately 5–7% of pregnancies globally. Despite extensive research, the precise etiology of preeclampsia is still not fully understood. However, nutritional deficiencies and metabolic disturbances have been frequently implicated, especially in low-resource settings where the prevalence of the condition is higher. Among the many biochemical parameters investigated, serum creatinine has emerged as potential markers associated with the onset and severity of preeclampsia.¹⁰

To the best of our knowledge, recent retrospective case-control studies have explored the clinical relevance of the serum uric creatinine in pregnancy. In our study, it was observed that the mean values of serum creatinine levels were 1.63 ± 0.17 and 0.86 ± 0.10 mg/dl in Group-II (Case) and Group-I (Control) respectively. A highly significant ($p < 0.001$) increase in serum creatinine levels were observed in preeclamptic patients (Case) when compared to that of the normal healthy pregnant women.

In one such study involving women diagnosed with preeclampsia and healthy controls ($n = 84$ and $n = 86$, respectively) significantly higher serum creatinine values was reported in the preeclampsia group.¹¹ Another recent study also confirmed elevated serum creatinine among preeclamptic patients compared to normotensive pregnant women.¹²

Every mother hopes for a healthy child who will reach their fullest potential in both physical and psychological growth.¹⁶ In developing countries, around 40,000 women, die each year due to preeclampsia or eclampsia. Preeclampsia itself is estimated to account for about 40% to 60% of maternal deaths in developing countries.¹⁷ Given this, serum creatinine levels may serve as an indirect and early marker of increased risk for developing preeclampsia.^{13,14}

In light of our findings and consistent with the current body of literature, it is evident that serum creatinine readily accessible and cost-effective biochemical markers. Our study supports that the specifically through the serum creatinine may enhance the accuracy of existing risk prediction models for preeclampsia.

CONCLUSION

The findings of this study demonstrate that serum creatinine levels are significantly elevated in women with preeclampsia compared to normotensive pregnant women. These alterations reflect underlying renal and metabolic disturbances associated with the condition. Therefore, incorporating routine screening of serum creatinine into antenatal care protocols may aid in the early detection of preeclampsia-potentially before the onset of clinical symptoms. Early identification and intervention could significantly improve maternal and fetal outcomes, thereby reducing the burden of preeclampsia-related complications.

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DISCLOSURE

All of the authors declared no competing interests.

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Metformin and Pitavastatin Alone and in Combination on Renal Function in Alloxan Induced Diabetic Rat

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ABSTRACT

Background: Type 2 diabetes has a strong association with dyslipidemia. Combination of antidiabetic and hypolipidemic drug are commonly practiced. Metformin, Pitavastatin and their combinations, widely used as therapeutic agents for diabetes and dyslipidemia. This study aimed to evaluate the renal safety by measuring serum creatinine levels in all groups of experimental rats.

Materials and methods: 48 healthy male Wister strains of albino rats weighting to 180-220 gm aged between 10-12 wks were selected for the study. The experimental condition was all set in a very. Alloxan was prepared accordingly. The metformin and pitavastatin solution were prepared every 48hrs to maintain its activity. Data were analyzed using ANOVA in each variable.

Results: In all six groups after two weeks treatment on day 15 The ranges of serum Creatinine in control group I were (0.3-0.9) mg/dl, diabetic control group IIA (0.7-1.2) mg/dl, metformin treated group IIB (0.3-1.1) mg/dl, pitavastatin treated group IIC (0.3-0.9) mg/dl, combination of metformin and pitavastatin treated group IID (0.3-0.8) mg/dl and group IIE (0.2-0.7) mg/dl. Here, significant difference in mean serum creatinine level in group IIA (0.97 ± 0.18) against group I (normal control group- 0.57 ± 0.23), other groups were insignificant when compare to group I (Normal control group). The ranges of serum Creatinine Although levels were within normal limit in all groups.

Conclusion: Metformin and pitavastatin combination might be an effective treatment in patients with both diabetes and dyslipidemia. As The ranges of serum Creatinine although levels were within normal limit in all groups.

KEY WORDS

Metformin; Pitavastatin; Renal function; Serum creatinine.

INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disorder of altered carbohydrate, fat and protein metabolism is become a global public health issue.¹ Prevalence of diabetes mellitus is currently increasing, sedentary life style and obesity, a major risk factor for diabetes.³ It is accompanied by damage, dysfunction and failure of various organs.² About 5 million adults died from DM

and its complications, in 2019.¹ Metformin is one of the safest and most effective anti-hyperglycemic agents currently used as first-line oral therapy recommended by both the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) since 2009.^{3,4} Metformin is a biguanide, improves glycemic control by enhancing insulin sensitivity in liver and muscle. Metformin also has a beneficial effect on several cardiovascular risk factors including dyslipidemia.⁵ It is estimated that 30-60% of patients with T2DM have dyslipidemia.⁶ Dyslipidemia is one of the major modifiable risk factors for CVD in DM patients. In DM, important enzymes and lipid metabolism pathways are affected, therefore, dyslipidemia is more common.¹ The one of the major goals of the treatment of dyslipidemias are the prevention of cardiovascular disease.⁷ Statins are considered to be the first-line pharmacological treatment for dyslipidemia worldwide and reducing the risk of coronary heart disease.⁸ Pitavastatin is the latest which is highly potent and has emerged with optimum efficacy and improved safety.^{9,10} Most statins increase the risk of new-onset diabetes. Unlike other statins, pitavastatin is reported to exert neutral effects on serum

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glucose level.^{11,12,13} Therefore, pitavastatin may be considered as good choices for patients with DM and hypercholesterolemia.¹⁴ Both metformin and statins act on glucose as well as lipid metabolism therefore, metformin–statin combination therapy is prescribed to many T2DM patients.¹⁵ When two drugs are used simultaneously those having synergistic effect helps to get a good response in managing disease conditions, as well as safety is a concern also. Hence animal studies can help in understanding the safety effect rather than human models. Alloxan is widely used to induce experimental diabetes therefore has been chosen to induce diabetes in rats. Alloxan causes diabetes by partial degeneration of beta-cells of pancreatic islets and subsequent compromise in the quality and quantity of insulin produced by these cells.¹⁶ The present study was intended for studying safety effect of Metformin and Pitavastatin alone and in combination in serum creatinine level in alloxan induced diabetic rats.

MATERIALS AND METHODS

Animal

A total number of 48 healthy male Wister strains of Albino rats weighting to 180-220 grams and ages between 10-12 weeks were selected for the study and which was collected from BCSIR, Dhaka. They were kept in animal house of Department of Pharmacology, Dhaka Medical College and were feed standard rat pellets collected from ICDDR'B Dhaka. Rats of different Groups were kept in different metallic cages and allowed to drink ab libitum and maintained under standard laboratory conditions. These rats were acclimatized for 3 days at room temperature and humidity before commencement of the study. Animal described as fasted were deprived of food for 16 hours but had free access to water. It is to be noted that out of 48 rats 6 rats were dead during the study period.

Chemicals

Drugs:

- Metformin: Metformin was supplied by Square Pharmaceuticals, Dhaka.
- Pitavastatin: Pitavastatin was supplied by Square Pharmaceuticals, Dhaka.

Reagents:

- Alloxan: Alloxan was supplied by Millon chemicals. Alloxan was dissolved in normal saline and was administered intraperitoneally in a dose of 120 mg/kg body weight.
- Reagents for estimation of serum creatinine.
- Normal saline.

This was an Experimental study was conducted at Department of Pharmacology, Dhaka Medical College, Dhaka. Total study period was one year extending from

January 2018 to December 2018. Sample size was 42 adults (180-220 gm) Wister strains of Albino rats. Stratified Random Sampling was followed for the selection of sample.

Alloxan induction in animal model

It was an experimental study, which designed to demonstrate the effect of combination therapy of Metformin and Pitavastatin on blood glucose level comparing to single drug of Metformin and Pitavastatin on Alloxan induced diabetic rats. The rats were divided randomly into two Groups containing 7 rats in Group I (Normal control Group) and 40 rats in Group II (Diabetic Group). To induce diabetes, these 40 rats of Group II were kept fasting overnight and 120 mg of Alloxan per kg body weight was injected intraperitoneally to each of the rats. The rats were than kept in cages with 5% glucose bottles to prevent hypoglycemia. After 72 hours of Alloxan injection to the rats, serum blood glucose level was estimated to measure the glycemic status, where blood was collected from the tail vein with aseptic precaution. Thirty-five rats became diabetic after 72 hours and 5 rats were died. All those 35 rats having blood glucose level ≥ 11.11 mmol/L and were considered as diabetic and further divided randomly into five Groups as IIA, IIB, IIC, IID and IIE. Each Group contained 7 rats. The Group I was treated as normal control and IIA was treated as diabetic control and the Groups IIB, IIC, IID and IIE were taken as experimental Groups. The day after 72 hours of Alloxan injection was considered as first day of follow up.

- Group I Normal control Group
- Group IIA Diabetic control Group
- Group IIB diabetic rats treated with Metformin 100 mg/kg body weight
- Group IIC diabetic rats treated with Pitavastatin 2 mg/kg body weight
- Group IID diabetic rats treated with Metformin 100 mg/kg and Pitavastatin 2 mg/kg body weight
- Group IIE diabetic rats treated with Metformin 200 mg/kg and Pitavastatin 4 mg/kg body weight.

Group I : This Group contained 7 rats, which were given standard rat diet and water for 15 days. Serum SGPT and serum creatinine were also measured on day 15.

Group II : Fasting blood glucose levels of 40 rats were checked on 1st day of experiment before induction of diabetes. Then the rats were given intraperitoneal injection of Alloxan at a dose of 120 mg/kg b.w. After Alloxan injection rats were provided with 15% glucose solution for 24 hours to prevent hypoglycemia along

with standard pellet diet and water ad libitum. Out of 40 rats, 5 rats were died within 3 days after Alloxan induction. Fasting blood glucose level was estimated 72 hours after Alloxan injection. Rats having blood glucose level ≥ 11.11 mmol/L were considered as diabetic and used for this study. All experimental rats became diabetic and further Grouped as IIA, IIB, IIC, IID and IIE. Each group contained 7 alloxan induced diabetic rats.

Group II A: In this Group, the diabetic rats were left untreated. On day 15 serum creatinine levels were estimated and the rats were sacrificed.

Group II B: In this Group, Alloxan induced diabetic rats were treated with Metformin 100 mg/kg orally by ryles tube for 15 days and serum creatinine were estimated on 15th day.

Group II C: In this Group, Alloxan induced diabetic rats were treated with Pitavastatin 2 mg/kg orally by and serum creatinine were estimated on 15th day.

Group II D: In this Group, Alloxan induced diabetic rats were treated with Metformin 100 mg/kg and Pitavastatin 2 mg/kg orally by ryles tube for 15 days serum creatinine was estimated after 15 days.

Group II E: In this Group, Alloxan induced diabetic rats were treated with Metformin 200 mg/kg and Pitavastatin 4 mg/kg orally by ryles tube for 15 days and serum creatinine were estimated on day 15th.

Collection of blood

Blood was collected aseptically from each animal after an overnight fasting condition.

Biochemical parameters analysis

Serum creatinine was analyzed on six Groups.

Estimation of serum Creatinine Level on day 15

Serum creatinine is an important laboratory marker for renal function. Kinetic colorimetric method was done to estimate serum creatinine level.

Principle of the method

The procedure was based upon a modification of the original picrate reaction (Jaffe, 1886). Creatinine under alkaline conditions reacted with picrate ions forming a reddish complex measured through the increase of absorbance in a prefixed interval of time was proportional to the concentration of creatinine in the sample.

Creatinine + Picric acid $\rightarrow$ red addition complex (Here, pH>12 and temperature 37°C)

Reference value: 0.2-0.9 mg/dl.

All the results were appropriately recorded in data collection form. Statistical analysis was done by SPSS

version 22.0. The variables were expressed as mean $\pm$ SD. The inter-Group comparison was analyzed by one-way ANOVA. Student's t-test was done for comparison of means. Statistical significance was considered at 5% level of significance

Prior to commencement of the study, after the departmental review, the research protocol was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka. The present study was experimental one involving animal. Proper permission regarding animal purchase, transport and experiment was obtained. Permission was also be taken for housing, administering foods on a standard rat pellet, collection of blood sample for biochemical analysis and sacrifice of animals under light anesthesia and collection of pancreases.

Ethical clearance: Dhaka Medical College ethical committee approved the study (no: MEUDMC/ECC/2018/220(R)).

RESULTS

The study was carried out to compare the blood glucose level before and after treatment in Alloxan induced diabetic rats with single and combination therapy with Metformin and Pitavastatin. For this study six experimental groups were selected. Group I normal control group, was given normal feed only. Group II was Alloxan induced Diabetic rats. Group two was further divided in Group- IIA, IIB, IIC, IID, IIE. Intraperitoneal injection of Alloxan significantly increased blood glucose level (15mmol/L) when compared with normal rats (4-6.5mmol/l). To assess the safety serum creatinine levels was also measured. Results were presented in tables and figures. Figure showed photographic and graphical representations of the relations, similarities and differences among different Groups. All the observations and results are described below.

The experimental rats were healthy and showed normal spontaneous activities throughout with normal respiration, responding appropriately to normal stimuli. On dissection, none of the rats from any group showed any gross abnormality of the internal organs like lungs, heart, liver, kidneys on naked eye examination.

Table I Comparison of mean serum creatinine levels among all groups at the end of drug administration

Groups	Mean $\pm$ SD (mg/dl)	F-value	p value
Group I	0.57 $\pm$ 0.23	4.625	0.002**
Group IIA	0.97 $\pm$ 0.18		
Group IIB	0.64 $\pm$ 0.30		
Group IIC	0.53 $\pm$ 0.24		
Group IID	0.54 $\pm$ 0.21		
Group IIE	0.44 $\pm$ 0.19		

Table I showed that group IIA (Diabetic control) had highest (0.97 ± 0.18) and group IIE had lowest (0.44 ± 0.19) mean serum creatinine level among all the six groups. Whereas significant difference among mean serum creatinine level were showed. The ranges of serum Creatinine were in group I (0.3-0.9) mg/dl, group IIA (0.7-1.2) mg/dl, group IIB (0.3-1.1) mg/dl, group IIC (0.3-0.9) mg/dl, group IID (0.3-0.8) mg/dl and group IIE (0.2-0.7) mg/dl. Although levels were within normal limit in all groups.

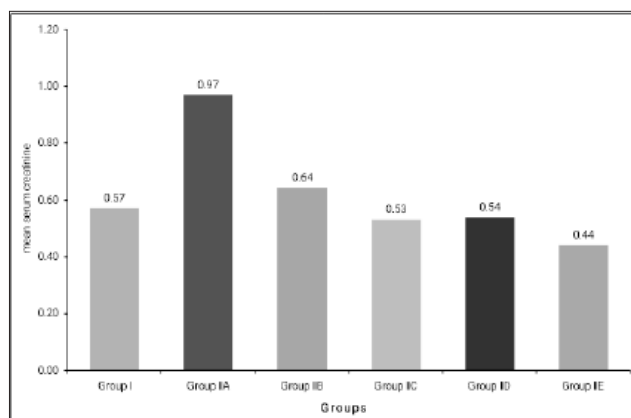


Figure 1 Simple bar diagram showing the mean serum creatinine levels in different groups

Figure 1 reveals comparison of mean serum creatinine levels in different groups. Group IIA showed highest level (0.97) of serum creatinine level and group IIE showed lowest level (0.44) of serum creatinine. The ranges of serum Creatinine were in group I (0.3-0.9) mg/dl, group IIA (0.7-1.2) mg/dl, group IIB (0.3-1.1) mg/dl, group IIC (0.3-0.9) mg/dl, group IID (0.3-0.8) mg/dl and group IIE (0.2-0.7) mg/dl.

Table II Comparison of serum creatinine between group I (Normal control group) with other groups at the end of drug administration.

Groups	Mean $\pm$ SD (mg/dl)	t-value	p value
Group I	0.57 $\pm$ 0.23		
vs Group IIA	0.97 $\pm$ 0.18	3.635	0.003**
vs Group IIB	0.64 $\pm$ 0.30	0.496	0.629 ^{ns}
vs Group IIC	0.53 $\pm$ 0.24	0.345	0.736 ^{ns}
vs Group IID	0.54 $\pm$ 0.21	0.245	0.811 ^{ns}
vs Group IIE	0.44 $\pm$ 0.19	1.143	0.275 ^{ns}

Table II showed significant difference in mean serum creatinine level in group IIA (0.97 ± 0.18) against group I (Normal control group- 0.57 ± 0.23) other groups were insignificant when compare to group I (normal control group). The ranges of serum Creatinine were in group I (0.3-0.9) mg/dl, group IIA (0.7-1.2) mg/dl, group IIB (0.3-1.1) mg/dl, group IIC (0.3-0.9) mg/dl, group IID (0.3-0.8) mg/dl and group IIE (0.2-0.7) mg/dl.

DISCUSSION

This experimental study was carried out to evaluate the effect of Metformin and Pitavastatin when administered alone and in combination on renal function in Alloxan induced diabetic rats. The serum creatinine is a potent renal marker which increase conditions that reveal renal damage. Comparison of mean serum creatinine levels in different groups reveals that there was significantly increased serum creatinine in study group II A (Diabetic control group) in comparison to group I (Normal control group) and the result is statistically significant at 1% level of probability ($p < 0.001$). Group IIA diabetic control group showed highest level (0.97) of serum creatinine level.¹⁷ But there was no significant change of serum creatinine among group I (control group) and study group IIC, group IID and study group IIE. Group IIE (Diabetic rats treated with Metformin 200 mg/kg and Pitavastatin 4 mg/kg body weight.) showed lowest level (0.44) of serum creatinine. The ranges of serum Creatinine were in group I (0.3-0.9) mg/dl, group IIA (0.7-1.2) mg/dl, group IIB (0.3-1.1) mg/dl, group IIC (0.3-0.9) mg/dl, group IID (0.3-0.8) mg/dl and group IIE (0.2-0.7) mg/dl. After two weeks of treatment there was significant difference in mean serum creatinine level in group IIA (0.97 ± 0.18) against group I (Normal control group- 0.57 ± 0.23), other groups were insignificant when compare to group I (Normal control group). Group II B (Metformin treated group) show not significant result in compare to group I (Normal control group), group II C (Pitavastatin treated group) show not significant result in compare to group I (Normal control group) and is Reno protective.^{18,19} Combination group IID and group IIE also show no significant change in serum creatinine level. Hyperglycemia gives rise to many complications of diabetes which includes nephropathy. Serum creatinine levels among different groups were measured. At the termination of treatment, there was no statistically significant difference found in the serum creatinine level of all groups and were found within normal ranges.

CONCLUSION

Serum creatinine level among all groups of experimental rats were within normal limit at the end drug administration of Metformin, Pitavastatin given alone and when given in combination.

DISCLOSURE

All of the authors declared no competing interests.

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Self-Medication with Antimicrobials among Medical Students of Bangladesh during the COVID-19 Pandemic: A Cross-Sectional Study

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ABSTRACT

Background: The COVID-19 pandemic disrupted healthcare access globally, potentially increasing unsupervised antibiotic use. Self-medication with antimicrobials among medical students is of particular concern due to their future prescribing role and its implications for Antimicrobial Resistance (AMR). The objective of the study was to describe the pattern of antimicrobial use as self-medication among the undergraduate medical students of Bangladesh during COVID-19 pandemic.

Materials and methods: A descriptive cross-sectional study was conducted from October 2020 to February 2021 among 4th-year MBBS students from 14 medical colleges (Five government, Nine non-government) in Bangladesh. Data were collected via a validated online questionnaire covering demographics, antimicrobial use without prescription and reasons for such practice.

Results: Of 916 respondents, the prevalence of antimicrobial self-medication was 22.06%. Among these, 75.24% used a single drug, 16.83% used two drugs and 7.92% used three concurrently. Azithromycin was most frequently used (52.47% of self-medicators), followed by doxycycline (16.83%) and ivermectin (15.84%). Fever, sore throat and dry cough were the most reported symptoms.

Conclusion: Despite medical training, a considerable proportion of students engaged in unsupervised antimicrobial use during the pandemic. Strengthened antimicrobial stewardship education is essential to address irrational prescribing habits early in medical careers.

KEY WORDS

Antimicrobials; COVID-19; Medical students; Self-medication.

INTRODUCTION

Self-medication, defined as the autonomous selection and consumption of medicines for self-diagnosed conditions without professional medical consultation, is a widespread global practice.¹ While it can offer benefits such as saving time, reducing healthcare costs

and empowering patients to manage minor ailments, inappropriate self-medication particularly with antimicrobials can have severe consequences. These include the emergence of Antimicrobial Resistance (AMR) adverse drug reactions, misdiagnosis and masking of underlying diseases.^{2,3} AMR, in particular, poses a significant public health threat, potentially rendering many current treatments ineffective, thereby increasing morbidity, mortality and healthcare expenditure.⁴⁻⁶

In many Low and Middle-Income Countries (LMICs) including Bangladesh, weak pharmaceutical regulatory enforcement allows easy over-the-counter access to antibiotics.⁷⁻⁸ This is compounded by high infectious disease burdens, gaps in public awareness and misconceptions about the efficacy of antibiotics against viral infections.⁹

The COVID-19 pandemic placed unprecedented strain on healthcare systems worldwide, disrupting access to medical services and fostering uncertainty about effective treatments.¹⁰⁻¹³ Lockdowns, fear of hospital-acquired infections and a proliferation of unverified treatment claims amplified by social media, created an environment conducive to increased self-medication with antimicrobials, often without evidence-based justification.^{14,15}

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Medical students are a particularly important group in this context. As future prescribers, they possess preliminary pharmacological knowledge but may lack the clinical maturity to make fully informed prescribing decisions.^{16,17} Studies in various countries have reported variable rates of antimicrobial self-use among medical students, but the COVID-19 pandemic presents a unique setting characterized by heightened anxiety, misinformation and easy access to drugs.^{13,18} Patterns established during medical school can influence future prescribing behaviors, making this a critical area of investigation.

In Bangladesh, there is limited evidence on the prevalence and determinants of antimicrobial self-medication among medical students during the pandemic. This study aimed to determine the prevalence of antimicrobial self-medication among the medical students of Bangladesh during COVID-19, identify the most commonly used antimicrobial agents and explore the underlying reasons and illness profiles associated with this practice.

MATERIALS AND METHODS

This was a descriptive cross-sectional study conducted in the Department of Pharmacology & Therapeutics of 14 Medical Colleges of Bangladesh including government (Armed Forces Medical College, Cumilla Medical College, Manikganj Medical College, Jashore Medical College Manikganj and Rangpur Medical College) and non-government medical colleges (Army Medical College Bogura, Army Medical College Chittagong, BGC Trust Medical College, Brahmanbaria Medical College, Chattogram International Medical College, Jalalabad Ragib-Rabeya Medical College, Sylhet, Khwaja Yunus Ali Medical College, Sirajganj, Medical College for Women, Dhaka and US-Bangla Medical College, Narayanganj) from October 2020 to February 2021. Study was conducted among the 4th year MBBS students of studied medical colleges and total 916 medical students participated in this study. A structured questionnaire was used for data collection and questionnaire was validated before survey. Ethical approval was taken from the Institutional Review Board (IRB) of BGC Trust Medical College, Chittagong. Permission was taken from college authorities and informed consent was taken from the participants of the Structured Questionnaire Survey. Researchers explained the nature and purpose of the survey to the students during a virtual class. This self-administered

questionnaire was linked in google form and was distributed among study population through email, messenger, whatsapp and other social media who gave consent. To assure the quality, students filled and submitted the questionnaire quickly during end of class. Later, this web-based questionnaire was sent to students who were absent in the class through email. A reminder mail or message was given on 7th day and 15th day of the primary one. The response generated by the students was received through google drive and it did not accept double response from same participant. To maintain confidentiality, responses were anonymous.

Data was compiled, presented and analyzed using Microsoft Excel and was expressed as percentage.

RESULTS

Nine hundreds and sixteen respondents were covered during the study period, of which 326 (35.59%) were males and 590 (64.41%) were females.

Table I Distribution of demographic characteristics of respondents (n=916)

Variables	Frequency	Percentage (%)
Gender		
Male	326	35.59
Female	590	64.41
Type of institution		
Government	477	52.08
Non-government	439	47.93

Overall prevalence of self-medication with antimicrobials among medical students was 22.06% (Figure 1).

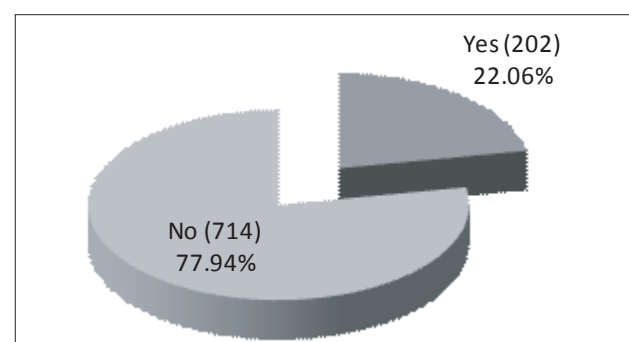


Figure 1 Overall prevalence of self-medication with antimicrobials among medical students (n=916)

Figure 2 showed that among 202 students, 152 (75.24%) took at least one antimicrobial drug, whether 34 students (16.83%) and 16 students (7.92%) took two drugs combination and three drugs combination respectively.

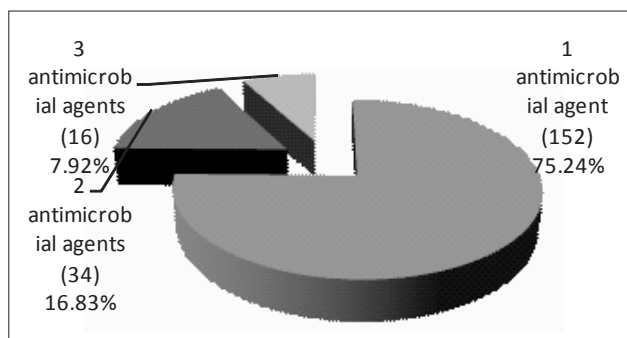


Figure 2 Pattern of antimicrobial consumption (n=202)

Figure 3 showed that azithromycin (52.47%) was the mostly used anti-infective agent as self-medication, followed by doxycycline (16.83%) and ivermectin (15.84%).

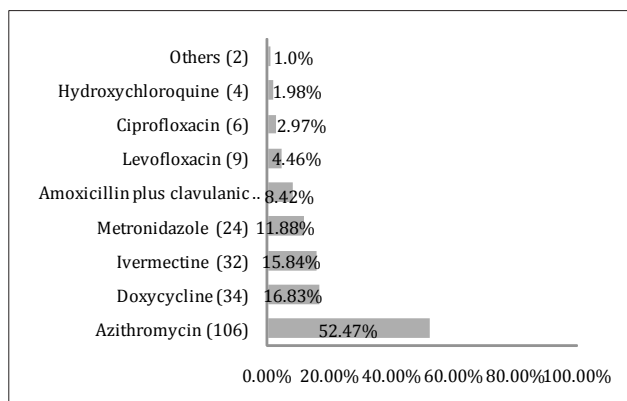


Figure 3 Antimicrobials used as self-medication (n=202)

As shown in Figure 4, fever (81.68%) was the most common reported illness followed by sore throat (53.96%) and dry cough (46.09%) for which antimicrobial was taken.

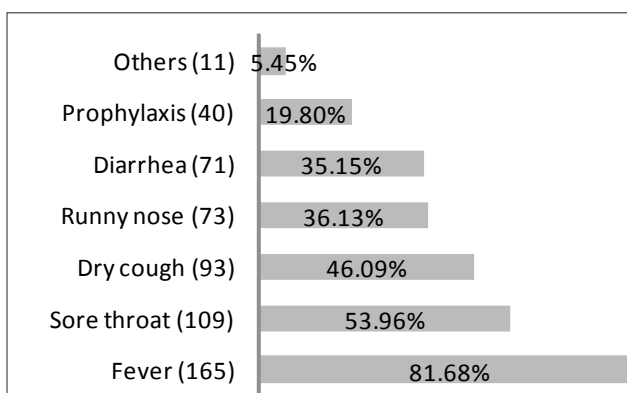


Figure 4 Reasons for antimicrobial self-medication (n=202)

DISCUSSION

This study found that more than one in five medical students of Bangladesh engaged in antimicrobial self-medication during the COVID-19 pandemic, despite

their medical training. Although this prevalence is lower than some pre-pandemic reports among the general public in Bangladesh, it remains concerning because these students are future prescribers whose habits will influence patient care.¹⁹

The predominance of azithromycin aligns with early-pandemic global trends, fueled by anecdotal and preliminary reports suggesting antiviral benefits, despite insufficient supporting evidence.^{14,20} Doxycycline and ivermectin use mirrors similar patterns seen in other LMICs, where accessibility, low cost and social media promotion contributed to their popularity.⁹

The research finding showed that fever was the most frequently reported symptom prompting antimicrobial use, followed by sore throat and dry cough. This pattern aligns with early-pandemic perceptions of these symptoms as indicative of COVID-19, potentially contributing to the high rates of empirical antimicrobial use despite viral etiologies.²¹

The use of multiple antimicrobials though less frequent, carries risks including drug-drug interactions, additive toxicities and increased selection pressure for resistant organisms.²²

From a public health perspective, such practices among medical students are troubling for two main reasons. First, inappropriate antimicrobial use directly contributes to AMR, a global health emergency.⁴ Second, self-medication behaviors formed during training may translate into future prescribing patterns that perpetuate irrational antimicrobial use.⁵

These findings underscore the urgent need to integrate comprehensive antimicrobial stewardship education into undergraduate medical curricula. Interactive, case-based learning on appropriate antimicrobial selection, resistance mechanisms and consequences of misuse could foster more rational prescribing attitudes. In parallel, stricter regulation of over-the-counter antibiotic sales in Bangladesh would reduce easy access and promote professional consultation.^{4,5}

CONCLUSION

Self-medication with antimicrobials was prevalent among Bangladeshi medical students during the COVID-19 pandemic, often involving drugs with limited or no proven efficacy against SARS-CoV-2. These behaviors, driven largely by perceived mild illness and prior experience, highlight the importance of early interventions in medical education to promote rational drug use. Strengthening antimicrobial stewardship training and regulating non-prescription antibiotic access are essential to combat future inappropriate prescribing and mitigate AMR.

DISCLOSURE

All the authors declared no competing interest.

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Insomnia in Elderly : A Review

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ABSTRACT

Background: Insomnia is a sleep disorder in which individuals have trouble falling asleep, staying asleep or waking up too early-addressed problems of elderly / ageing. Studies indicate that up to 50% of older adults struggle with falling or staying asleep. Various sleep problems in the elderly are linked to *Age-related cognitive decline and normal aging processes can be further disrupted by sleep disturbances caused by medical or psychiatric conditions such as *Chronic pain, depression and dementia. Additionally primary sleep disorders like *Sleep-disordered breathing and periodic limb movements during sleep *Can worsen the situation, especially when combined with other risk factors. Since sleep plays a crucial role in protecting the body and maintaining overall well-being, addressing sleep disorders is essential for a better quality of life. This review focuses on evaluating sleep disorders in elderly / ageing.

Methodology: This current study is a systematic review to published studies and articles by using PubMed and Google. Search strategy using appropriate key words and title.

Conclusion: Normal elderly / ageing accompanied by changes in the sleep quality, quantity and architecture. Specially there appears to be a measurable decrease in the ability to initiate and maintain sleep accompanied by a decrease in the proportion of the deeper more restorative slow wave sleep and REM sleep in the healthy elderly / ageing.

KEY WORDS

Ageing; Elderly; Insomnia; Sleep disorder.□

INTRODUCTION

The insomnia was borrowed from Latin *insomnis* “Sleepless” from the prefix in “Not” plus *somnus* “Sleep”. *Somnus* is actually related to Greek *hypnos* “Sleep” the source of English words such as *hypnosis* and *hypnotic*.

Sleep problems are common among the elderly / ageing. Those who experience sleep difficulties often report a lower quality of life and exhibit more symptoms of depression and anxiety compared to those who sleep well. Research indicates that insufficient sleep is linked to serious health risks and higher mortality rates in older adults.¹⁻³ As people age, the occurrence of Sleep-Related Breathing Disorders (SRBD) and insomnia symptoms rises significantly. However, little is known about how these conditions coexist and their combined effects.⁴⁻⁶ Poor sleep in older adults also increases the risk of reduced physical abilities, workplace accidents and memory issues.⁴

Etiology is complex, involving multiple factors, such as neurodegenerative changes in the brain, the patient's environment, medical or psychiatric morbidity, and medications used to treat chronic illnesses.^{2,7} Risk factors for sleeping difficulty in the elderly are depression, respiratory symptoms, disability and fair to poor perceived health and use of prescribed sedatives. The relationship between sleep disturbance and depression in the elderly is especially strong. Untreated insomnia may result in depression and the presence of a depressed mood may even predict insomnia. It is difficult to determine whether depression causes insomnia or vice versa in a study of 7954 respondents by Ford and Kamerow suggests that unremitting insomnia causes depression.⁸⁻¹⁰ This decreased ability to sleep is often as a function of co-morbidities associated with ageing.¹¹ A variety of age-related co-morbid conditions that exacerbate sleep disturbances such as ischemic heart disease, diabetes, depression, renal failure, arthritis and pulmonary disorders and the multiple medications used to treat them are common in the older adult population and enhance risk for development of insomnia.^{7,12-14} Narcotic analgesics routinely used to control chronic pain can cause Excessive Daytime Sleepiness (EDS).¹⁵

SEARCH STRATEGY

Available studies and abstract were identified through PubMed and Google Scholar (1989 – 2024). Key search topics were “Insomnia in Elderly : A review” and

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relevant articles from reference lists of reviewed articles were also searched. The search term were the following key words used in combination : Ageing; Elderly; Insomnia; sleep disorder. Bibliography was also searched from relevant full text.

DISCUSSION

Dementia

Dementia is a neurodegenerative disorders (e.g. Alzheimer's disease, Parkinson's disease). It affects memory, thinking, language, judgment and behavior. Behavioral disturbances are exhibited in almost all people with dementia. Common behavioral disturbances are mood disorders (e.g. Depression, apathy, euphoria) sleep disorders Insomnia, hypersomnia, night-day reversal) psychotic symptoms (Delusions and hallucinations) and agitation (e.g. Pacing, wandering, sexual disinhibition, aggression). They are often persistent greatly diminish quality of life of patients and their family caregivers.¹⁶ Reports suggest that 19-44% of community-dwelling patients with dementia complain about sleep disturbances such as circadian rhythm changes, medical illnesses, depression and the primary sleep disorders.¹⁷

Medical and Psychiatric Illnesses

Insomnia is difficulty in getting to sleep or staying asleep for long enough to feel refreshed on the next morning, even though he/she have had enough opportunity to sleep.¹⁸ Studies showed that sleep disturbances in patients with chronic medical diseases such as arthritis, chronic pain, diabetes etc report difficulty in falling and/or staying asleep. Other health-related diseases those are associated with insomnia include congestive heart failure, cancer, nocturia, shortness of breath due to chronic obstructive pulmonary disease, neurological deficits related to cerebrovascular accidents and Parkinson's disease.⁷ Ohayon and Roth conducted a large cross-sectional survey and observed that in 65% of those with major depression, 61% with panic disorder and 44% with generalized anxiety disorder also suffered from insomnia.¹⁹ Perlis et al. also described that insomnia is a significant risk factor for recurrent and a new onset of major depressive disorder especially for the elderly subjects, particularly women, were at greater risk for the development of depression.²⁰ The annual incidence rate of insomnia in 65 years or older is approximately 5%.²¹ While medications are traditionally used to treat insomnia, however, recent studies have shown that behavioral treatments are more effective and thus, recommended as the first-line treatment option. Others treatment involves a combination of sleep restriction therapy, stimulus control therapy, relaxation techniques and good sleep hygiene practices.²²

Circadian Rhythm Changes

As people older, their circadian rhythms become weaker, desynchronized and lose amplitude. Changes in the phasing of the circadian rhythm develop in older adults which can cause changes in the timing of the sleep period. The amplitude of the circadian rhythm decreases with age. In turn, this reduction can increase the frequency of night time awakenings and the severity of daytime sleepiness.²³ Nocturnal secretion of endogenous melatonin that also plays an important role in the sleep-wake cycle gradually decreases with age, possibly resulting in reduced sleep consolidation, duration and early morning awakenings.²³ Light exposure, social and activity rhythms has been demonstrated as the most powerful contributing to circadian entrainment in humans to the 24-h day.²⁴⁻²⁵

Primary Sleep Disorders and Elderly / Ageing

Mental disorders, medical conditions, medications or substance use are not counted as the primary sleep disorders. The most common primary sleep disorder in the elderly population is sleep-disordered breathing. Sleep-Disordered Breathing (SDB) describes a range of respiratory events that occur periodically during sleep, from simple snoring to complete cessation of air flow (Apnea) at the more severe end. Snoring is the sound caused by the vibration of the uvula and soft palate due to obstructed air movement during breathing while sleeping. It plays a role in the breathing cessation during an apnea event and approximately 50% of those who snore also have SDB.²⁶ The number of instances of apnea and hypopnea (Partial reduction in airflow) per hour of sleep is called the Apnea-Hypopnea Index (AHI). For SDB diagnosis, a patient has an AHI > 5-10. Sleep-disordered breathing is more prevalent in the older population and even more common in elderly nursing home patients, especially among those who suffer from dementia.²⁷⁻³⁰ Risk factors for SDB include: Age, gender and obesity. Other conditions that increase the risk of developing SDB include, the use of sedating medications, alcohol consumption, family history, race, smoking and upper airway configuration. The main symptoms of SDB in the elderly population are snoring and EDS. The Sleep Heart Health Study found that the risk of developing cardiovascular disease, including coronary artery disease, congestive heart failure and stroke, is positively related to the severity of SDB.³¹⁻³³

The most common and proven treatment for SDB is Continuous Positive Airway Pressure (CPAP). Patients with sleep apnea-hypopnea syndrome treated with CPAP have improved daytime function, alertness and quality of life.³⁴ Following CPAP treatment, older adults have increased neurobehavioral outcomes in

cognitive function, memory and have more consolidated sleep. Moreover, a positive effect for CPAP user observed on the factors affecting the cardiac functions included vascular resistance, platelet coagulability and other aspects of cardiovascular health. Therefore, the SDB treatment needs to be considered as an important and urgent regardless of the age.³⁵⁻³⁶

Other important primary sleep disorders are Restless Legs Syndrome/Periodic Limb Movements in Sleep (RLS/PLMS) and Rapid Eye Movement Sleep-Behavior Disorder (RBD).

Restless Legs Syndrome/Periodic Limb Movements in Sleep

Restless Legs Syndrome (RLS) is an uncomfortable sensation in legs accompanied by urge to move that occurs in a relaxed awake or restful state and thus, is more common during the evening or at night. Movement provides temporary relief of this uncomfortable sensation. Other terms that are used to describe this sensation include, Creepy-crawly, electric current, crazylegs, worms moving, ants crawling or pain.³⁷ The development of secondary RLS is associated with renal failure, iron deficiency, frequent blood donation, Parkinson disease, neuropathy, as well as pregnancy. Generally, these medical conditions are more frequently complicated in patient with RLS than in healthy controls.³⁸ Periodic Limb Movements in Sleep (PLMS) are characterized by clusters of repetitive leg jerks or kicks causing brief arousal and/or awakening occurring approximately every 20-40 sec over the course of a night during sleep. PLMS is diagnosed with an overnight sleep recording (Polysomnogram) which shows patients having at least 5 leg jerks per hour of sleep associated with arousal. It is often related to RLS and in the absence of RLS, there may belittle clinical significance to PLMS. The prevalence of both RLS and PLMS increases significantly with age.³⁹ The recommended treatments for RLS/PLMS are dopamine agonists for all age groups.⁴⁰

Rapid Eye Movement Sleep-Behavior Disorder (RBD)

RBD is a condition in which the skeletal muscle atonia normally found in Rapid Eye Movement (REM) sleep is absent. The patient's uncontrolled movements like kicking, punching, running and/or yelling are found in sleep and sometimes it can be aggressive and/or violent and might result in injuries either to the patient himself and/or the patient's bed partner. The etiology of chronic RBD is currently unknown, some data suggest that RBD may be the first manifestation and/or indication of a neurodegenerative disease.⁴¹

Study showed that 50% of those diagnosed with RBD has developed Parkinson's disease or Multiple System Atrophy within 3-4 years.⁴²

Among the common problems related to aging is sleep quality. Sleep disturbances that are frequently seen in people with neurologic disorders place significant stress on the functional status, changes in cognition and mood and behavioral disruptions. In addition, sleep-disordered breathing is a common manifestation higher in older compared to middle-aged adults resulting in an increased burden for families and caregivers associated with increases in overall health care costs. Careful health assessment in an individual with sleep disorders can improve the overall sleep problems for elderly in this population.

Table I Some Wake-Promoting Agents⁴³

MEDICATION	DOSE (MG)	COMMON SIDE EFFECTS	SERIOUS SIDE EFFECTS	CONTRA INDICATIONS AND PRECAUTIONS
Amphetamine/ dextroamphetamine IR (Adderall)	5-60	Weight loss, headache, insomnia, tremor, abdominal pain, anorexia.	Cardiomyopathy, chest pain, MI, irregular heart rate, immune	Advanced arteriosclerosis, hyperthyroidism, severe
Dextroamphetamine	5-60	xerostomia, euphoria, nervous, restlessness	hypersensitivity, reaction, CVA, CNS stimulation, psychotic disorder with prolonged use, sudden death,	hypertension
Methylphenidate hydrochloride (Ritalin, Concerta)	10-50	Loss of appetite, abnormal behavior, restlessness	Hypertension (Frequent), tachyarrhythmia (Frequent), thrombocytopenia, hallucinations	H/O drug dependence or alcoholism. Pts taking MAOIs and pts with glaucoma, motor tics, Tourette's syndrome
Modafinil (Provigil)	200-800	Headache, nausea, anxiety nervousness, insomnia, dizziness	Hypersensitivity, Stevens-Johnson syndrome, anaphylactoid hypertension	Angioedema, hypersensitivity, reaction

Avg: Average, CNS: Central Nervous System, CVA: Cerebrovascular Accident, MAO: Monoamine Oxidase, MAOI: Monoamine Oxidase Inhibitor, MI: Myocardial Infarction.

Talbe II Some Hypnotic Drugs Used in the Treatment of Insomnia⁴⁴

DRUG TYPE	MEDICATION	DOSE (MG)	SIDE EFFECTS	CONTRA INDICATIONS AND PRECAUTIONS
Benzodiazepine Hypnotics	Nitrazepam (Alodorm)	5-10	Drowsiness, dizziness, visual disturbance, hypersensitivity reactions, GI disturbance, urinary retention, dependency	Acute pulmonary insufficiency, respiratory depression, chronic psychosis
Nonbenzodiazepine Hypnotics	Temazepam (Restoril)	15-30	History of drug or alcohol use, tolerance, amnesia, psychiatric reactions	
	Zolpidem (Ambien)	5-10	Daytime drowsiness, dizziness, vertigo, nightmare, confusion	
	Zopiclone	(Age > 65 yrs)		
	(Imovane)	3.75	tremor, unsteady gait	
	Clonazepam (Klonopin)	(Age > 65 yrs)		
Nonhypnotics			Muscle hypotonia, coordination disturbance, mental change	Respiratory depression Acute pulmonary insufficiency
Sometimes Used to Aid Sleep	Diazepam (Valium)	0.5-3		

Table III Other Drugs Used to Treat Insomnia ⁴⁴

Drug	Drug Type	Dose (Mg)	Side Effects	Contra Indications and Precautions
Melatonin	Momone	3-6	Headach, depression	Autoimmune diseases
	Ethanolamine			
Diphenhydramine	antihistamine	50-75	Drowsiness, dryness of mouth & skin	Alcohol & other CNS depressants
Gabapentin	Anticonvulsant	900	Fatigue, weight gain, ataxia	drug

CONCLUSION

In conclusion, some evidence indicates that sleep need is reduced in older adults, including that older adults innately get less sleep, show less intense rebound sleep following deprivation, report less subjective sleepiness under sleep restriction conditions, and suffer a smaller increase in lapses of attention after sleep deprivation and restriction. However, alternative explanations of these findings leave open the possibility that sleep need remains high while sleep-generating capacity is impaired, for which there is now significant supportive empirical data. While there remains no complete consensus surrounding this debate, the current evidence appears to most parsimoniously support the hypothesis that older adults do not have a reduced sleep need, but rather, an impaired ability to register and/or generate that unmet sleep need.

RECOMMENDATION

In elderly / ageing patients sleep disorders occur at a higher frequency but may be difficult to assess. Residing in a long-term care facility are associated with increased depression which impacts sleep and environmental factors in long-term care facilities may additionally disrupt sleep. Interventions tailored to these challenges enhance effectiveness, including working with the patient's caregiver, installing bright room lighting and encouraging engagement in exercise and social activities offered by the facility.

DISCLOSURE

The author declared no competing interests.

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A Case of Disseminated Neonatal Varicella Infection: A Challenge to Treat

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ABSTRACT

Background: Varicella infection caused by varicella zoster virus can occur in intrauterine life and in neonate if mother is infected with the virus. The characteristic skin lesions are vesicular eruption at the hairline with caudal spread from the head to the trunk and extremities giving a centripetal distribution and pruritus followed by a prodrome of fever, malaise, headache and myalgias. The aim and objectives of this case report is to aware about severe complications of varicella infection in neonate which require early diagnosis and prompt management.

Case Presentation: We report a case of neonatal varicella where the mother was having vesicular skin eruptions two days prior to the time of delivery and the neonate contracted it during the perinatal period and developed clinical disease on the twelfth day of life complains of skin eruptions with fluid filled lesions all over the body associated with fever and poor feeding, excessive cry and respiratory difficulty for 2 days. Metabolic acidosis, hypoalbuminaemia, impetigo and abscesses, bacteraemia, pneumonia complicate the patient. Specific anti-viral therapy, intravenous immunoglobulin, intravenous albumin, electrolytes were given. early diagnosis and prompt management save the life of the patient.

Conclusion: Maternal varicella infection just before delivery has higher risk of developing neonatal varicella infection which can be disseminated and fetal. Early diagnosis and prompt management, prophylactic treatment to neonatal are the key to save patient from complications and disseminations.

KEY WORDS

Dissemination; Neonatal Varicella infection.

INTRODUCTION

Varicella-Zoster Virus (VZV) is a double stranded encapsulated DNA virus belonging to the Herpes virus family (human Herpes virus type 3, HHV-3).¹ The virus is spread by airborne droplets and by direct contact with the fluid of infectious lesions, highly contagious and epidemics occur most often in late winter or spring. The incubation period is from 10 to 21 days, followed by a prodrome of fever, malaise, headache and myalgia's. The rash typically begins 24-48 hours later at the hairline with caudal spread from the head to the trunk

and extremities, giving a centripetal distribution. Lesions are pruritic and vesicular on an erythematous base ('Dewdrops on a rose petal').²⁻³ Varicella infection has a broad range of clinical presentations, from mild spontaneously resolving infections to severe complicated episodes requiring hospitalization and intravenous therapies.⁴ It can lead to disseminated life-threatening diseases in unimmunized newborns contaminated around the time of delivery. Pattern and severity of child infection depends on the moment of contamination (Before, around or after delivery) the maternal immunostatus against VZV, the gestational age of the baby and the presence of other underlying conditions.⁵ The most common complication seen is bacterial super infection leads to impetigo and abscesses and rarely bacteraemia, pneumonia and encephalitis.⁵

CASE PRESENTATION

Master 'X' 14 days old post dated (40+wks) male normal vaginally delivered neonate, 1st issue of a non-consanguineous parents from kotwali visiting to Outpatient Department of Dermatology and Venereology of Chattagram Maa-O-Shishu Hospital on 1st August, 2022 with the chief complains of skin eruptions with fluid filled lesions all over the body associated with fever and poor feeding, excessive cry

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and respiratory difficulty for 2 days with H/O varicella infection of mother two days before delivery of the child. According to patient's mother, the skin lesions initially starts from scalp, hairline then spread over the trunk then gradually spread to the whole body with nasal congestion and lesions became pus forming. There is no history of convulsion, diarrhea or vomiting with history of taking Homeopathic medicine and history of maternal chicken pox infection two days prior to the delivery of the baby. Outdoor consultant examined the patient and suspected the case was of neonatal varicella infection and advised to admit. After admission in neonatal ward respected bed doctor pediatrician found On admission baby was irritable, ill looking, toxic in appearance, moderate anaemia, no jaundice or dehydration, Heart rate-164b/m, R/R-72b/m, Temp-101 degree F, SBP-50 mm of Hg, Po2-92%, CRT-<30, weigh-3.8kg, length-48cm, OFC-34cm, Anterior fontanelle-open, on examination of skin there was vesicular eruption on erythematous base, non-follicular pustules with crust formation with vesicular lesions all over the body. On abdominal examination there is no organomegaly. His reflex was hypertonic, irregular, Swallowing: poor, no congenital anomaly. They provisionally diagnosed the case as a post dated (40+ wks) with AGA9 (3.8kg) with varicella with secondary infection with low onset neonatal sepsis. On investigations there was microcytic hypochromic anaemia, neutrophilic leucocytosis, hyponatremia (124mmol/l), hypoalbuminaemia (1gm/dl), SGPT-normal(33u/l), Serum creatinine normal(0.3mg/dl), random blood sugar 105mg/dl, serum calcium 9.2mg/dl, Arterial blood gas analysis-shows oxygen saturation-96%, Paco2 decrease, sign of acidosis, urine routine examination was normal and urine culture shows no growth. Tzanck smears of skin scrapings show multinucleated giant cells and confirm the diagnosis of herpes virus infection, culture and sensitivity from pus from lesions shows growth of staphylococcus. Patient was treated in isolation ward with oxygen inhalation 1l/min, intravenous acyclovir (20mg/kg)-3cc+12cc I/V fluid @ 15d/min over one hour, eight hourly for 14 days, intravenous albumin 10gm/50ml-19ml I/V @6.3ml/min via g/p for 3 days, intravenous immunoglobulin (19cc I/V@ 6.3ml/h via s/p over 3 hours stat and daily for 3 days), Hyponatremia was corrected within 48 hours with nacl (0.9%), 80ml (Total requirement =deficit+daily requirement= 20.5+11.4= 32mcg) in a day with fluid, injectable antibiotics-cefotaxime and flucloxacillin, intravenous-amino acid, glucose and electrolytes, Calcium gluconate, frusemide topical mupirocin ointment, acyclovir cream.



Image 1 Vesiculopustular eruption with crust formation more confluent in face and trunk. On the day of admission



Image 2 Hyperpigmented crusted plaques and patches with scaling on the 7th day of admission



Image 3 Healed lesions, hyperpigmentation, residual crust and scarring on 10th day of admission

DISCUSSION

Neonatal varicella is rarely encountered and treated even less. It is distinct from congenital varicella caused due to the intrauterine infection of the fetus. Neonatal varicella on the other hand is caused due to peri-natal infection of the neonate in a very narrow window of time. Incidence of neonatal varicella is very low. It is difficult to diagnose by residents and junior doctors and pediatricians.⁶ Experienced pediatric dermatologist can manage the case promptly. Disseminated varicella in the newborn was first described by Hubbard in the late 19th century.⁷ Incidence of varicella has been reported to be between 0.1 to 0.7/1000 pregnancies as around 88 to 98% of the population already has anti-varicella zoster virus antibodies by 20–40 years of age.⁸⁻¹⁰ Although the occurrence of neonatal varicella is quite rare, up to 31% of infants with severe disease may succumb to it.¹¹ M. Aparajita et al. report a case of Haemorrhagic varicella in newborn in Indian pediatrics where she found the 21 days neonate presented with vesicular eruption all over the skin which gradually become haemorrhagic blisters in skin with melena, hepatomegaly with history of mother's varicella infection 4 days prior to delivery. They also treat the case with intravenous acyclovir for 14 days.¹² Ak. Bardwaj et al. report a case of neonatal varicella where they found mother with history of varicella infection 3 days prior delivery and deliver a healthy baby with no skin lesion and normal weight and normal vitals. They gave prophylactic acyclovir soon after birth but after 5 days neonate developed vesicular eruption in skin with respiratory difficulties, they shift the patient to NICU and continue acyclovir for 14 days and gradually lesions healed.¹³ Chandra Madhur Sharma et al also reported classical case of neonatal varicella without dissemination.¹⁴ Poonam Marwah et al report a case of fatal neonatal varicella despite varicella zoster immunoglobulin where they said about a 9 days old neonate with vesicular eruption all over skin with respiratory difficulties and poor feeding with history of receiving varicella zoster immunoglobulin 12h after delivery as child's mother had history of varicella infection 3 days prior delivery. On examination it was found that baby was in shock and repeated convulsion. He was isolated and treated with intravenous acyclovir (15 mg/kg 18 h), antibiotics, phenobarbital and phenytoin, inotropes and mechanical ventilation. The child, however, continued to deteriorate and expired on day 15 of life. Investigations revealed positive serum varicella zoster immunoglobulin M antibody test (Test value - 1.32 Immune Status Ratio [ISR] positive >0.90 ISR), lumbar puncture suggestive of viral encephalitis (Cerebrospinal fluid protein - 175 mg%,

sugar - 68 mg% [Blood sugar - 102 mg%], cells - 200/mm³, 70% were lymphocytes). Blood picture showed positive C-reactive protein. Repeated blood cultures sent during the neonate's hospital stay were sterile. Chest X-ray showed bilateral infiltrates suggestive of varicella pneumonia.¹⁵

It is very important to initiate anti-viral therapy in the neonate at the earliest opportunity. The case reported here and others reported had a very high chance of contracting neonatal varicella since the mother had developed chicken pox two days prior to the date of delivery. If acyclovir therapy was initiated prophylactically which was helpful in reducing both the severity and duration of the rash in the baby when baby is delivered may be there was a possibility of the baby may not develop complications. Acyclovir and its pro-drug form valacyclovir are the drugs of choice for treatment of acute Varicella zoster virus infection.

LIMITATIONS

Varicella zoster immunoglobulin can't given as unavailability of this immunoglobulin. So outcome can't be observed.

CONCLUSION

Maternal varicella infection just before delivery has highest risk for neonate to develop disseminated neonatal varicella infection. Management remains a challenge in daily practice. Contamination around delivery deserves aggressive preventive therapy. Rapid diagnosis and prompt management is lifesaving like this case.

RECOMMENDATION

Prophylactic antiviral is recommended for neonates whose mother has history of varicella infection one week prior delivery to prevent complications and dissemination. More cases required for future research.

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PATIENT CONSENT

Informed written consent was taken from the parents of the child for publication of this case report, including photographs.

DISCLOSURE

All the authors declared no competing interest.

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