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ISSN 1023 - 1986
eISSN 2408 - 8366

BANGLADESH JOURNAL OF MEDICINE

May 2024 Volume 35 Number 2

Content continued in inside front cover

OFFICIAL ORGAN OF
THE ASSOCIATION OF PHYSICIANS OF BANGLADESH

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BANGLADESH JOURNAL OF MEDICINE

ISSN 1023 - 1986
eISSN 2408 - 8366

Vol. 35 No. 2, May 2024

Official Journal of the Association of Physicians of Bangladesh (APB)
Room: 1701, Block: D, Dept. of Medicine
Bangabandhu Sheikh Mujib Medical University, Shahbagh, Dhaka, Bangladesh

Bangladesh Journal of Medicine, the official Journal of Association of Physicians of Bangladesh is a peer reviewed journal. It is published thrice in a year (January, May and September). It accepts original articles, review articles, case reports, clinical images, short communi- cation and correspondence etc. The area of coverage is broadly Medicine and its all branches. The editorial board has the right to choose the submitted articles suitability for the journal. Complimentary copies of the journal are sent to libraries of all Public Medical Colleges and other relevant academic institutions in the country and selected institution abroad.

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ANNUAL SUBSCRIPTION

Tk. 400/- for local and US$ 40 for overseas subscribers.

PUBLISHED BY

Prof. Quazi Tarikul Islam
on behalf of the Association of Physicians of Bangladesh

PRINTED AT

Asian Colour Printing
130 DIT Extension Road, Fakirerpool
Dhaka, Bangladesh
Phone : +88 02 58313186, +88 01835180135
E-mail: asianclr@gmail.com
Web: asiancolourprinting.com

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

EDITORIAL

ADVANCEMENTS IN DENGUE PREDICTION: A PATH TOWARDS EFFECTIVE PREVENTION AND MANAGEMENT

ASM ALAMGIR

Dengue fever, a mosquito-borne viral infection, continues to pose a significant public health challenge globally, particularly in tropical and subtropical regions. Dengue cases have risen dramatically around the world, with 70% of them occurring in Asia. Globally, the World Health Organization (WHO) estimates that 3.9 billion people – or half of the world's population – are at risk of infection.

Bangladesh has seen regular outbreaks of dengue from the year 2000. Yet the recent outbreak has been surprising – not only did a surge in cases start earlier than usual (typically cases start during the June-October monsoon), but the disease has also spread beyond its previous concentration in Dhaka and Chattogram.In 2022, Dhaka city accounted for 63% of cases, while in 2023, 66% were reportedfrom outside Dhaka anddengue is being reported from all 64 districts of the country.

Despite ongoing efforts to control its spread, the incidence of dengue fever remains alarmingly high, with millions of cases reported annually. Because of this, there is an urgent need to explore innovative approaches for dengue prediction and proactive measures to mitigate its impact on public health.

Traditionally, dengue prevention strategies have primarily focused on vector control measures, such as mosquito eradication programs and community education campaigns. While these efforts have undoubtedly helped reduce transmission rates, they often fall short in accurately predicting and preemptively addressing outbreaks. However, recent advancements in data analytics, epidemiological modeling, and artificial intelligence offer promising avenues for enhancing dengue prediction.

One notable approach involves the integration of environmental data, such as temperature, humidity, and rainfall patterns, with epidemiological surveillance data to develop predictive models for dengue outbreaks. By leveraging machine learning algorithms and real-time data streams, researchers can identify high-risk areas and forecast the likelihood of dengue transmission with greater accuracy. Additionally, the advent of digital surveillance systems and mobile health technologies enables timely reporting of dengue cases, facilitating prompt response and mitigation efforts.

Furthermore, the use of serological and molecular tools for dengue surveillance allows for early detection of the virus in both human and mosquito populations. Seroprevalence studies provide valuable insights into the immunity levels within communities, helping prioritize resource allocation for vaccination(as and when available) campaigns and targeted interventions. Similarly, molecular techniques, such as polymerase chain reaction (PCR) assays, enable rapid identification of dengue virus strains and their genetic diversity, aiding in tracking viral spread and monitoring potential outbreaks.

While significant progress has been made in dengue prediction, several challenges and opportunities lie ahead in this evolving field. Firstly, there is a critical need for interdisciplinary collaboration between epidemiologists, entomologists, data scientists, and healthcare professionals to develop comprehensive predictive models and decision support systems for dengue prevention and control. By harnessing collective expertise and resources, we can better understand the complex dynamics of dengue transmission and implement targeted interventions tailored to local contexts.

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DOI: https://doi.org/10.3329/bjm.v35i2.72814
Date of received: 21/04/2024 Date of accepted: 22/04/2024

Moreover, efforts should be intensified to strengthen public health infrastructure and surveillance capabilities in dengue-endemic regions. This includes enhancing laboratory capacity for rapid diagnostics, expanding access to vector control measures, and fostering community engagement through education and awareness campaigns. Additionally, investment in research and development of novel therapeutics and vaccines against dengue is essential to complement existing prevention strategies and reduce the burden of the disease on healthcare systems.

Furthermore, prioritizing equity and social justice in dengue control efforts is paramount to ensuring that vulnerable populations, such as low-income communities and marginalized groups, are not disproportionately affected by the disease. This necessitates a holistic approach that addresses underlying social determinants of health, promotes community empowerment, and fosters sustainable development practices.

The science of dengue prediction has witnessed significant advancements in recent years, offering new opportunities to strengthen prevention and control efforts. By leveraging innovative technologies, interdisciplinary collaborations, and community-driven approaches, we can improve our ability to predict, prevent, and manage dengue outbreaks effectively. However, sustained investment, strong political commitment, and collective social action are essential to realizing the full potential of these advancements and achieving a world free from the burden of dengue fever.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

REVIEW ARTICLE

ARTIFICIAL INTELLIGENCE IN MEDICINE: A NEW FRONTIER

MD. AZIZUL HAQUE[1], QUAZI TARIKUL ISLAM[2]

Abstract:

Artificial intelligence (AI) refers to the engineering and science of making intelligent machines through algorithms or rules, mimicking human cognitive functions, such as learning and problem-solving. AI has several branches, such as machine learning and deep learning, which can add intelligence to applications. Machine learning is the study of algorithms that allow computer programs to improve automatically through experience. Deep learning algorithms learn from an extensive, multi-layered collection of interconnected processes and expose these processors to many examples. In the coming years, the integration of AI in routine medical care is expected to revolutionize Medicine, potentially improving patient care and quality of life. The time required for a diagnosis can be greatly reduced, and diagnostic efficiency can be significantly enhanced when AI assists clinicians. Large language model chatbots are capable of clinical expert-level medical note-taking, consultation, and question-answering.Chatbotscan generate human-like text, may help diagnose diseases based on medical records, and may suggest treatment options or plans. Artificial intelligence algorithms, particularly deep learning, have demonstrated remarkable progress in radiological image analysis and diagnosis and may improve radiologists' efficiency. These algorithms may also improve diagnostic accuracy in dermatology, histopathology, fundoscopy, endoscopy, and other medical images. Natural language processing and ambient clinical intelligence automate administrative duties like recording patient visits in electronic health records, streamlining clinical workflow, and freeing up doctors to spend more time with patients. AI may also help with new drug discoveries, precision medicine, and clinical research. AI developments can revolutionize several healthcare-related fields and pave the way for a more individualized, accurate, predictive, and portable future.

Keywords: *Artificial intelligence, Medicine, machine learning, deep learning, convolutional neural network.*

Received: 18.04.2024 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72811

Citation: *Haque MA, Islam QT. Artificial Intelligence in Medicine: A New Frontier. Bangladesh J Medicine 2024; 35: 54-60.*

Introduction:

Artificial intelligence (AI) is the intelligent behavior by computers with little to no human interaction. Alan Turing, considered to be the father of theoretical computer science and artificial intelligence, first described using computers to simulate intelligent behavior and critical thinking in 1950. Turing described a simple test, later known as the Turing test, to determine whether computers can achieve human-level performance in cognition-related tasks.[1]John McCarthy first used the phrase "artificial intelligence" (AI) in 1955, characterizing it as "the science and engineering of making intelligent machines."The discipline of artificial intelligence was officially established in 1956 during a conference held at Dartmouth College.[2]AI refers to the engineering and science of making intelligent machines through algorithms or rules, which mimics human cognitive functions, such as problem-solving and learning. [3]

With continued progress in electronicspeed, capacity, and software programming, computers continued to evolve. *Deep Blue* was the first chess computer to beat

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Garry Kasparov, the reigning world champion, in a game under tournament conditions on February 10, 1996.It was a symbolic moment for AI because it demonstrated that AI can match or even surpass human intelligence. In the last few decades, the use of AI has been expanded in many scientific fields, especially healthcare. There are two branches of AI: virtual and physical. The virtual branch is represented by natural language processing, neural networks, and machine learning. In contrast, the physical branch is represented by intelligent medical devices and robots delivering care.

AI has several fields, such as machine learning and deep learning, that can add intelligence to many applications. Algorithms that allow computer programs to automatically get better through experience are called machine learning. Machine learning algorithms fall into three categories: (i) unsupervised (ability to identify patterns), (ii) supervised (classification and prediction algorithms based on prior examples), and (iii) reinforcement learning (use of reward and punishment sequences to form a strategy for operation in a particular problem space).[4]Deep learning (DL) algorithms use extensive, multi-layered collections of interconnected processes, and these processors are exposed to many examples.DL is the predominant method in AI today, driving improvements in speech and image recognition.[5]In the coming years, the integration of AI in routine medical care is expected to revolutionize Medicine, potentially improving patient care and quality of life.

AI in Medical Diagnosis:

The time required for a diagnosis can be greatly reduced, and diagnostic efficiency can be significantly improved when AI assists clinicians. Through the analysis of clinical data from radiology (such as X-ray, CT, and MRI), pathology, endoscopic, ultrasonographic, and biochemical examinations for relevant medical conditions, artificial intelligence (AI) can make a prompt and accurate conclusion, particularly for complex diagnoses.

Use of Large Language Model Chatbots in Medicine:

Chatbots such as GPT-4 (Generative Pre-trained Transformer 4) were released in March 2023, and they can perform several text-based tasks in Medicine. Early studies have shown that these models can facilitate clinical expert-level medical note-taking, consultation, and question answering. After listening to healthcare provider-patient interactions, automated medical note-taking by AI can significantly reduce the administrative burden.[6]ChatGPT and others can respond to case scenarios written as prompts and have impressive but mixed results.[7]

These models can generate human-like text, may assist in diagnosing diseases based on medical records, and even suggest treatment options or plans. Without any specialized training or reinforcement, ChatGPT performed at or near the passing threshold of 60% accuracy in the United States Medical Licensing Examination (USMLE) step 1, step 2 CK, and step 3 examinations. Furthermore, ChatGPT's explanations showed a high degree of insight and consistency. These findings imply that large language models can be helpful in clinical decision-making and medical education.[8]

Early studies of large language models for text-based tasks in Medicine have included chatbots such as GPT-4 (Generative Pre-trained Transformer 4) and have shown that these models are capable of clinical expert–level medical note-taking, question answering, and consultation. Chatbots can also be a source of healthcare information for patients and may help fight off medical myths and disinformation. A Bangla Chatbot developed by local biomedical engineers in collaboration with local physicians can have a massive impact on spreading authentic medical information to patients and caregivers.

Automation and Ambient Clinical Intelligence:

Artificial intelligence systems that use natural language processing (NLP) algorithms may be able to automate administrative duties like recording patient visits in electronic health records, streamlining clinical workflow, and freeing up doctors to spend more time with patients.[9]

AI's speech recognition software can recognize a patient's or doctor's spoken language, convert it to patient notes, and save them electronically, thereby reducing workload.[10]

AI in Radiology:

Artificial intelligence (AI) algorithms, particularly deep learning, have demonstrated remarkable progress in radiological image analysis and diagnosis. Radiologists can use AI to interpret images from various imaging methods, such as radiography, CT, MRI, and ultrasonography. Traditionally, radiologists visually assess medical images to diagnose, characterize, and monitor diseases. AI algorithms can automatically recognize complex patterns in imaging data and provide quantitative rather than qualitative assessments of radiographic characteristics.AI-based algorithms help the radiology workflow, including image acquisition, image reconstruction, visualization, analysis, diagnosis, and prognosis prediction. They also help non-radiologist doctors using medical-imaging AI.[11]

Researchers compared the performances of AI with those of human radiologists in interpreting various radiological images. The AI-Rad Companion Chest X-ray (AI-Rad, Siemens Healthineers) was tested against two human radiologists' written reports. The AI-Rad offered better sensitivity for the detection of lung lesions (0.83 versus 0.52), consolidations (0.88 versus 0.78), and atelectasis (0.54 versus 0.43) compared to humans.[12]The performance of a DL algorithm for identifying chest radiographs with clinically relevant abnormalities in the emergency department setting was evaluated by Hwang et al. For the AI algorithm, a sensitivity of 88.7% and a specificity of 69.6% at the high-sensitivity cutoff was noted. Radiology residents showed lower sensitivity (65.6%; p<0.001) and higher specificity (98.1%; p<0.001) compared with the algorithm. After the reinterpretation of chest radiographs with the use of the algorithm's outputs, the residents' sensitivity improved.[13]WHO has recommended computer-aided Detection for Tuberculosis (CAD4TB) as an alternative to human reporting of digital chest X-ray (CXR) for screening and triage for TB. It takes 10 seconds to evaluate lung abnormalities. A study in Bangladesh showed that the sensitivity of CAD4TB v6 was close to 100%, whereas the human radiologist's sensitivity was 88.2%.[14]Not only in CXR, artificial intelligence systems have approached neuroradiologist-level differential diagnosis accuracy at brain MRI. For accuracy of the top three differential diagnoses, the AI system (91% correct) performed similarly to academic neuroradiologists (86% correct; p = 0.20) and better than radiology residents (56%; p <0.001), general radiologists (57%; p < 0.001), and neuroradiology fellows (77%; p = 0.003).[15]

Integrating AI into radiology offers possible advantages and difficulties for radiologists and the AI community. The majority of radiology residents and radiologists anticipate significant changes in the radiology field during the next decade, and they think AI should play the function of a "co-pilot," serving as a second set of eyes and streamlining workflow duties. AI is also a valuable tool for non-radiologist clinicians in resource-poor settings where round-the-clock radiology services are unavailable.[16]

In addition to the radiologic diagnosis, AI algorithms can accurately predict clinical outcomes based on CT data in cancer and traumatic brain injury cases.[17,18]Effective clinician-AI collaboration is essential for successfully applying AI in radiology, utilizing the complementary skills of both.

AI for Interpretation of Medical Images:

AI algorithms are remarkably successful in the interpretation of medical images. Their use has been extended to various medical imaging applications, including the diagnosis of dermatologic conditions and the interpretation of electrocardiograms, pathological slides, and ophthalmic images.[16]Google Net Inception or similar algorithms can be trained with millions of dermatological images. Subsequently, the patterns of submitted digital images can be analyzed at a pixel level, and a diagnosis can be made.[19]

A systematic review was done by OT Jones et al. to evaluate the role of artificial intelligence and machine learning algorithms in facilitating the early diagnosis of dermatologic malignancies, focusing on their application in primary and community care settings. It showed reasonable mean diagnostic accuracy for melanoma (89·5%), squamous cell carcinoma (85·3%), and basal cell carcinoma (87·6%).[20]Application of deep-learning convolutional neural networks, one of the most powerful artificial intelligence techniques, to the interpretation of electrocardiograms (ECG), is feasible and valuable. Neural networks trained with large numbers of digital ECGs can diagnose common cardiac conditions and help detect some atypical conditions like silent atrial fibrillation, asymptomatic left ventricular dysfunction, and hypertrophic cardiomyopathy based on the ECG alone.AI algorithms to detect other cardiac conditions, such as amyloid heart disease, and aortic valve stenosis are in the active stages of development.[21]

Accurate histopathological diagnosis is a prerequisite for the management of many diseases. However, even for experienced pathologists, visual observation and subjective interpretation can result in intra- and inter-observer disagreement. AI-aided computational pathology can improve the diagnostic accuracy of pathology slides. One of the other advantages of computational pathology is that it allows the simultaneous inspection of histopathology images along with patient metadata, such as demographic, gene sequencing, or expression data, and progression and treatment outcomes. Whole slide imaging can detect features that are difficult to detect by the human eye alone.[22]

Internists in their daily clinical practice have to do fundoscopy to diagnose many systemic conditions affecting the eyes, like diabetic and hypertensive retinopathy, papilloedema, optic atrophy, Roth spots, choroid tubercle, retinitis pigmentosa, and many others. Machine learning algorithms can help immensely in diagnosing ophthalmic conditions from ophthalmic images. Conventional diagnostic methods

relying solely on physicians' knowledge and professional experience can lead to a high rate of misdiagnosis and delayed ophthalmic referral, resulting in poor outcomes. Diabetic retinopathy is a potentially preventable cause of blindness, affecting millions of people worldwide. A deep convoluted neural network for automated detection of diabetic retinopathy was first used by Gulshan et al.[23]Keel and colleagues developed a deep learning-based diabetic retinopathy screening model for use in an endocrinology outpatient clinic, which resulted in 96% patient satisfaction.[24]

Lumineticscore (formerly IDX-DR) is the first medical device to be authorized by the US FDA to provide a screening decision for diabetic retinopathy without the oversight of a clinician, stratifying patients into those who require immediate ophthalmology review, and those that do not, who need 12 monthly screenings. [25]

AI in Endoscopy:

AI-augmented endoscopy can significantly enhance the diagnosis of gastrointestinal diseases, including Barrett's esophagus (with or without dysplasia),early detection of carcinoma at different sites, small bowel angiodysplasia, colonic polyp, and assessment of mucosal healing in ulcerative colitis, by shorteningthe detection time and improving the diagnostic accuracy. The convoluted neural networks may also aid automated endoscopy reporting and triaging for endoscopy referral, thus reducing the administrative workload of a busy endoscopy unit.[26]

The current guidelines propose endoscopic surveillance in Barrett's esophagus (BE) patients with random four-quadrant biopsies obtained every 1-2 cm to detect dysplasia. This is because only experts can accurately perform the visual diagnosis of early dysplasia related to BE. Furthermore, 10% of upper gastrointestinal malignancies are overlooked during endoscopy. AI-aided diagnosis is expected to help endoscopists minimize these shortcomings of conventional endoscopy.[27]A convolutional neural network (CNN)pre-trained and fine-tuned on a dataset of thousands of endoscopic images, either positive or negative for H. pylori, may help in the diagnosis of Helicobacter pylori gastritis based on endoscopic images alone with higher accuracy compared to manual diagnosis by endoscopists.[28]

AI in Diabetes Care:

The global diabetes prevalence in 20–79-year-olds in 2021 was estimated to be 10.5% (536.6 million people), rising to 12.2% (783.2 million) in 2045.[29]AI-based technologies may lead to data-driven actions and improve outcomes for patients with diabetes. Machine learning (ML) is particularly suitable for clinical applications to diabetes, where it will increasingly be used to predict the risk of developing diabetes, optimize treatments for patients with diabetes, and diagnose diabetic complications in their early, treatable stages.ML algorithms have already been used to predict a person's risk of developing diabetes by analyzing lifestyle activities, physiologic sensor data, and genomic data.[30]Clinical decision support tools based on supervised machine learning have been created to predict short- and long-term HbA1c response following insulin introduction in patients with type 2 diabetes mellitus. With guidance from AI, patients with diabetes can now make everyday decisions about their food and exercise. Apps can allow patients to assess the quality and calorie value of their food intake.[31]

Deep learning (DL) is a subset of machine learning that relies on more complex algorithms called artificial neural networksto imitate how a human brain processes data and recognizes patterns. DL is more powerful than ML and has been adapted to diagnose long-term, resource-intensive complications of diabetes, such as diabetic retinopathy and diabetic macular edema.[32]The One Drop Mobile app can help patients with type 1 and type 2 diabetes schedule medication reminders, view statistics, set goals, track health outcomes, and get data-driven insights. The use of this app for tracking self-care was associated with improved HbA1c in patients with diabetes.[33]

AI in Precision Therapeutics:

AI will broaden the horizons of precision Medicine in the near future through developments in synthetic biology and AI-guided drug discovery. Synthetic biology has led to advancements in the last ten years, including personalized cancer medicines and CRISPR gene editing. Nevertheless, creating such sophisticated treatments is still incredibly costly and inefficient.

Future advances in data access (genomic, proteomic, glycomic, metabolomic, and bioinformatic) will enable AI to handle a much greater degree of systematic complexity, revolutionizing our understanding of, contributions to, and influence on biology. This will assist in better estimating which agents are more likely to be effective early on and also better anticipate undesirable drug effects, which will increase the efficiency of the drug discovery process.[9]

Use of AI in Conducting Clinical Research:

Through more effective participant matching and recruiting, as well as more thorough data analysis, artificial intelligence, and machine learning hold the potential to enhance, streamline, and expedite clinical trials. Furthermore, by comparing past data to target trial enrollment criteria, synthetic control groups might

be able to be created. Additionally, AI and machine learning may improve understanding and prediction of potential adverse events and patient subpopulations.[34]

Remote Patient Monitoring Using Artificial Intelligence:

AI-augmented remote patient monitoring (RPM) is one of the common healthcare applications that assist doctors in monitoring patients with acute or chronic illnesses at remote locations, older adults in-home care, and even hospitalized patients.RPM is commonly used to measure vital signs or other physiological parameters that can assist with clinical judgments or treatment plans. RPM can be used to monitor blood sugar levels in diabetes, epilepsy, cardiac arrhythmias, mental health monitoring, monitoring of patients in ICU, etc.[35]

Priorities for Bangladesh:

The following developments and applications in the field of AI may have a significant impact on the improvement of healthcare delivery in Bangladesh: AI-enhanced electronic health records, AI speech-to-text software, Bangla chatbot, widespread availability and use of clinical-decision assistance, development of open-source AI software to minimize cost, and development of local AI platforms using Bangladeshi demographic data.

Areas of Concern:

One primary concern about using AI in Medicine is that it will "dehumanize" Medicine by reducing human touch, compassion, and patient empathy. This concern is countered by the argument that ambient clinical intelligence (ACI) and natural language processing (NLP) will reduce administrative burden and help clinicians focus more on the patient. A study by Sinsky et al. showed that physicians spent only 27% of their office day on direct clinical interaction with the patient but spent 49.2% of their office day on electronic health records and paperwork.[36]The use of AI technologies might make Medicine more "humanized."

Another concern is about patient confidentiality and data security; ongoing monitoring and privacy violations through medical devices and the Internet of Things can increase the stigma around chronically ill or more disadvantaged citizens. To prevent this, the issue of data protection and data ownership must be handled carefully; laws and regulations are likely to emerge that will also safeguard these issues.

AI replacing physicians is another concern raised by some healthcare workers, but it is an improbable event.AI is and will be complementary to physicians, and 4P model of Medicine (predictive, preventive, personalized, and participatory) is best delivered when AI acts in concert with the physicians.[37]American philosopher Hubert Dreyfus argued that human problem-solving and expertise depend on our intuition and background sense of the context. These unconscious skills can never be fully captured by AI.[38]

Another concern is that automation bias-the tendency to over-rely on automation and to ignore contradictory, non-automated information (even if it is correct), may weaken the clinical skills of a physician. To address this issue, we must emphasize that AI is not fault-proof, and doctors should critically evaluate the information provided by automated systems and trust their judgment when necessary.[39]

Medical mistakes by AI are also a possibility and must be carefully addressed. Close collaboration between physicians and biomedical engineers, use of local demographic data in the locally-developed AI tools, and extensive validation of AI tools before clinical application might help to reduce errors by AI.[40]

Conclusion:

AI developments have the potential to revolutionize several healthcare-related fields and pave the way for a more individualized, accurate, predictive, and portable future. For practical application of AI in Medicine, we need tech-savvy doctors with both clinical experience and digital expertise. Our medical curriculum may need to be updated to produce the "augmented" doctors who can adapt to the widespread use of AI in Medicine. Finally, we need to customize AI in our national context to meet the needs of our population.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

DIAGNOSTIC ROLE OF SERUM ADENOSINE DEAMINASE IN SMEAR-NEGATIVE PULMONARY TUBERCULOSIS

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Abstract:

Background: *Diagnosis of tuberculosis is not always easy, particularly if it is a case of sputum smear-negative pulmonary tuberculosis (SNPTB). Patients with respiratory symptoms resembling SNPTB are difficult to differentiate based on clinical features, chest X-ray, and Xpert MTB/RIF negativity. So, additional diagnostic test with high sensitivity and specificity is needed to increase the yield of the ongoing diagnostic strategy for SNPTB. Adenosine deaminase (ADA) is now being widely used for the diagnosis of TB particularly in effusion fluids due to its simplicity, low cost, and quick available results, it is not always possible to access effusion fluids and therefore, it would be helpful to take advantage of serum levels. Therefore, the purpose of the study was to assess the role of serum ADA in the diagnosis of SNPTB.* ***Methods:*** *This cross-sectional analytical study was conducted in Dhaka Medical College & Hospital, Dhaka from March 2019 to September 2021. A total of 140 patients were included in this study and divided into two groups according to selection criteria: Group I (SNPTB, n=62), and Group II (non-TB pulmonary diseases, n=78). ADA estimation was carried out using the sensitive colorimetric method described by Guisti and Galanti with a BIOSIC kit. After the collection of all the required data, analysis was done by SPSS 24.0.* ***Results:*** *The mean age of the study patients was 48.02 ± 9.60 years (23-73 years) with male predominance in both Group I and Group II (71 % and 60.3%, respectively, p>0.05). Non-TB pulmonary cases were significantly older than SNPTBpatients (52 ± 8.56 vs 43.02 ± 8.49 years, p<0.001). SNPTB patients had a significantly higher frequency of cough, fever, and weight loss compared to non-TB pulmonary cases (p<0.05). In contrast, chest pain and shortness of breath were more frequent in Group II than in Group I (p<0.05). Serum ADA was significantly higher among SNPTB patients compared to non-TB pulmonary cases (48.16 ± 12.13 vs 18.64 ± 7.85 IU/L, p<0.001). ROC analysis of serum ADA in the diagnosis of patients with SNPTB found an AUC of 0.9850 (95% CI, 0.969-1.00) which was statistically significant (p<0.001). A cut-off value of serum ADAe"33 IU/L showed sensitivity, specificity, NPV, PPV, and accuracy of 93.55%, 94.87%, 94.87%, 93.55%, and 94.29%, respectively to correctly diagnose SNPTB cases.* ***Conclusion.*** *This study finding stated that serum ADA may be a useful marker to distinguish SNPTB from non-TB respiratory diseases. However, further study with a more generalized study population is recommended.*

Keywords: *ADA, Smear-negative Pulmonary TB*

Received: 26.12.2023 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72627

Citation: *Ali N, Ali IA, Azad KAK. Diagnostic Role of Serum Adenosine Deaminase in Smear-Negative Pulmonary Tuberculosis. Bangladesh J Medicine 2024; 35: 61-69*

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Introduction:

Tuberculosis (TB), which is one of the important re-emerging infectious conditions is caused by Mycobacterium *tuberculosis*. Pathologically, it is characterized by the formation of granulomas.[1]About one-third of the world's population is infected with TB latently and annual new cases of TB worldwide count approximately 9 million.[2] It has become a global health concern for both developing and developed countries. TB now ranks as a leading infectious disease killer globally alongside Human Immuno-deficiency Virus (HIV) despite being preventable and curable.[3] According to WHO Global TB Report 2016, Bangladesh is regarded as one of the world's 30 high TB burden countries with an annual occurrence of 362,000 new TB cases. Due to tuberculosis, about 73,000 people die annually (World Health Organization, 2017).[4]

Tuberculosis can present as pulmonary tuberculosis (PTB) or extrapulmonary tuberculosis (EPTB). Pulmonary TB is the most common form of tuberculosis among them.[5] The main symptoms of PTB are chronic cough, low-grade fever, evening rise of temperature, hemoptysis,dyspnea, chest pain, weight loss, and unresolved pneumonia.[6] In clinical practice, rapiddiagnosis of TB can be difficult, and early pulmonary TB detection has become challenging for clinicians. Prompt detection of active pulmonary tuberculosis has become a priority for tuberculosis control, both for patient treatment and public health intervention to prevent further transmission in the community. Chest X-ray is useful but is non-specific fordiagnosis of pulmonary TB. Moreover, TB can cause symptoms and radiologic results that are indistinguishable from those of community-acquired pneumonia.[7]

There are other different diagnostic modalities but they have some drawbacks. Cultureis the golden standard for TB diagnosis, but it may take 8 weeks. The polymerase chain reaction (PCR) test for TB diagnosis is expensive and requires skilled personnel and a lot of equipment. Finding acid-fast bacilli is the quick screening method fordiagnosis of pulmonary TB; nevertheless, the sensitivity is low.[8] Despite the best of efforts, a clinician oftenhas to face difficulties in smear-negative patients, and sometimes, it becomes very difficult to diagnose this entity. Co-morbidities like diabetes mellitus, HIV, and other immune-compromised conditions further complicate the picture leading to atypical clinical and radiological presentations.[9,10] This delay in diagnosis and subsequent treatment leads to increased transmission of TB and chances of drug resistance. Hence, in recent years, there has been a great demand to find a rapid diagnostic method for the same.[11]

Adenosine deaminase (ADA) is one such biomarker that is nowadays being studied as a diagnostic tool in the diagnosis of tuberculosis due to its simplicity, low cost, and quickly available results.[12] Adenosine deaminase (ADA) activity measurement is a biomedical method. ADA is an enzyme that contributes to purine metabolism. This enzyme helps in catalyzing the hydrolytic deamination of adenosine to inosine, and deoxyadenosine to deoxy inosine and plays an important physiological role in the regulation of the effects of these metabolites on immunological, neurological, and vascular processes. ADA is important for the proliferation and differentiation of lymphoid cells, especially T cells, and helps in the maturation of monocytes to macrophages. ADA is an index for cellular immunity and previous studies have proved its value in the diagnosis of TB, even for assessing TB effusions.[13] Activity of this enzyme increases in TB patients. In several studies, ADA levels in sputum and serum were used to diagnose tuberculosis and followed during treatment. However, some prior studies employed effusion fluids, and a very small number of studies used patients' serum. It is not always possible to access effusion liquids in patients with pulmonary and extra-pulmonary TB; therefore, it would be helpful to take advantage of serum levels.[14]This study was designed to look at the diagnostic usefulness of serum ADA in smear-negative pulmonary TB. The findings of this study will serve to provide a clear image of ADA for TB diagnosis, allowing future TB strategies to be conducted more effectively.

Methods:

This cross-sectionalanalytical study was conducted at the Department of Medicine, Dhaka Medical College & Hospital, Dhaka between March, 2019 to September, 2021. The study protocol was approved by the Ethical Review Committee (ERC) of Dhaka Medical College and Hospital. A total of 140newly diagnosed pulmonary cases admitted within the study period fulfilling the inclusion and exclusion criteria were included in this study byconvenient purposive sampling. The study subjects were divided into two groups according to selection criteria: Group I (Smear negative Pulmonary TB, n=62), and Group II (non-TB pulmonary cases viz. pneumonia, COPD, bronchiectasis, lung malignancy, n=78). The inclusion criteria for Group I(smear-negative pulmonary TB cases) were age: >18 years, at least two sputum specimens negative for Acid Fast Bacilli (AFB) but Xpert MTB/RIF positive, radiological abnormalities consistent with pulmonary TB - any cavitary lesion, consolidation involving mostly in the upper lobe, diffuse patchy opacity/consolidation involving lobe/whole lungand clinical symptoms of pulmonary TB - (any two) - cough for 3 weeks or more, hemoptysis, fever,

loss of appetite, weight loss. night sweats. The inclusion criteria for Group II(non-Tb pulmonary cases: pneumonia, COPD, bronchiectasis, lung malignancy) were: Age: > 18 years, for pneumonia – clinical symptoms of pneumonia (any two – cough with/ without sputum production, fever, dyspnea, pleuritic chest pain) and radiological evidence of consolidation with/without sputum smear positive for bacteria or culture positive; for COPD – clinical symptoms (dyspnea, chronic cough or sputum production) and radiological evidence suggestive of COPD with spirometric confirmation of post-bronchodilator FEV1/ FVC < 0.7; for bronchiectasis - chronic cough with tenacious sputum production and radiologically by the presence of bronchial airway dilation on CT chest; for lung malignancy – clinical symptoms (cough, hemoptysis, shortness of breath, chest pain, weight loss, fever) and radiological abnormalities consistent with lung malignancy (obvious mass, widening of the mediastinum, atelectasis (lung collapse), consolidation, pleural effusion) with histological confirmation by biopsy and sputum specimens negative for Acid Fast Bacilli (AFB) / Xpert MTB/RIF negative for all non-TB pulmonary cases. Patients with sputum smear-positive pulmonary TB, history of previous pulmonary/extra-pulmonary TB or ongoing anti-TB treatment, having secondary immunodeficiency states: HIV, organ transplantation, treatment with long-term corticosteroids, any malignancy in the body other than lung malignancy, presence of hepatic or renal impairment, pregnant and lactating women, having concomitant lymphoproliferative disease were excluded from the study. In those patients having a productive cough, sputum for AFB was sent to DOT corner in DMCH which was done by Light Emitting Diode (LED) fluorescence microscopy (FM). Sputum for acid-fast bacilli was performed in all patients on two sputum specimens as follows - one on-spot specimen which was collected on the spot when a patient was sent to the DOTS. Another was the early morning specimen where patients were given a sputum container to collect the second specimen on the following morning. Early morning sputum was also collected for Xpert MTB/ RIF examination which was done in the college building of DMCH. Sputum was also sent for gram stain, and culture in the Microbiology Department of DMCH. Chest-Xray P/A view was done in the Radiology Department of DMCH.Other necessary investigations - CBC with ESR, MT, Spirometry, CT scan of the chest, and CT-guided FNAC/Biopsy where appropriate were carried out.Those subjects whose at least two sputum specimens were negative for Acid Fast Bacilli (AFB) but Xpert MTB/RIF positive were considered as smear-negative pulmonary TB cases. And for those whose Xpert MTB/RIF was negative, they were considered as non-TB pulmonary cases. After the final enrollment, blood samples for serum ADA were sent to the BSMMU Microbiology Department written in routine biochemistry form. Serum ADA was analyzed using a sensitive colorimetric method described by Guisti and Galanti with a BIOSIC kit.All the final data were collected in the semi-structured and pretested case record form. During data collection, the highest standard ethical measures were ensured and maintained throughout the study. These data were analyzed statistically by the standard procedure to arrive at a definite conclusion about the research question.

Results:

Out of 140 patients, 62 patients had smear-negative pulmonary TB (SNPTB), and rest 78 patients were suffering from non-TB pulmonary diseases, of whom, 35 patients had pneumonia, 25 had COPD, 10 had lung carcinoma and the remaining 8 patients had bronchiectasis. SNPTB patients were assigned as Group I and non-TB pulmonary cases were assigned as Group II.

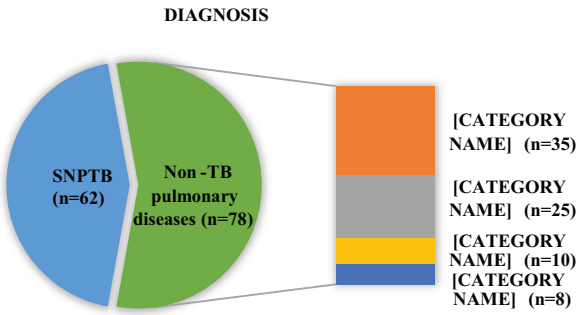

Fig. -1: *Distribution of study population according to diagnosis (n=140)*

Table I shows the baseline characteristics of the study population. Male subjects were predominant in both Group I and Group II which were 71 % and 60.3%, respectively. The mean age of the study population was 48.02±9.60 years. Patients in Group II (non-TB pulmonary cases) were significantly (p<0.00) older than Group I (SNPTB cases) with a mean age of 52±8.56 vs 43.02±8.49 years respectively.The majority patients in Group I were garment workers (38.7%) which was found statistically significant (p<0.05), while the majority patients in Group II were service holders (24.4%).Most of the study subjects in Group I and Group II were from middle-income status - 51.60% and 50% respectively, though there were no significant differences (p value=0.928) between the two groups regarding socio-economic status.

Table I

Baseline characteristics of the study population (n = 140)

Baselinecharacteristics	Group I (*n*=62)	Group II (*n*=78)	p-value
Gender			
Female	18(29 %)	30(39.7 %)	
Male	44(71%)	48(60.3%)	#[a]p>0.05
Mean Age (years)	43.02 ± 8.49	52 ± 8.56	#[b]p<0.001*
Range	41-50	51-60	
Occupation			
Housewife	7(11.3%)	18(23%)	#[a]0.7
Service Holder	11(17.7%)	19(24.4%)	#[a]0.3
Garment worker	24(38.7%)	15(19.2%)	#[a]<0.011*
Businessman	9(14.5%)	11(14.1%)	#[a]0.94
Cultivators	6(9.7%)	10(12.8%)	#[a]0.56
Unemployed	3(4.8%)	4(5.1%)	#[a]0.94
Student	2(3.2%)	1(1.3%)	#[a]0.43
Socio-economic status			
Low income	43.50%	46.20%	
Middle income	51.6%	50%	#[a]0.928
High income	4.8%	3.8%	

Group I= Smear negative pulmonary TB, Group II= Non-TB pulmonary cases
#[a]Chi-squared Test ($c^2$2), #[b]Students t-test were performed.
* Significant

Table II shows that SNPTB patients had a significantly higher frequency of cough, fever and weight loss compared to non-TB pulmonary cases (p-value<0.05). In contrast, chest pain and shortness of breath were more frequent in Group II than in Group I (p<0.05).

Table II

Distribution of study population according to clinical features (n=140)

Clinical features	Group I (n=62) No. (%)	Group II (n=78) No. (%)	p-value#
Cough	62(100)	71(91)	0.017*
Sputum	49(79.0)	52(66.7)	0.105
Hemoptysis	4(6.5)	8(10.3)	0.424
Fever	46(74.2)	36(46.2)	0.001*
Weight loss	32(51.6)	25(32.1)	0.019*
Chest pain	7(11.3)	24(30.8)	0.006*
Shortness of breath	10(16.1)	38(48.7)	<0.001*

Group I= Smear negative pulmonary TB, Group II= Non-TB pulmonary diseases
Chi-squared Test (χ^2) was performed.
* Significant

Table III shows that maximum SNPTB patients (74.2%) had ESR in 1st hour 50-100 mm, while maximum non-TB pulmonary cases had ESR <50 mm in 1st hour which was statistically significant (p<0.001).

Table III

Distribution of study population according to ESR level (n=140)

ESR in 1st hour	Group I (n=62) No. (%)	Group II (n=78) No. (%)	p-value#
<50 mm	8(12.9)	61(78.2)	<0.001*
50-100 mm	46(74.2)	14(17.9)	
>100 mm	8(12.9)	3(3.8)	

Group I= Smear negative pulmonary TB, Group II= Non-TB pulmonary diseases
Chi-squared Test (χ^2) was performed.
* Significant

Table IV shows that maximum number of SNPTB patients (69.4%) had positive Mantoux test (MT), while all of the non-TB pulmonary patients were negative for MT, which was statistically significant (p<0.001).

Table IV

Distribution of study population according to Mantoux test (n=140)

MT test	Group I (n=62) No. (%)	Group II (n=78) No. (%)	p-value#
Positive	43(69.4)	0(0)	<0.001*
Negative	19(30.6)	78(100)	

Group I= Smear negative pulmonary TB, Group II= Non-TB pulmonary diseases

Chi-squared Test (χ^2) was performed. * Significant

Table V shows that Sputum for gram stain was positive in 14.5% of SNPTB patients and 23.1% of non-TB pulmonary disease patients without any statistical significance (p>0.05).

Table V

Distribution of study population according to sputum examination (n=140)

Sputum	Group I (n=62) No.(%)	Group II (n=78) No.(%)	p-value#
Gram Stain positive	9(14.5)	18(23.1)	0.202
Gene Xpert positive	62(100)	0(0)	1.00

Group I= Smear negative pulmonary TB, Group II= Non-TB pulmonary diseases

Chi-squared Test (χ^2) was performed.

Table VI shows that serum ADA was significantly higher among SNPTB patients compared to non-TB pulmonary patients (48.16±12.13 vs 18.64±7.85 IU/L, p<0.001).

Table VI

Comparison between the two groups according to serum ADA values (n=140)

	Serum ADA level (IU/L)		p-value#
	Mean±SD	Range (min-max)	
Group I	48.16±12.13	21-81	<0.001*
Group II	18.64±7.85	5-38	

Group I= Smear negative pulmonary TB, Group II= Non-TB pulmonary diseases

Student t-test was performed. * Significant

ROC analysis of serum ADA in the diagnosis of patients with SNPTB found an AUC of 0.9850 (95% CI 0.969-1.00) which was statistically significant (p<0.001). A cut-off value measured ≥33 IU/L showed 93.55% sensitivity and 94.87% specificity (Fig.-II and Table VII)

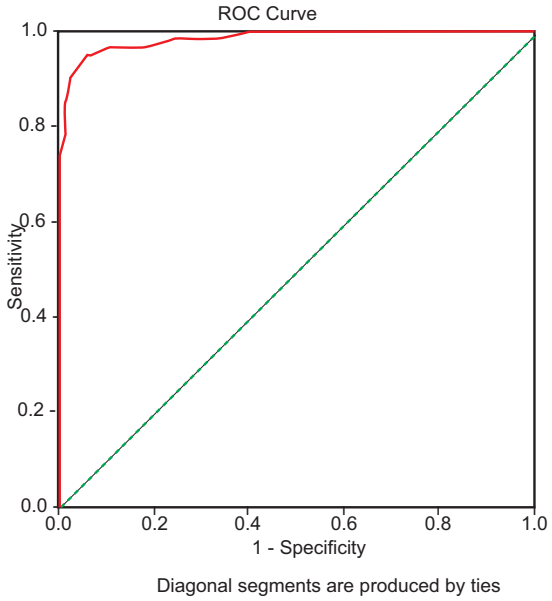

Fig.-2: *ROC analysis of serum ADA in diagnosis of patients with SNPTB (n=140)*

Table VII

Result of ROC curve

AUC	Standard error	95% CI		P value
	Lower	Upper		
0.985	0.005	0.969	1.00	<0.001*

AUC: Area under the curve; CI: Confidence Interval

* Significant

Table VIII shows that, among 62 SNPTB cases, a cut-off value of serum ADA of e”33 IU/L could detect truly 58 cases of SNPTB.

Table VIII

Cross tabulation of serum ADA between the two groups based on derived cut-off value (33 IU/L) (n=140)

Serum ADA (IU/L)	Smear negative Pulmonary TB		Total
	Yes	No	
≥33 IU/L	True positive (TP)	False positive (FP)	TP+FP
	58	4	62
<33 IU/L	False negative (FN)	True negative (TN)	FN+TN
	4	74	78
	TP+FN	FP+TN	
	62	78	140

A cut-off value of serum ADAe" 33 IU/L showed sensitivity, specificity, PPV, NPV, PLR, NLR, and accuracy 93.55%, 94.87%, 93.55%, 94.87%, 17.98%, 0.07%, and 94.29%, respectively (fig.-6). The cut-off value for serum ADA e" 33 IU/L has been derived from Karumuri et al. (2010).

Positive likelihood ratio: An individual having serum ADA value e" 33.IU/L is 17.98times more likely to have SNPTB compared to individuals having serum ADA d" 33 IU/L.(PLR > 1 indicates a test has diagnostic value).

Diagnostic accuracy: Serum ADA ≥33 IU/L can detect 94 individuals correctly with SNPTB among 100 individuals.

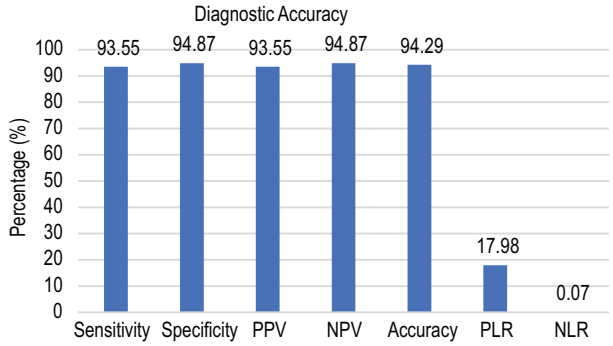

Fig.-3: Diagnostic accuracy of Serum ADA to distinguish smear-negative pulmonary TB from non-TB pulmonary diseases (n=140)

Discussions:

In this study, the majority respondentsin Group I were aged between 41-50 years (48.4%) followed by (35.5%) in the 31-40 years age group with a mean age of 43.02±8.49 years. Among patients in Group II, the majority were in the age group of 51-60 years (42.3%) followed by (35.9%) greater than 60 years with a mean age of 52±8.56 years. In line with my study findings, previous studies also found almost similar age distribution with male preponderance among pulmonary tuberculosis patients (Mohankudo et al. 2019; Malempati and Medooru 2018; Pandey et al. 2016; Shah 2015).[13,15,16,17]

The majority of the participants were male in this study. This might be because of more exposure of economically productive males to the external environment. In a previous study, the differences in sociodemographic characteristics in two periods, from the very beginning of the 21st century and 10 years after, were examined. In both observed periods, male people suffered from tuberculosis more frequently. (Smiljic et al. 2018).[18] In the low socioeconomic background of our country, females are given less attention, and access to healthcare facilities is limited.

The majority of the patients were garment workers in Group 1 (38.70%) and service holders in Group II (24.40%). Most of them belonged to middle-incomefamilies in our study, about 51.60% and 50% respectively in Group I and Group II. This might be due to more exposure to the external environment, working in overcrowded places, inadequate nutrition, alteration in immune function, poor ventilation, and poor hygiene habits.

Cough was the predominant clinical feature in 100% of patients of Group I, followed by 79% sputum production, 74.2% fever and 51% weight loss. Sajith et al. (2015) found in their study that cough with expectoration was prevalent in 96.5% of TB patients followed by weight loss (80.7%), fever (73.7%), and loss of appetite (54.4%).[19]

Maximum patients in Group I (74.2%) had ESR in 1st hour of 50-100 mm, while maximum non-TB pulmonary cases had ESR <50 mm in 1st hour which was statistically significant ($p < 0.001$). Mandal and Chavan (2016) found in their study that, ESR was elevated in 87% and normal in 26% of pulmonary TB patients.[20] About 69.4% of patients in Group I had Mantoux test positive with 100% negative in non-TB pulmonary cases in this study. Karumuri, et al. (2010) also found in their study that about 75% of pulmonary TB patients had positive Mantoux test.[21]

Sputum for gram stain was positive in 14.5% of SNPTB patients and 23.1% in non-TB pulmonary cases without any statistical significance ($p > 0.05$). Sputum for Xpert MTB/RIF was 100% positive in Group I.

In this study, serum ADA was significantly higher among Group I patients compared to Group II (48.16 ± 12.13 vs 18.64 ± 7.85 IU/L, $p<0.001$). Similarly, Chander and Shrestha (2012) also found in their study that the mean serum ADA among smear-negative TB cases was (42.26 ± 21.22 U/L) andhealthy control was (18.88 ± 6.67 U/L) with statistical significance ($p<0.0001$).[22]Alaarag et al. (2016) found mean ADA of (42.26 ± 21.22 U/L) and (23.31 ± 8.22 U/L) in smear-negative pulmonary TB and non-TB pulmonary cases respectively in their study with statistical significance ($p<0.001$).[23]Karumuri, et al. (2010) in their study found a higher mean ADA of (41.6 ± 6.4 U/L) in smear-negative TB cases compared to healthy controls (15.5 ± 0.5 U/L) with statistical significance ($p<0.001$).[21] Saini et al. (2018) reported a mean ADA of (39.478 ± 32.22 U/L) in sputum-negative TB cases and (11.819± 8.0235 U/L) in control groups with statistical significance ($p<0.00$).[1] In a study by Shah (2015), the serum ADA level in smear-negative pulmonary TB subjects was (35.12 ± 12.1 U/L) which was statistically significant ($p<0.001$) as compared to that of in healthy

subjects (14.603 ± 4.69 U/L).[17] Agarwal et al. (2019) also reported that serum ADA levelin smear-negative pulmonary TB subjects was found to be highly significant (38.48 ±10.56 vs 15.30 ± 0.23 U/L, p<0.001) as compared to that of healthy subjects.[24]

In the present study, ROC analysis of serum ADA in the diagnosis of patients with smear-negative pulmonary TB cases found an AUC of 0.9850 (95% CI 0.969-1.00) which was statistically significant (p<0.001). A cut-off value of serum ADA ≥33 IU/L showed sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of 93.55%, 94.87%, 93.55%, 94.87% and 94.29% respectively to correctly diagnose smear-negative pulmonary TB cases. Karumuri et al. (2010) also found 33 U/L as the cut-off value for serum ADA in diagnosing pulmonary tuberculosis in their study with a sensitivity 98.06% and specificity of 95.35%.[21] Similarly, Kanchan et al. (2014) evaluated the usefulness of ADA with a cut-off value of 33.3 U/L in serum to diagnose pulmonary tuberculosis patients efficiently with sensitivity, specificity, positive predictive value, negative predictive value of 96.69%, 96.69 %, 96.69% and 96.69% respectively.[25] Besides, an exact similar cut-off point (serum ADA e" 33 U/L) was also reported by Jhamaria et al. (1988) in diagnosing TB patients from patients with non-tubercular diseases with a specificity 100% and sensitivity of 98%.[26]Alaarag et al. (2016) found the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of serum ADA to be 95%, 86.7%, 90.5%, and 92.9% respectively, at 30 U/L cut-off point.[23] Pandey et al. (2016) found a cut-off value of serum ADA for TB diagnosis of 30 U/L, with sensitivity, specificity, positive predictive value (PPV), negative predictive value(NPV) of 81.3%, 100%, 81.33%, and 100% respectively.[13] Chander and Shrestha (2012) showed that at a serum ADA level of 30 U/L as a cut-off value, serum ADA had sensitivity, specificity, positive predictive value (PPV), negative predictive value of 83.10%, 91.25%, 94% and 69.52% respectively.[22]

However, according to the cut-off point that has been used in different research, sensitivity, specificity, PPV, and NPV have been reported differently, and therefore the outcomes of different studies must be interpreted cautiously. Since there is no program in order to standardize the ADA results, determining a cut-off point for ADA must be dependent on the type of method and defined separately for each area. Studies have shown that in areas in which tuberculosis is endemic, test sensitivity is of high importance.[27,28] In my research project, the sensitivity for truly diagnosing smear-negative pulmonary TB cases from non-TB pulmonary cases was also high (93.55%). Besides, the negative predictive value of this test was also high (94.87%) and this gives it a place as a widely usable screening test to exclude smear-negative pulmonary TB. Therefore, the determination of serum ADA should be done routinely, particularly if the diagnosis of tuberculosis is in doubt, and also to differentiate smear-negative pulmonary tuberculosis from non-tubercular pulmonary diseases.

Conclusion:

In this study, serum ADA was significantly higher in smear-negative pulmonary TB (SNPTB) patients than in non-TB pulmonary cases, with a remarkable diagnostic accuracy. These results correspond with the findings of previous studies with slight variations. Hence, the present study suggests to use of serum ADA estimation as the biochemical marker in the diagnosis of SNPTB highlighting it as a simple, rapid, cheaper, and accurate diagnostic test.

Limitations of the study:

Although the results of this study support the hypothesis,there are some facts to be considered which might haveaffected the result of the current study. It was a single-center study. The study population was relativelysmall.

Data Availability: The datasets analyzed during the current study are not publicly available due to the continuation of analyses but are available from the corresponding author upon reasonable request.

Conflict of Interest: The authors stated that there is no conflict of interest in this study

Funding: This research received no external funding.

Ethical consideration: The study was approved by the Ethical Review Committee of Dhaka Medical College & Hospital, Dhaka, Bangladesh. Informed consent was obtained from each participant or caregiver of the patients.

Author Contributions: All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Acknowledgments: The authors were grateful to the staff of the Department of Medicine of Dhaka Medical College & Hospital, Dhaka, Bangladesh.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

CLINICAL PROFILE AND IN-HOSPITAL OUTCOME OF ACUTE HOUSEHOLD SUBSTANCES POISONING IN A TERTIARY CARE HOSPITAL

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Abstract

Background: *Poisoning is an acute medical emergency. Among the thousands of harmless products available for household, very few are hazardous. Still, self-poisoning with these substances is one of the commonest mode of poisoning. This study was carried out to get information related to clinical profile and inhospital outcome of household substances poisoning in a particular area of Bangladesh.* ***Methods:*** *This cross-sectional type of descriptive study was carried out in the department of Medicine, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet, Bangladesh during the period of June 2022 to November 2022.Purposive convenient sampling was applied to recruit sample from study population. Calculated sample size was 64. Detailed history including nature of poisoning (unintentional/ intentional), route of poisoning, type of poison, symptoms and signs with relevant laboratory findings were documented in a structured data collection sheet through interview from the patient or their guardians after obtaining informed written consent. In-hospital outcome in terms of survival (discharged, discharge without advice/ absconded) and mortality were recorded.* ***Results:*** *Among 64 participants majority 65.63% (n=42) were female and most 56.25% (n=36) were of 18-20 years age group.Regarding educational status 96.87 %(n=62) participants were educated. All of the poisoning were intentional and by oral route. Harpic was the most common agents 59.38% (n=38) used by the victims.Vomiting was the most common 81.25% (n=52) symptomand oral ulcer was the commonest 40.63% (n=26) sign. No significant abnormality of vital signs and laboratory investigations were found. Majority of the respondents 43.75 % (n=28) stayed 2 days in hospital for treatment purpose. Total 85.94% (n=55) respondents were discharged with advice and 14.06% (n=9) respondents left hospital without medical advice. No death was documented in this study.* ***Conclusion:*** *Young teenaged female patients were the majority of victims in our study reflecting the degree of powerlessness and hopelessness of young, educated people with unemployment and difficulties in coping with life stressors.*

Keywords: *Clinical profile, Acute Poisoning, Household substances, In-hospital outcome.*

Received: 16.01-2024 *Accepted: Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.71026

Citation: *Mahmud S, Hezbullah M, Chakraborty SR, Farooqui R, Sultana S. Clinical Profile and In-hospital Outcome of Acute Household Substances Poisoning in a Tertiary Care Hospital.. Bangladesh J Medicine 2024; 35: 70-75.*

Introduction:

The pattern of poisoning varies from country to country and region to region depending on factors like geography, availability or accessibility of poison, socio-economic conditions, cultural and religious influences.[1] Among the thousands of harmless products available as household, very few are hazardous. Still, poisoning with these substances is one of the common modes of poisoning all around the world as well as in South Asia.[2]Some commonly encountered poisonous substance in household are detergents (bleaching agents, floor cleaner, laundry detergents), solvents

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(kerosene, thinner), automotive products (petrol, brake fluid, battery water), cosmetics and personal care (soaps, shampoo, nail polish) as well as other household products (mothball, button battery) etc.[3]

The pathology of poisoning depends on the route of exposure and absorption of the poison into the body. Most cases of household poisoning occur through oral ingestion leading to corrosive effects in the alimentary system along with systemic toxicity.[4] Direct contact to the skin or eye may cause damage to the contact area. Mortality is most often caused by tracheal necrosis and perforation of the esophagus or stomach, followed by mediastinitis or peritonitis.[5]Baseline survey in Bangladesh showed household products are responsible for around 20.6% acute poisoning cases.[6]Patil et al. found household products as the most common agent of poisoning in an urban setting of India.[2]A study done in Dhaka medical college by Khokan et al. showed 7.76% of poisoning was due to household substances.[7] But meta-analysis of global data on household poisoning is still missing, though there are a considerable number of regional evidence.

Self-poisoning is one of the commonest acute medical presentations. It is therefore vital that poison prevention authorities are well informed regarding patterns of poisoning, clinical profiles of poisons and outcome of several household poisons to plan effective preventive strategies and treatment modalities.[8] So, knowledge regarding clinical features, complications and geographical variations of different poison is necessary to treat the patient, specifically household substances poisoning. This study was carried out to get information related to clinical profile and pattern of household substances poisoning in a particular area of Bangladesh.

Methods:

This cross-sectional type of descriptive study was carried out on admitted patients with acute household substance poisoning in the department of Medicine, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet, Bangladesh during the period of June 2022 to November 2022. Those who fulfilled the inclusion criteria and did not have exclusion criteria were recruited as the study sample. Purposive convenient sampling was applied to recruit sample. Sample size was calculated using Cochran's formula considering 95% level of significance and 10% precision level (marginal error). Calculated sample size was 64.The subjects were thoroughly informed about the aims, objectives and detail procedure of the study before enrolment. An informed written consent was taken from each participants or their guardians.Detailed history including nature of poisoning (unintentional/ intentional), route of poisoning, type of poison, symptoms and signs with relevant laboratory findings were documented in a structured data collection sheet through interview of the patient or their guardians. In-hospital outcome in terms of survival (discharged, discharge without advice/absconded) and mortality were recorded. All respondents got standard hospital care after diagnosis of the particular poisoning. Data entry and analysis was done using Microsoft excel and SPSS for windows version 22.0 respectively. Data were presented as the proportion of valid cases for discrete variables and as means ± standard deviations. Differences in baseline characteristics were compared using the student t-test. A 'p' value less than 0.05 was considered significant.

Results:

Among 64 participants majority were female 65.63% (n=42) followed by male 34.38% (n=22). Mean age of female and male were 21.83 ± 6.31 and 26.95 ± 10.83 respectively(p value=0.0197). Of the participants 43.75% (n=28) were married, 53.13% (n=34) were unmarried, 1.56% (n=1) was separated and 1.56% (n=1) was divorced. Regarding educational status most of the respondents were below SSC 40.63%(n=26), followed by SSC passed 32.81% ((n=21), HSC passed 20.31%(n=13), graduate 3.13%(n=2), and illiterate 3.13% (n=2). Most of the participants were unemployed 37.50% (n=24), followed by housewife 32.81% (n=21), non-government employee 12.50% (n=8) and businessman 4.69% (n=3).The majority 84.38% (n=54) of the respondents lived in rural areas and rest 15.66% (n=10) were found to be living in urban areas. Among all participants 87.50%(n=56) had no co-morbidity but Pregnancy, Bronchial asthma, Hypertension, COPD, Diabetes mellitus were found in 4.69%(n=3), 3.13% (n=2), 1.56%(n=1), 1.56%(n=1) and 1.56%(n=1) patients respectively. Regarding mode of poisoning all 100%(n=64) cases were intentional and route was oral. Results are shown in diagram-1 and table: I-VII.

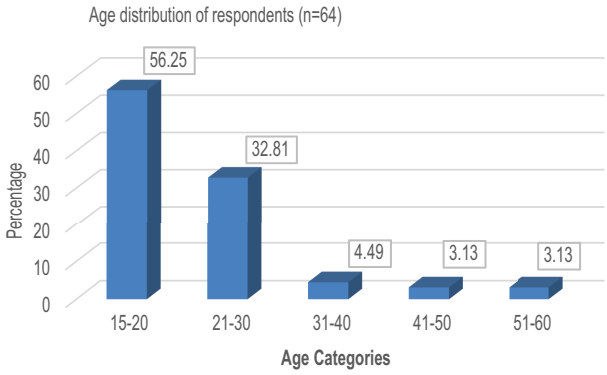

Diagram-1 : Age distribution of respondents (n=64)

Table-I

Type of poisoning (n=64)

Causes Of Poisoning	Number of Respondents	Percentage (%)
Rodenticides (aluminium phosphide, zinc phosphide)	10	15.63
Ant killer (Dimethyl parathion)	1	1.56
Oleander seeds	1	1.56
Harpic	38	59.38
Mosquito repellents(Pyrethroids)	3	4.69
Terpene oil	2	3.13
Soap	1	1.56
Corrosive other than harpic	6	9.36
Kerosene	2	3.13
Total	n=64	100%

Table-II

Interval between poisoning and presentation (hours) (n=64)

Interval between poisoning and presentation	Number of Respondents	Percentage (%)
0-1 hour	6	9.38
1-2 hours	21	32.81
2-3 hours	13	20.31
4-6 hours	14	21.88
More than 6 hours	10	15.63
Total	n=64	100%

Table-III

Clinical symptoms and signs of poisoning patient (n=64)

Clinical Presentations	Number of Respondents	Percentage (%)
Vomiting	52	81.25
Salivation	8	12.50
Diarrhoea	6	9.38
Abdominal Pain	5	7.81
Cough	1	1.56
Fever	1	1.56
Oral Sore	26	40.63
Dysphagia	23	35.94
Palpitation	1	1.56
Mydriasis	1	1.56
Crepitations of lungs	4	6.25
Tachypnea	4	6.25
Fever	1	1.56
Oral ulcer	26	40.63

Table-IV

Distribution of vital signs (n=64)

Clinical characteristics	Mean ± SD		Min	Max
Pulse (bpm)	88.25	10.56	60	112
SpO2 (%)	98.22	1.44	93	100
Respiratory rate (breaths/min)	14.62	2.82	12	26
Temperature (°F)	98.23	2.12	96	102
Systolic blood pressure	112.97	15.4	80	160
Diastolic blood pressure	72.39	9.4	50	100

Table-V

Investigations results of the respondents (n=64)

Investigation Name	Number of investigations done (n=64)	Result of investigations	
		Normal	Abnormal
CBC	52	52	0
Blood Sugar (Random)	62	62	0
Urine R/M/E	52	52	0
S. Electrolytes	41	41	0
S. Creatinine	41	41	0
Chest X-Ray	50	50	0
ECG	62	62	0
SGPT	10	10	0

Table-VI

Duration of hospital stay (days) (n=64)

Duration of hospital stay (days)	Frequency (Number of respondents)	Percentage (%)	Mean ± SD (Duration of hospital stay)
1	25	39.06	
2	28	43.75	
3	7	10.94	1.875 ± 0.968
4	3	4.69	
6	1	1.56	
Total	n=64	100%	

Table-VII

Distribution of outcome (n=64)

Outcomes	Number of Respondents	Percentage (%)
Survival	55	85.94
Discharged without advice	9	14.06
Death	0	0%
Total	n=64	100%

Discussion:

We enrolled 64 patients of household substances poisoning admitted in medicine department of Sylhet MAG Osmani medical college hospital from June 2022 to November 2022. Total 88 patients were admitted with the complaints of poisoning with different household substances during study period, among whom 64 patients were enrolled and remaining excluded according to criteria. It was found that the most common age group to attempt household substances poisoning is the young age group that is between 18-20 years 56.25% (n=36), followed by 21-30 years 32.81% (n=21) (Diagram-1). This result was similar to a previous study from other parts of Bangladesh.[9]In another Bangladeshi study it was shown that 68.2% respondent's age were between 16-28 years.[10] Another study done in India showed that nearly 65% of the study population were in the age group of 15-25 years, while 25% of the study population was in the age group of 26-44 years.[11]High rate of poisoning with household substances in this economically active age group would have direct and indirect effects on the family as well as in the community both socially and economically.

Females attempted more with household substances poisoning 65.63% (n=42) when compared with the males 34.37% (n=22) and female to male ratio was 1.9:1(p value= 0.0197). Unmarried cases were leading 53.13% (n=34) followed by married cases 43.75% (n=28). These findings were also consistent with other studies.[10]This might reflect the lack of cope up ability of this group to social stress.

Significant proportion of the respondents were unemployed 37.50% (n=24) followed by housewife 32.81% (n=21), non-government employee 12.50% (n=8) and businessman 4.69% (n=3). The high incidence of household substances poisoning among the unemployed people reflects that they are financially unstable group and among the housewife indicates that familial instability is the underlying cause.[12]

Regarding educational status, most of the respondents were below SSC 40.63% (n=26) followed by SSC passed 32.81% (n=21). HSC passed respondents was 20.31% (n=13), graduate and above were 3.13% (n=2). But illiteracy was found in only 3.13% (n=2) respondent. So, poisoning with household substances are increasing in teenage group who are studying in high school and college. These group of people are emotionally vulnerable. This is similar to study by Camidge et al.[13] This finding is also consistent with the study of Ahmed et al where suicidal and homicidal poisoning were common in educated group and accidental poisoning was common in non-educated group.[14]

The majority of the respondents 84.38% (n=54) were from rural areas and rest 15.66% (n=10) were from urban areas. Similar result were observed in many other studies done in Bangladesh and in south Asia.[14,15] But this is not similar to a study done in Dhaka Medical College Hospital by Khokon et al.[7]This may be due to the fact that household substances used for self-poisoning are widely available both at rural and urban areas of Bangladesh.

Regarding mode of poisoning in our study subjects all were by oral route and all were intentional. Harpic is a common household cleaning staff mainly composed

of 10% Hydrochloric acid with a pH of 0.5 and it is commonly abused by women.[15]According to our study findings toilet cleaning agent (Harpic) ingestion was the most common household product used for poisoning accounting for 59.38% (n=38) of all cases (n=64). Rodenticides were the second leading type 15.63% (n=10), followed by corrosives other than Harpic 9.36% (n=6), Mosquito repellents-Pyrethroids 4.69% (n=3), Kerosene 3.13% (n=2), Terpene oil 3.13% (n=2), Ant killer (dimethyl parathion)1.56% (n=1), Oleander seeds 1.56% (n=1) and Soap 1.56% (n=1) (Table-I).Similar pattern were also observed in studies of other developing countries.[16,17]

Most of the patient presented with history of vomiting 81.25% (n=52), followed by oral ulcer 40.63% (n=26), dysphagia 35.9% (n=23), salivation 12.50% (n=8), abdominal pain 7.81% (n=5), diarrhea 9.38% (n=6), fever 1.56% (n=1), cough 1.56% (n=1) and palpitation 1.56% (n=1) (Table-III).No patient suffered from aspiration pneumonia, respiratory distress, ARDS, shock, acidosis, coma or with seizure in presentation in our study. So gastrointestinal symptoms were the predominant symptoms in our study. But Khokan et al. found 6 patient of 128 patient presenting with respiratory distress.[7] Chan TYK et al. found serious complication like aspiration pneumonia, ARDS due to aspiration of Dettol directly or following gastric lavage into airway.[18]

In acute household substances poisoning duration of hospital stay is low in comparison to other pesticides and pharmaceuticals poisoning. In this study the mean duration of hospital stay was 1.88±0.96 days. Highest 6 days of hospital stay was found in 1.56% (n=1) respondents. Most of the patient got discharge from hospital within 24-48 hours of their admission(Table-VI). This finding is similar with previous studies.[19]

Most of the patients in this study was found to be in younger age group. Co-morbid conditions like HTN, DM, COPD etc. are less common in young age.So most of the respondents in our study were without any such co-morbid conditions. Complications with household substances depends upon type and amount of poison intake in both healthy and co-morbid patients.[20] But in our study 4.69% (n=3) patients were pregnant where no major complications were seen during hospital stay. This may be due to less amount intake of corrosive and other household substances poisons.

Regarding outcome, during the study period no death was found in hospital. Most of the respondents 85.94% (n=55), were discharged with medical advice and 14.06% (n=9) respondents left hospital without medical advice or absconded (Table-VII). These findings correlate with the study done by TYK Chan et al. where hospital mortality were found low in comparison to other type of poisoning.[14] In Bangladesh similar findings were found in a study of Dhaka Medical College Hospital.[7]

Conclusion:

Attempted suicide or accidental poisoning with household substances is a major public health problem to be addressed like any other medical condition. Household substances poisoning has an increasing trend as these are easily available. It commonly affects the young productive age group most of whom are unemployed and dependent on other family members. This seems to reflect the degree of powerlessness and hopelessness of young, educated people with unemployment and difficulties in coping with life stressors. Harpic followed by Rodenticides were found to be the most common household agent used for self-poisoning. For this reason gastrointestinal symptoms and signs were predominant at presentation. Early recognition of the clinical features with prompt action to poisoning patient can save catastrophic complications. As there is no national guideline regarding management of household substances poisoning, so management varies with individual to institutes. People should be aware regarding poisoning prevention, first aid measurement and early hospital admission of poisoned patient.

Limitations of the study:

This was a cross-sectional and single centered hospital-based study, so the actual magnitude of the problem may not be reflected in the results. Toxicological analysis could not be performed due to lack of facility and nature of the study. Another major limitation of the study is the lack of follow-up of the subjects after their discharge from the hospital.

Conflict of interest:

The authors stated that there is no conflict of interest in this study.

Funding:

No specific funding was received for this study.

Ethical consideration:

The study was conducted after approval from institutional ethical review committee. The confidentiality and anonymity of the participants were maintained.

Funding

No specific funding was received for this study.

Acknowledgement

The authors were grateful to the doctors and staffs of the Department of Medicine of Sylhet M.A.G Osmani Medical College & Hospital, Bangladesh.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

ASSESSMENT OF NUTRITIONAL STATUS AND FUNCTIONAL CAPACITY OF RURAL ELDERLY POPULATION IN CHATTOGRAM, BANGLADESH

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Abstract

Background: *Bangladesh, like many developing countries, is experiencing population ageing. There is inadequate information regarding the prevalence of malnutrition and functional dependency in community-living rural senior residents in this country. The study aims to determine the nutritional status and functional capacity of the rural elderly population of Chattogram District of Bangladesh and to search for its associated factors.* ***Methods:*** *This community-based cross-sectional study included 213 subjects aged 60 years and over from two Upazilla of Chattogram district by a multistage random sampling technique. Sociodemographic and clinical data were collected using a structured questionnaire, nutritional status was assessed with the Mini Nutritional Assessment-Short Form (MNA-SF) tool and functional assessment was done using the Modified Barthel self-care index (BSI).* ***Results:*** *The participants' mean age was 66.1 ± 6.5 years and 51.6 % was female. More than half of the participants (45.4%) were illiterate. The majority of them were living in a joint family with their spouse. About 70% of the participants were from lower socioeconomic classes, 82.2% were not engaged in any vocational activity, 74.6% were entirely dependent economically on others, and 110 (51.6%) had multi- morbidity. The prevalence of malnutrition and risk of malnutrition were 29.9% and 56.8% of the study sample, respectively. About 44% of the participants need help to perform their daily activities. Poor nutritional status was significantly more frequent in elderly subjects aged more than 70 years, in respondents living without a partner, and in older people with multi-morbidity.* ***Conclusion:*** *Poor nutritional status was commonly observed among older adults living in rural areas in Chattogram. The associated factors should be further considered for targeting particularly vulnerable individuals.*

Keywords: *Malnutrition, Older population, Mini nutritional assessment, Modified Barthel self-care index, Bangladesh.*

Received: 18.01.2024 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.71065

Citation: *Chowdhury MR, Chowdhury MAH, Hoque SMK, Paul S, Dutta AK. Assessment of Nutritional Status and Functional Capacity Of Rural Elderly Population In Chattogram, Bangladesh.. Bangladesh J Medicine 2024; 35: 76-81*

Introduction:

Like the world population aging scenario, the average life expectancy of the people of Bangladesh rose to 72.6 years in 2019, according to a report by the Bangladesh Bureau of Statistics (BBS).[1,2] Over the past decades, Bangladesh's health program and policies have focused on population stabilization, maternal and child health, and disease control.[3,4] However, current statistics for older people in Bangladesh give an idea of a new challenge of medical, social, and economic problems that may arise.[5] Hence, it is essential to organize our health system so that it will face problems due to the senior population load.

Nutritional disorders are serious and common findings in the elderly population.[5-8] Malnutrition is linked to decreased muscle mass, higher infection rates, poor

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health outcomes, and impaired quality of life.[9] In a study conducted among elderly patients visiting the emergency department, malnutrition was shown to be the strongest independent risk factor of short-term mortality.[10]

As a critical factor for healthy aging, nutritional status information will be a significant public health concern, mainly because of the growing elderly population.[11] Studies conducted in different countries, including Bangladesh, reveal a high prevalence of poor nutritional status and impaired functional ability among the elderly population.[5-8,12,13] To our knowledge, nutrition and functional status in the community-dwelling elderly Bangladeshi population living in rural areas in the Chattogram district remains unexplored. In addition, the relative impact of the factors contributing to nutritional status may differ from one population to another, depending on the cultural background. Present study aimed to evaluate the nutritional status and functional capacity of the geriatric population of selected rural areas of Chattogram District of Bangladesh.

Methods:

The Department of Medicine, Chittagong Medical College Hospital, conducted a community-based cross-sectional study in some selected rural areas of the Chattogram District of Bangladesh from October 2018 to September 2019. As referred by the United Nations, people aged 60 years or more were considered an older population,[14] and respondents of that age group living in two villages of Chattogram District were the study population.

Through a multistage sampling method, two hundred and fifty households were selected from two villages of Chattogram. Now, from within all the selected households, all older adults were enrolled as study participants by arranging a medical camp in the nearest suitable place with the help of trained volunteers. Finally, it was possible to include 213 older adults in this study. Seriously ill persons, persons having malignancy, and bedridden persons were excluded.

A pretested semi-structured questionnaire used in the face to face interviews for data collection. The questionnaire had two parts; questions related to sociodemographic characteristics and questions related to economic status. Two tools were used, one is Mini Nutritional Assessment (MNA) Scale to obtain nutritional status and another one is modified Barthel Self Care Index (BSI) for functional assessment. Socioeconomic status class was categorized as upper, upper middle, lower middle, upper lower, and lower class according to modified Kuppuswamy's Socioeconomic scale.[15] Morbidity was defined as the self reported and diagnosed previously by any registered physician. Multi morbidity was defined as the co-occurrence of two or more chronic health conditions in one person. The nutritional status assessment was done by using the MNA-SF scale, where four screening questions and three assessments (i.e., height, weight, calf circumference) were taken into consideration. The scores assigned for individual responses were according to the MNA-SF questionnaire.[16,17] The total score was 14, and 0 to <7 was categorized as malnourished, 8 to 11 as at risk of malnutrition, and 12 to 14 as well-nourished.[16,17] Functional capacity was assessed as per the Modified BSI of Activities of Daily Living (ADL).[18] This index provides information using a standardized, validated scale to assess a patient's ability to perform simple tasks relating to personal care. The scale has good validity and inter-rater reliability. Total scores range from 0 to 20, with lower scores indicating increased disability and higher scores indicating greater independence. Functional capacity was categorized as heavily dependent on caregivers with a score of 0-10, needing moderate help with a score of 11-13, and independent as 14-20.[18]

Data cleaning and detailed analysis were performed using the IBM SPSS software version 23.0. Continuous variables were reported as means and standard deviation, and categorical variables were reported as counts and percentages. We used chi- square tests to assess bivariate associations between categorical variables. For analysis, the MNA variable was dichotomized: 'malnutrition' was collapsed with at risk of malnutrition to identify people with 'poor nutritional status' versus those with 'satisfactory dietary quality. Pearson's correlation coefficients were performed for linear relations between total MNA scores and BSI. Statistical significance was defined as $p < 0.05$.

Results:

The mean age was 66.12±6.52 years (range 60-95 years), and 48.4% were male. More than half of the participants (45.4%) were illiterate. The majority of them were living in a joint family with their spouse. About 70% of the participants were from lower socioeconomic classes, 82.2% were not engaged in any vocational activity, and 74.6% were entirely dependent economically on others (Table I).

Table I
Sociodemographic characteristics of the participants (n=213)

Variables	Frequency	Percentage
Age		
60-70 years	148	66.5
>70 years	65	33.5
Sex		
Male	103	48.4
Female	110	51.6
Education		
Illiterate	118	55.4
Literate	95	44.6
Marital status		
Partnered	180	84.5
Single	33	15.5
Family type		
Nuclear	54	25.4
Joint	159	74.6
Vocational status		
Working	38	17.8
Not working	175	82.2
Socioeconomic status		
Upper	2	0.9
Upper middle	10	4.7
Lower middle	29	13.6
Upper lower	109	51.2
Lower	63	29.6
Economic dependency		
Independent	30	14.1
Partly dependent	24	11.3
Fully dependent	159	74.6

Out of 213 participants only 10 (4.7%) were free from any morbidity. Most prevalent self reported co-morbid illness among the elderly population were HTN (46%) and DM (30.5%). Out of 213 rural elderly 110 (51.6%) had multi-morbidity. Out of 213 elderly subjects included in the study 30 (14.1%) had satisfactory nutritional status, 121 (56.8%) were at risk of malnutrition and 62 (29.1%) were malnourished by MNA tool. Out of 213 elderly subjects included in the study 120 (56.3%) were independent in performing their daily activities as assessed by BSI tool, 70 (32.9%) need occasional help and 22 (10.8%) need major help for the same purpose.

Table II
Nutritional and functional status of the elderly participants

Variables	Frequency	Percentage
Nutritional status		
Satisfactory nutrition	30	14.1
At risk of malnutrition	121	56.8
Malnutrition	62	29.1
Functional status		
Independent	120	56.3
Need occasional help	70	32.9
Need major help	23	10.8

The correlation between MNA and BSI were examined and there was significant positive correlation between these two variables (Pearson correlation coefficient r=0.324, p<0.05) (Figure 1).

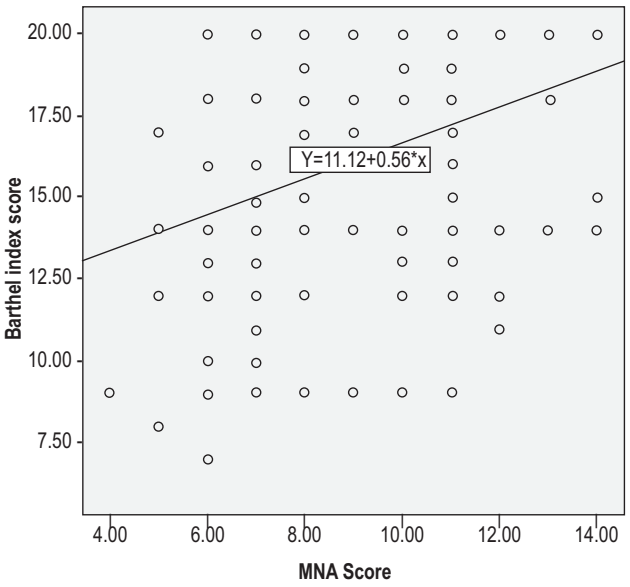

Figure 1: *Correlation between MNA score and BSI score among rural elderly.*

The characteristics associated with poor nutritional status (both malnutrition and at risk of malnutrition) were examined in Table III, which shows that, older age, being widowed/divorced and having multi-morbidity appeared to be significantly associated with a poor nutritional status (p<0.05).

Table III

Frequency of poor nutritional status evaluated by MNA according to baseline characteristics in rural elderly (n=213)

Variables		n	Poor nutritional statusn (%)	P value*
Age	60-70 years	148	121(81.8%)	0.008
	>70 years	65	62 (95.4%)	
Sex	Male	103	87 (84.5%)	0.556
	Female	110	96 (87.5%)	
Family type	Nuclear	54	50 (92.6%)	0.103
	Joint	159	133 (83.6%)	
Marital status	Partnered	180	150 (83.3%)	0.011
	Single	33	33 (100%)	
Education	Illiterate	118	104 (88.1%)	0.299
	Literate	95	79 (83.2%)	
Vocationalstatus	Working	38	29 (76.3%)	0.061
	Not working	175	154 (88.0%)	
Socioeconomicstatus	Upper & middle	48	39 (81.3%)	
	Lower	165	144 (87.3%)	0.291
Economic dependency	Independent	30	22 (73.3%)	
	Partly dependent	24	20 (83.3%)	0.080
	Fully dependent	159	141 (88.7%)	
Multi-morbidity	Absent	103	83 (80.6%)	0.030
	Present	110	100 (90.9%)	

*Chi-square test.

Discussion:

This research aimed to identify the nutritional status and functional capacity and factors associated with the nutritional status of the older population in rural area of Chattogram and revealed that 29.1% of them were malnourished, which corresponds with the findings from other studies conducted in Bangladesh, where the reported the proportion of malnutrition was 26.0 and 25.8%.[8,19] Studies conducted in India and Nepal showed a similar proportion of malnourished.[13,20,21] In contrast, a much lower proportion of malnutrition was observed in a study conducted in Hong Kong, where only 1.1% were malnourished.[22] As already showed in the previously published paper,[7] poor nutritional status, defined as either malnutrition or risk of malnutrition, was present among 85.9% of the studied population, much higher than the study conducted in community-dwelling elderly subjects in Lebanon (37.1%). A global study with data from community-dwelling older people in developed countries such as Switzerland, France, Japan, Sweden, and South Africa showed only 5.8% were malnourished.[23] Better healthcare facilities, especially targeting the older age group, and nutritional guidelines, which were strictly followed in the countries mentioned above, might be the reason behind the lower proportion of malnutrition. The other objective of our study was to estimate functional status of the elderly community dwellers. In this study 10.8% of the total elderly need major help in performing their daily activities which is almost similar to a study conducted in our country in rural area where only 7% reported limitations in ADL.[9]

There was a positive correlation between MNA and BSI scores in the present study population which indicated that as the nutritional status decreased functional capacity also declined proportionately. Malnutrition has previously been associated with poor functional status. MNA-SF is also a tool capable of predicting functional disability in the elderly. A low MNA-SF score has also been related to incident disability in older adults.[24,25]

In our study population, the proportion of poor nutritional status was higher among the elderly aged >70 years than the elderly aged between 60-70 years; among females than males; among the residents in nuclear families than joint family; among single than partnered elderly; among illiterate than literate; among vocationally inactive than active; among lower socioeconomic than middle and upper socioeconomic group; economically dependent than independent group; and among elderly with multi-morbidity than without. However, the association of age groups, marital status, and multi-morbidity reached statistical significance. Previous studies reported that female sex, elderly people suffering from poor financial condition, having low level of education, those with multiple chronic diseases, those reporting chronic pain or presenting mental disorders were at high risk of malnutrition.[7,8,12,13]

Limitations: Certain limitations apply to this study. Caution should be exercised in generalizing our study's findings due to the inclusion of the subjects from a single district of the southeastern part of Bangladesh. The cross-sectional study design used in this study was not ideal for identifying the cause-and-effect relationship between malnutrition and the associated factors. The sample size of this study was relatively smaller than studies of a similar nature.

Conclusion: The majority of the rural older population were malnourished or at risk of malnutrition. Higher age, living a single life and multi-morbidity status were the factors associated with the proper nutrition of the older population

Conflict of Interest: The authors declare no conflict of interest Funding: No specific funding was received for this study.

Ethical consideration: The study was conducted after approval from the ethical review committee of Chittagong Medical College. The confidentiality and anonymity of the study participants were maintained.

Acknowledgement: Thankful to all members of local charitable foundations such as Jostha Moyee Smriti Charitable Foundation, Save Our Society, and Navin Mela for their support in collecting data for this study.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

RELATIONSHIP OF VITAMIN D DEFICIENCY WITH NON- MOTOR FUNCTIONS OF PARKINSON'S DISEASE

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Abstract

Background: *Parkinson's disease (PD), a neurodegenerative disorder is associated with substantial public health and economic burdens. Low levels of vitamin D are a common finding in patients of PD. The aim of the study was to investigate the relationship between the vitamin D level and non-motor symptoms of Parkinson's Disease* ***Methods:*** *This case-control study was conducted in Department of Neurology, BIRDEM General Hospital, Dhaka for a period of 12 months. A total of 120 participants, 60 patients with PD and 60 age and sex matched sample of healthy controls were enrolled and informed written consent was taken. Information on socio-demographic characteristics, clinical features, laboratory parameters and neurological examinations were assessed. A semi-structured questionnaire was used for data collection and data was analyzed with Statistical Package for Social Science (SPSS) version 24.0.* ***Results:*** *Age and gender was not significantly different between PD cases and controls. Mean vitamin D level was significantly lower among the patients with PD compared to controls (25.97±3.44 ng/ml vs38.47±5.08 ng/ml, (p<0.01). Among all the cases of PD, 45% had akathisia, 36.7% had depression and 40% had insomnia. According to Modified Hoehn and Yahr score 53.3% patients were in stage 1-2, 26.7% in stage 2-3 and 20% in stage >3.The mean vitamin-D level was 28.43±2.43, 24.06±1.57 and 21.92±1.62 in stage 1-2, stage 2.5-3 and stage>3 respectively and vitamin D level decreased significantly with advancement in stages of PD (p<0.01). While assessing the depression in patients with PD, it was observed that stages of PD was significantly associated with severity of depression, patients with >3 stage of PD was moderately severe (16.7%) and severely depressed (16.7%) than patients with <3 stage PD (p=0.009).* ***Conclusion:*** *Importance should also be given for recognition of non- motor symptoms in PD patients, since these symptoms have an impact on patient's quality of life.*

Keywords: *Vitamin D Deficiency, Non- Motor Functions, Parkinson's Disease*

Received: 11.04.2024 *Accepted: 22/04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72400

Citation: *Khan MSH, Mouri UK, Islam MR, Rahman T, Rahman A, Ahmed JU. Relationship of Vitamin D Deficiency with Non- Motor Functions of Parkinson's Disease. Bangladesh J Medicine 2024; 35: 82-87*

Introduction:

Parkinson's disease (PD) is the second most common neurodegenerative disease after Alzheimer's disease (AD). The prevalence of PD increases with age; it affects 1% of the population over the age of 60[1]. Over the last two decades, multiple studies have examined the relationship between low levels of vitamin D and Parkinson's disease. Several studies concluded that, serum level of vitamin D is significantly lower in patients with PD compared to healthy controls in their studies.[2, 3] Vitamin D was proposed to alter cholinergic, dopaminergic, and noradrenergic neurotransmitter

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pathways in the central nervous system (CNS). Furthermore, vitamin D may play a role in neuronal plasticity and axogenesis. Several studies demonstrated that vitamin D ameliorates synthesis of neurotrophic factors and detoxification pathways which protect the integrity and structure of neurons.[4] Vitamin D enhances the synthesis of dopamine through increasing the level and activity of the enzyme tyrosine hydroxlase. Distribution of vitamin D receptors (VDR) in the substantia nigra is altered in patients with Parkinson's disease.[5] It has been demonstrated that vitamin D plays a role in dopamine synthesis through regulation of tyrosine hydroxylase gene expression. VDR is also highly expressed in putamen and caudate. Significant relationship was found between VDR gene polymorphism and Parkinson's disease. Vitamin D receptors were demonstrated in the promoter regions of ret, GDNFR-á, and neurturin genes which are strongly linked to PD.[6, 7]

Parkinson's disease is associated with substantial public health and economic burdens, which are expected to increase in the future with a rapidly growing older population. Identification of modifiable risk factors may therefore have important public health implications. Despite epidemiological data from different studies revealed that vitamin D deficiency may contributes in the development of Parkinson's disease, but it still a matter of debate whether this relationship is a direct effect or that patients suffering from Parkinson's disease have decreased ambulation and sun exposure and, as a sequence, higher prevalence of vitamin D deficiency.[8] Multiple epidemiological studies have shown that relative to controls, PD cases have lower serum/plasma levels of 25-hydroxyvitamin D (25(OH) D). Several studies concluded that, higher level of vitamin D in patients of Parkinson's disease were associated with better motor and non-motor function. In Bangladesh, there is limited study regarding the level of serum vitamin D in Parkinson's disease patients. The aim of this study was to assess the serum vitamin D level in patients with Parkinson's disease and to investigate the possible relationship between the serum vitamin D level and non motor symptoms in Parkinson's disease.

Methods:

This case control study was conducted in the department of neurology, BIRDEM general Hospital from 1st July 2022 to 30th June, 2023. Adult patients e"18 years of age who fulfilled the criteria for Parkinson's disease based on the British Brain Bank criteria[9] were included the study. Convenient sampling method was used. Patients with visual impairment or hearing loss affecting their ability to complete the tests, secondary Parkinsonism, Parkinson's plus syndrome and patient with clinically overt dementia, history of alcohol intake or drug abuse, major psychiatric Disorders, structural brain lesions in an MRI/CT scan study, on vitamin D supplements or medications that affect the vitamin D level, chronic kidney disease patient were excluded from the study.

All collected data was checked very carefully to identify any error in collecting data. Before commencement of the study, formal ethical approval was taken from the ERC of BIRDEM General Hospital, Dhaka. The study group consisted of 120 participants, 60 patients with PD and 60 age and sex matched sample of healthy controls. Written informed consent was taken from every patient. Clinical neurological examination including H&Y staging was performed and the findings were recorded for each PD cases. Non-motor symptoms were also assessed like depression was assessed by PHQ-9 quick depression assessment questionnaire.[10]

All the data collected was than analyzed in SPSS/PC 24 software. Results were expressed by appropriate tables, figures and analytical discussion. Data was compiled and analyzed by using SPSS version 24.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as mean (standard deviation) and categorical variables as frequencies and percentages. Comparison were done by Chi-Square ($\div^2$) test and Fisher Exact test for categorical variable and independent student t-test and one-way ANOVA and Post-Hoc analysis for continuous variable where necessary. A probability (p) value of < 0.05 ($p<0.05$) was considered statistically significant.

Results:

This case control study was conducted in the department of Neurology, BIRDEM General Hospital, and Dhaka to see the relationship of vitamin D deficiency with non- motor functions of Parkinson's disease.

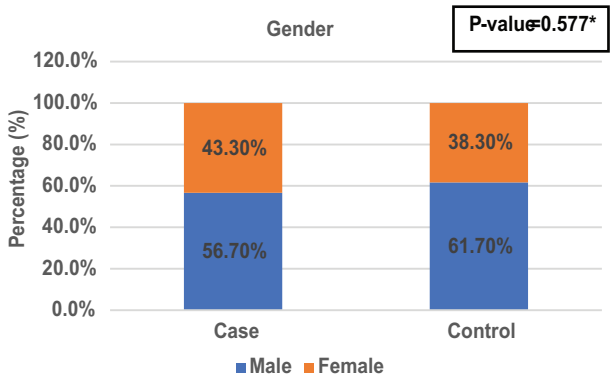
Table I

Distribution of the study participants according to age (n=120).

Age group (in year)	Case-group (n=60) n(%)	Control-group (n=60) n (%)	P-value
50 to 60	15 (25)	12 (20)	0.789*
61 to 80	40 (66.7)	42 (70)	
>80	5 (8.3)	6 (10)	
Mean±SD	68.4±9.43	69.8±9.37	0.456**

Cases group: PD patients.
Control group: Healthy controls.
P-value was determined by *Chi-square test and **Independent sample t test.

Majority of the patients were aged between 61 to 80 years in both case (66.7%) and control (70%) groups. Mean age of the cases and controls was 67.98±10.4 years and 69.43±10.1 years respectively. No significant difference in age was observed between two groups ($p>0.05$). P-value=0.577*



Cases group: PD patients.
Control group: Healthy controls.
*p-value was determined by Chi-square test.

Figure 1: *Gender distribution of the study participants (n=120).*

Among all, in case group 56.7% (n=34) were male and in controls group 61.7% (n=37) were male. Regarding gender, no significant difference was observed between two groups (p=0.577).

In case group 80% were married, 35% had completed SSC, 41.7% were unemployed and 60% had socio-economic status average. Besides, in control group, 76.7% were married, 33.3% had completed HSC, 41.7% were unemployed and 40% had socio-economic status average. No significant difference was found between both groups regarding socio-demographic profile.

Regarding co morbidities, no significant difference was observed between two groups (p>0.05).28.3% and 25% of the case and controls had HTN respectively. Family history of PD was 31.7% and 11.7% in PD patients and healthy controls respectively (p=0.007).

Mean serum 25 Hydroxy vitamin D level in cases was 25.97±3.44 ng/ml and in controlswas 38.47±5.08 ng/ml. Mean vitamin D level was significantly lower among the patients with PD compared to controls (p<0.01).

Vitamin D deficiency and insufficiency was significantly associated with PD (p<0.01), 5% and 78.3% of the patients had vitamin D deficiency and insufficiency compared to 1.7% in healthy controls respectively.

Table-II

Distribution of the study participants according to serum 25 Hydroxy vitamin D level (n=120).

Serum 25 Hydroxy vitamin D level (ng/ml)	Case-group (n=60) n(%)	Control-group (n=60) n(%)	p-value
Mean±SD	25.97±3.44	38.47±5.08	<0.01
Range	12-32	24-52	

Cases group: PD patients

Control group: Healthy controls

*p-value was determined by Independent sample t test.

Table-III

Distribution of the study participants according to vitamin D level (n=120).

Serum 25 Hydroxy vitamin D level (ng/ml)	Case-group (n=60) n(%)	Control-group (n=60) n(%)	p-value
Deficient (<20)	3(5)	1(1.7)	<0.01
Insufficient (20-30)	47(78.3)	1(1.7)	
Sufficient (30-100)	10(16.7)	58(96.7)	

*p-value obtained by chi-square test.

Table-IV

Clinical presentation of patients with PD (n=60).

Clinical presentation	Frequency (n)	Percentage (%)
Non-motor symptoms		
Akathisia	27	45
Depression	22	36.7
Pain	19	31.7
Constipation	11	18.3
Insomnia	24	40
Duration of the disease		
<5	35	58.3
5-10	22	36.7
>10	3	5
Modified Hoehn and Yahr score		
1-2	32	53.3
2.-3	12	26.7
>3	16	20

Among all the cases of PD 45% had akathisia, 36.7% had depression and 40% had insomnia. Majority had duration of disease <5 years (58.3%). According to Modified Hoehn and Yahr score 53.3% patients were in stage 1-2, 26.7% in stage 2-3 and 20% in stage >3.

Table-V

Association of depression with different stages of Parkinson's disease patients (n=60).

Depression	Stage 1-2	Stage 2.5 to 3	Stage >3	p-value*
None (0-4)	19(59.4)	12(75)	7(58.3)	0.009
Mild (5-9)	4(12.5)	1(6.3)	1(8.3)	
Moderate (10-14)	9(28.1)	3(18.8)	0	
Moderately severe (15-19)	0	0	2(16.7)	
Severe (20-27)	0	0	2(16.7)	

*p-value obtained by chi-square test.

While assessing the depression in patients with PD, it was observed that stages of PD was significantly associated with severity of depression, patients with >3 stage of PD was moderately severe (16.7%) and severely depressed (16.7%) than patients with <3 stage PD (p=0.009).

Discussion:

Parkinson's disease (PD) is a complex and progressive neurological condition characterized by postural instability, rigidity, and resting tremor. In addition, PD is linked to a broad range of non-motor symptoms that heighten total disability.[1,2] Majority of the patients were aged between 61 to 80 years in both case (66.7%) and control (70%) group with mean age of the case and control was 67.98±10.4 years and 69.43±10.1 years accordingly. Majority of the cases and controls were male. Similar age and gender distribution was also observed by a study.[11] Another study also found older age and male predominant among the PD patients.[12] Ageing remains the biggest risk factor for developing Parkinson's disease.[15] As control group were age and gender matched with case group so no significant difference found between both groups.

Mean serum 25 hydroxy vitamin D levels in cases was 25.97±3.44 ng/ml and in controls 38.47±5.08 ng/ml. Mean vitamin D level was significantly lower among the Case groups. Similar study revealed a strong association between hypovitaminosis D and PD.[13]Another study described that mean serum 25(OH)D concentrations were lower in PD than control participants (44.1±21.7 vs. 52.2±22.1 nmol/L, p < 0.05). A study also revealed that vitamin D has a significant impact on Parkinson's disease.[14] Beyond regulating calcium homeostasis and bone metabolism, vitamin D has extensive impacts on a wide range of systems and tissues, including the CNS.[15] There are accumulating evidences supporting the role of vitamin D deficiency in the pathogenesis of PD. Long-standing low vitamin D levels may lead to chronic loss of dopaminergic neurons in the central nervous system and, as a consequence, the development of Parkinson's disease.[16]

Among all the cases of PD 45% had akathisia, 36.7% had depression and 40% had insomnia. Majority had duration of disease <5 years (58.3%). A relevant study concluded that, constipation, urgency, insomnia, panic attack, light headedness and recent memory impairment were the most prevalent non motor symptoms in PD compared to controls.[17] While assessing the depression in patients with PD, it was observed that stages of PD was significantly associated with severity of depression, patients with >3 stage of PD was moderately severe (16.7%) and severely depressed (16.7%) than patients with <3 stage PD. A study concluded that 31.25% of patients with PD had depression while 40.6% of patients had anxiety disorder. Depression was higher in females and patients with history of depression and low socioeconomic status (SES). Hoehn and Yahr scale accounted for 33.4% of variance for depression. Advanced disease stage and severity were independent predictors for depression while disease severity and younger age of onset were the main predictors for

anxiety. Depression has a negative impact on the overall quality of life of PD patients especially on physical and psychosocial domains.[18]

Current study revealed that Vitamin D level significantly decreases with the increased stage of Parkinson's disease patients which was similar to a previous study.[19] A relevant study also revealed that Vitamin D deficiency seems to be related to disease severity and disease progression.[20] It was observed in another study that Vitamin D deficiency was significantly associated with disease severity of PD.[13] The relationship between low vitamin D status and PD is supported by current study along with several studies. Vitamin D deficiency is evident in PD patient, and such deficiency significantly affected non-motor symptoms.

Conclusion:

In summary, this study results showed that mean vitamin D level was significantly lower among the patients with PD compared to controls. Importance should also be given for recognition and management of non- motor symptoms in PD patients, since these symptoms have an impact of patient's quality of life. Furthermore, multicenter longitudinal randomized researches are recommended to understand the role of vitamin D level.

Limitations of the study:

This was a single center study. Sample size was small. In this study, since there were no repeated measurements, so the results only reflect the period in which the study was conducted.

Conflict of Interest:

The authors stated there is no conflict of interest in this study.

Funding:

No funding.

Ethical Consideration:

Ethical measures were taken throughout the study period to maintain a high standard of confidentiality and anonymity of the participants. Formal approval was taken from the ethical committee of Sir Salimullah Medical College Mitford Hospital.

Acknowledgement:

The authors were grateful to the staff of the Department of Neurology, BIRDEM general Hospital Hospital.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

EFFICACY OF BEDSIDE INDEX FOR SEVERITY IN ACUTE PANCREATITIS (BISAP) SCORE AS PREDICTOR OF IN-HOSPITAL OUTCOME IN ACUTE PANCREATITIS

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Abstract:

Background: *Acute pancreatitis is a potentially life-threatening condition characterized by inflammation of the pancreas. Early identification of patients at risk of severe disease is crucial for devising appropriate management strategies and improving outcomes. The aim of the study was to investigate the efficacy of BISAP score as predictor of in-hospital outcome in patients with acute pancreatitis.* ***Methods:*** *This was a longitudinal study conducted in Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka from January 2023 to December 2023. After ethical approval, a total 107 subjects were included in this study based on inclusion and exclusion criteria. Severity of the disease was assessed by BISAP score. Theoutcome determinants were length of hospital stay, complete recovery, partial recovery with complication, transfer to ICU and mortality. Chi Square test, Binominal Regression analysis and Receiver operator characteristic (ROC) curve analysis were performed as applicable. p value <0.05 was considered as the level of significance.* ***Results:*** *The mean BISAP score among 107 study participants was 2.00 ± 0.76. Patients with BISAP score ≥3 had significantly increased odds of prolonged hospital stay (OR: 11.226; 95% CI: 2.985-42.222; p<0.001), higher rate of partial recovery with complications (OR: 7.302; 95.325% CI: -20.997; p<0.001). <0.001), and greater likelihood of intensive care unit (ICU) transfer (OR: 1.136; 95% CI: 0.968-1.333; p=0.004). A BISAP score cutoff value of ≥3 was associated with increased length of hospital stay (sensitivity 91.3%, specificity 97.6%, AUC=0.945), partial recovery with complications (sensitivity 83.3%, specificity 96.4%, AUC=0.899), and ICU transfer (sensitivity 75%, specificity 80.6%, AUC=0.778).* ***Conclusion:*** *It can be concluded that increased BISAP score can be served as an independent predictor of in-hospital in patients with acute pancreatitis (AP).*

Keywords: *Acute pancreatitis, Bedside index for severity in acute pancreatitis (BISAP) score, in-hospital outcome.*

Received: 13.04.2024 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72610

Citation: *Islam MS, Hossain A, Islam MD, Abira M. Efficacy of Bedside Index for Severity in Acute Pancreatitis (BISAP) Score as Predictor Of In-Hospital Outcome In Acute Pancreatitis. Bangladesh J Medicine 2024; 35: 88-92*

Introduction:

Acute pancreatitis (AP) is an acute inflammation of the pancreas dueto auto-digestion of the gland by pancreatic digestiveenzymes, leading to morphologic changes and impairment of function or any[1,2]. It is a reversible process[2]. The incidence of acute pancreatitis varies from 5.4 to 79.8 per 1,00,000 population and it carries an overall mortality rate of 10-15%[3]. The

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mortality rate approaches 40% in severe cases[3]. It is a potentially life-threatening disease with variable presentation. In more than 90% of patients presented with abdominal pain[4].Alcohol, gallstones and hypertriglyceridemia constitute the primary causes of acute pancreatitis in many countries[5].

Numeric grading systems like Acute physiology and chronic health evaluation (APACHE) II, Ranson and Modified Glasgow scores are commonly used today as indicators of disease severity[6]. While Ranson and Modified Glasgow scores cannot be used for the first 48 hours and APACHE score is cumbersome to use[6].Bedside index for severity in acute pancreatitis (BISAP) score has been proposed as an accurate method for early identification of patients at risk for in-hospital mortality[7]. BISAP scoring system is very simple, inexpensive, easy to remember and calculate[8]. It accurately predicts the outcome of patients with AP[8]. There is no need for additional computation. Each of the parameter can be easily obtained early in the course of admission. The BISAP score stratifies patients within the first 24 hours of admission according to the severity and is able to identify patients at increased risk of mortality prior to the onset of organ failure[7,9]. BISAP score also validated and practiced as a useful tool for classification of AP by American College of Gastroenterology (ACG)[10]because of its simplicity and found accurate to predicts the outcome of patients with AP but less published data are available in our country with this scoring scale. Therefore, present study has been designed to evaluate the efficacy of BISAP score as predictor of in-hospital outcome in acute pancreatitis.

Methods:

This was a longitudinal study conducted in Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh from January 2023 to December 2023. A total 107 acute pancreatitis patients were included by purposive sampling. Acute pancreatitis was diagnosed on the basis of revised Atlanta classification (2012)[11]. Sample size was calculated by using a statistical formula. Patients with chronic pancreatitis, relapsing pancreatitis, pancreatic malignancy, chronic kidney disease, diabetes ketoacidosis, chronic liver disease, hepatic encephalopathy were excluded from the study.Ethical approval was obtained from the ethical review board prior of study. The nature and purpose of the study was explained to each subject in details. Informed written consent was taken from the participants. The history of disease, habits, demographic variables, risk factors, clinical examination, biochemical data, CT and MRI findings were recorded. With aseptic precaution, 5 ml of venous blood was collected from ante-cubital vein by a disposable plastic syringe from each participant for estimation of complete blood count, serum level of amylase, lipase, albumin, blood glucose, BUN, serum Ca^{2+}, LDH, ASTand ABG in the laboratory of SSMCH.Severity of the disease was assessed by bedside index for severity in acute pancreatitis (BISAP) score[8]. The outcome determinants was length of hospital stay, complete recovery, partial recovery with complication, transfer to ICU and mortality. All the information were recorded in a structured data collection.Data were expressed as mean ± SD, frequency, percentage and presented in appropriate tables and figures. Chi Square test, Binominal Regression analysis and Receiver operator characteristic (ROC) curve analysis were performed as applicable by windows software using IBM SPSS (statistical package for social sciences) Statistics for Windows, Version 26.0. p value <0.05 was considered as the level of significance.

Results:

In this study, population had a mean age of 52.09±14.94 years,with 66.4% being male and 33.6% being female (Table-I). The mean BISAP score was 2.00±0.76 (Figure-1).Mean±SD length of hospital stay was 6.77±1.51 days. Among the admitted patients about 77.6% were discharged with complete recovery, 22.4% patients were discharged with partial recovery. About 3.7% patients were transfer to ICU for further management (Table-II). Our study revealed patients with a BISAP score ≥3 was significantly higher odds of increased length of hospital stays (OR: 11.226; 95% CI: 2.985 to 42.222; p<0.001)partial recovery with complications (OR: 7.302; 95% CI: 2.539 to 20.997; p<0.001) and ICU transfer (OR: 1.136; 95% CI: 0.968 to 1.333; p=0.004) in acute pancreatitis patients (Figure 2).

Table I

Distribution of study subject according to age and gender (N=107)

Variable	Study Subjects (N=107)
Age (Years)	52.09±14.94
Gender	
Male	71 (66.4%)
Female	36 (33.6%)

Data were expressed as Mean±SD, frequency and percentage

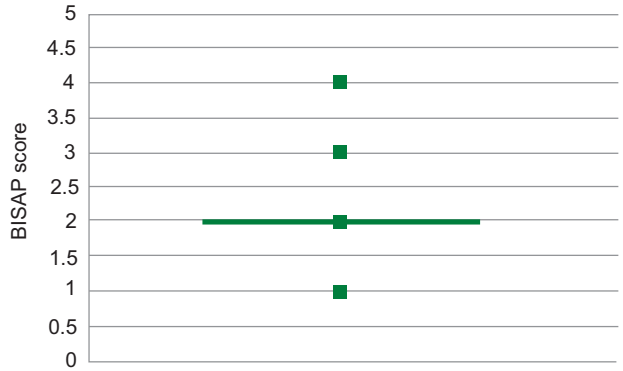


Figure 1: *Box and Whisker plot showing BISAP score of the study subjects (N=107)*

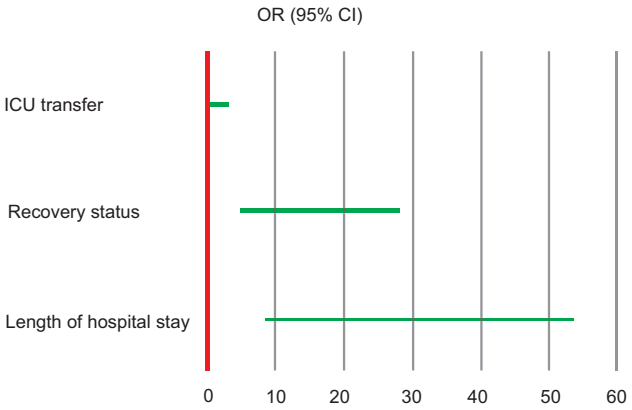
Table II

Distribution of the study subjects according to in-hospital outcome (N=107)

Outcome	Frequency	Percentage
Length of hospital stay (day)		
Mean ± SD	6.77±1.51	
Median (IQR)	7 (6-7)	
Complete recovery	83	77.6
Partial recovery with complication	24	22.4
Transfer to ICU	4	3.7
Death	0	0

Data were expressed as frequency, percentage, Mean ± SD, median and interquartile range (IQR)

ROC curve analysis revealed that a BISAP score cutoff value of ≥3 had high sensitivity and specificity in predicting increased length of hospital stay (91.3% and 97.6%, respectively), partial recovery with complications (83.3% and 96.4%, respectively), and ICU transfer (75% and 80.6%, respectively).{AUC = 0.945, 0.899 and 0.778; p = <0.05} (Table-III; Figure-3).



Binominal regression analysis was performed to calculate odds ratio (OR)

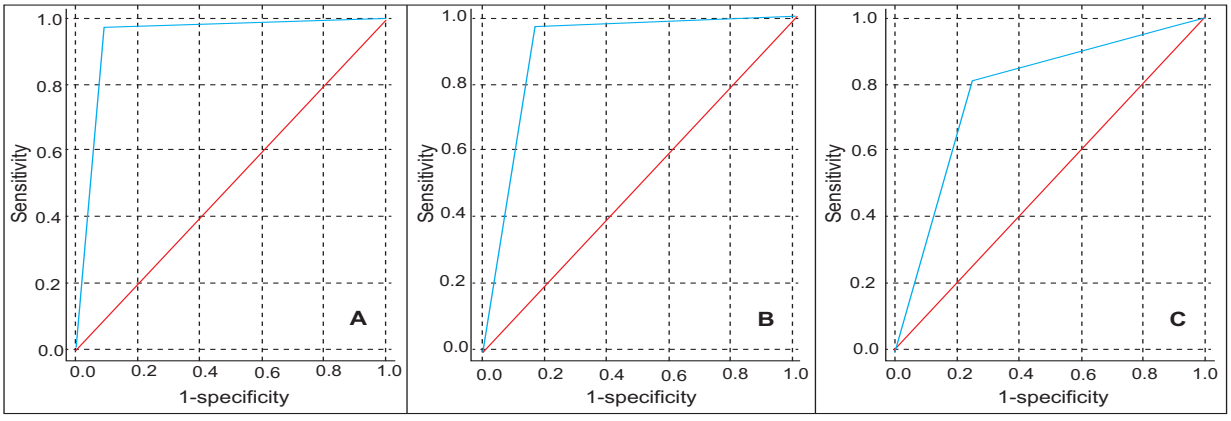
Figure 2: *Forest plot showing Odds ratio of BISAP score for predicting in-hospital outcome in acute pancreatitis (N=107)*

Table III

Diagnostic accuracy of BISAP score for predicting in-hospital outcome in acute pancreatitis (N=107)

Outcome	Sensitivity	Specificity	PPV	NPV	p values
Length of hospital stay	91.30%	97.60%	91.30%	97.60%	<0.001
Recovery	83.30%	96.40%	87.00%	95.20%	<0.001
ICU transfer	75%	80.60%	13%	98.80%	0.004

p value was obtained from Chi Square test



A=length of hospital stay, B=partial recovery withcomplication and C=ICU transfer

Figure 3: *Receiver operating characteristic curve (ROC) of BISAP score in predicting in-hospital outcome in acute pancreatitis patients (N=107)*

Discussion:

Early diagnosis and precise staging of disease severity are important goals in the preliminary evaluation and management of acute pancreatitis. Due to the risk of rapid worsening in severe acute pancreatitis, the assessment of severity becomes crucial to a clinician. Present study was undertaken to evaluate the efficacy of BISAP score as an independent predictor of in-hospital outcome of acute pancreatitis patients. Contemporary study observed mean BISAP score was 2.00±0.76. Similar observation was observed by Cho, et al.[12] and Kuntoji and Karimulla[8].

In current study, length of hospital stay was 6.77±1.51 days. Karim et al.[13] stated that the average hospital stay of patients was 9 days in mild pancreatitis and 13.5 days in severe pancreatitis. Gurleyik et al.[14] found mean hospital stay was 10 days in mild cases and a mean hospital stay was 21 days in severe cases. Karim et al.[13] informed that duration of hospital stay was significantly higher in severe acute pancreatitis probably due to increased tissue damage by inflammatory mediators.

In contemporary study, 22.4% patients were discharged with partial recovery and 3.7% patients were transfer to ICU for further management. Karim et al.[13] showed that 38.71% patients developed complication and 61.29% patients were discharged with complete recovery. Out of the 50 patients, 80% were discharged, 8% died, 10% were discharged against medical advice and 24% had to undergo ICU care observed by Manjunath et al.[15].

Our study revealed, BISAP score e”3 was 11 times risk for increased length of hospital stays, 7 times risk for increased rate of partial recovery with complication and 1 time risk for increase ICU transfer in acute pancreatitis patients. BISAP score had highly sensitivity and specific for predicting in-hospital outcome. The area of BISAP score under the ROC curve also considered as excellent for prediction of increased length of hospital stay, goodfor prediction of partial recovery withcomplication and moderatefor prediction of ICU transfer when cutoff values e”3 was taken as criteria for severe acute pancreatitis. These findings are parallel with other studies[16,17,18]. Chen et al.[19] recommended that BISAP has the advantages of simplicity and speed over traditional scoring systems. Park et al.[20] and Cho et al.[12] reported that BISAP requires data that are very easy to obtain at the time of admission which makes it much easier to calculate. Hagjer and Kumar[21] informed that BISAP is equivalent to the complex APACHE II in predicting hospital outcome.

Conclusion:

The study findings demonstrate that the BISAP score is an effective independent predictor of in-hospital outcomes in patients with acute pancreatitis. A higher BISAP score (e” 3) was associated with increased length of hospital stay, higher rates of partial recovery with complications, and a greater likelihood of ICU transfer.

The BISAP score offers several advantages, including its simplicity, ease of calculation within the first 24 hours of admission, and ability to stratify patients according to disease severity. Considering the BISAP score for predicting in-hospital outcomes in acute pancreatitis patients, while acknowledging the need for further prospective and multicenter studies to corroborate these findings and determine optimal cutoff values.

Limitations:

Small sample size and this single hospital based study did not reflect exact scenario of the whole community.

Data Availability:

The datasets analyzed during the current study are not publicly available due to the continuation ofanalyses but are available from the corresponding author on reasonable request.

Conflict of Interest:

The authors stated that there is no conflict of interest in this study

Ethical consideration:

The study was conducted after approval from the ethical review committee of Sir Salimullah Medical College, Mitford Hospital, Dhaka. The confidentiality and anonymity of the study participants were maintained.

Acknowledgement:

The authors acknowledge the Department of Medicine, Sir Salimullah Medical College, Mitford Hospital, Dhaka for their kind cooperation during sample collections and all the study subjects for their active participation.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

CHARACTERISTICS OF DISEASE PROFILE OF HOSPITALIZED ADULT PATIENTS REFERRED TO THE CARDIOLOGY DEPARTMENT IN A TERTIARY CARE ORTHOPEDICS HOSPITAL

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Abstract:

Background: *For patients admitted to a tertiary care orthopedic hospital, cardiac consultation is a common practice and almost essential in every country. This is because of the increased morbidity and mortality of cardiac cases, especially during the perioperative period. The study was conducted to understand and evaluate the common causes of referral and to discover the disease profile pattern of referred cases to the cardiology department in this hospital.* ***Methods:*** *This prospective observational study was carried out in the cardiology department, National Institute of Traumatology and Orthopedics Rehabilitation in Sher-E-Bangla Nagar, Dhaka, from July 2022 to December 2022. After data collection, data analysis was done using the SPSS-22 version, and findings were expressed in frequency and percentage.* ***Results:*** *This study revealed that the majority of referred cases were routine and non-cardiac (75%), with normal LV function on echo. on cardiac cases were referred for the fitness of general anesthesia. Among cardiac cases, hypertension (9%) got the highest referral; followed by OMI (4%), ICM (2.4%), congenital heart disease (2.2%), ventricular heart disease (2.4%), arrhythmia (1.8%), ACS (2.4%), pulmonary embolism (0.3%), and others (0.4%).****Conclusion:*** *Cardiac problems, morbidity, and mortality are increasing day by day. So every different tertiary care hospital should have an enriched cardiology department with an efficient team and proper instrumental support.*

Keywords: *Cardiology, Referral, Hospitalized Patients.*

Received: 19/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72773

Citation: *Siddiqui MAE, Islam DMK, Huda SMN, Ullah AZMA. Characteristics of Disease Profile of Hospitalized adult patients Referred to the Cardiology Department in a Tertiary Care Orthopedics Hospital. Bangladesh J Medicine 2024; 35: 93-95.*

Introduction:

In a tertiary care specialized hospital, referral and consultation with different units (Subspecialty) is very common for specific diagnosis and treatment. Even Hypertension that is well managed in a primary care setting, still there are many referrals to the cardiology department for uncontrolled one[1].

Internationally there are many recommendations of different institutions and bodies about how and when to refer a patient to cardiology unit. For example, in Queensland, before referring a patient to a cardiologist a confirm diagnosis of cardiac diseases has to made clinically as well as by relevant investigations.[2]

But it is more on less common in every recommendation about urgent referral which includes acute coronary syndrome (ACS) Acute left ventricular failure (ALVF), Fatal arrhythmia (e.g.- ventricular tachycardia, complete heart block etc.) [2-4]

NITOR (National Institute of Traumatology and Orthopedics Rehabilitation) Hospital is the largest tertiary care orthopedic hospital in Dhaka, Bangladesh, (Capital city of Bangladesh) which deals mainly with

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orthopedic cases. We conducted this cross sectional study of six months to discover the disease profile pattern of the referred cases to our cardiology department from different units of this hospital.

Methods:

This is a prospective observational study carried out in cardiology department of National Institute of Traumatology and Orthopedics Rehabilitation, Dhaka, Bangladesh. Our main objectives were to find out the common issues and condition of patients, which compelled a doctor to take opinion from cardiology department. We excluded the patients below 18 years' age (both male and female), known psychiatric patients and whose diagnosis were not confirmed (regarding cardiology consultation) during hospital stay. After excluding these cases, total number of patients referred to our unit was 668. After confirming the diagnosis, we categorized the patients first into following groups Cardiac and Non cardiac cases. According to the condition of cardiac patients, further sub classification was done as bellow Asymptomatic and Symptomatic: stable, unstable / urgent/critical cases. Many non-cardiac and routine cases were referred to us mainly for EGC and echocardiography for evaluation of cardiac fitness for general anesthesia (G/A). All the relevant date was compiled and Analysis was done using SPSS-22.

Results:

Among the study male were 82% and female were18%

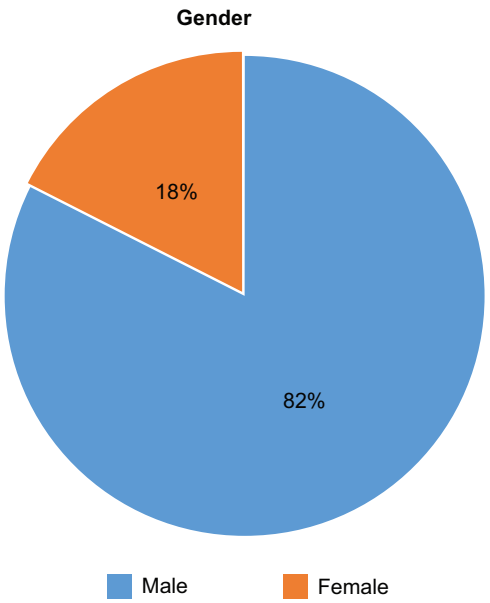

Figure-1: *Distribution of respondents in the referrals*

Among total referral cases, most of them were routine and non-cardiac (n=501, p= 75%). Total number and percentage of critical patients were (n=167, p= 25%); most of them were AMI, LVF, ICM, acute pulmonary embolism. the top most common causes of referral were as follows:

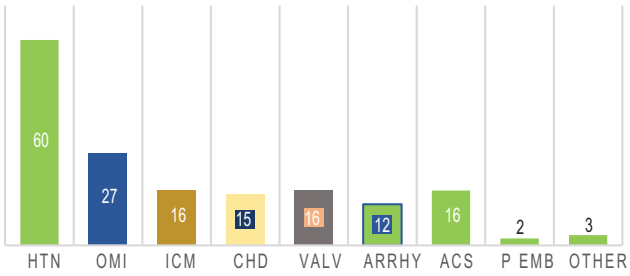

Figure-2: *2 Among the respondents cardiac diseases was hypertension : 60, OMI: 27,ICM:16,CHD: 15, valvular heart disease: 16,arrhythmia: 12,acs: 16,pul embolism: 02 and others: 03*

Discussion:

Taking cardiology consultation from a non-cardiac case in common in every hospital [5]. This is because of not only for excluding any cardiac Disease of atypical presentation is missed which can be fatal for the patients 6-8, 9.

Among all the referrals, number of cardiac cases were (n=167, p= 25%). majority of referred cardiac cases were in stable clinical condition. Large number of referred non cardiac cased is likely to avoid any case fatality, because of atypical presentation of cardiac cases in elderly and in diabetic patients, which is very common worldwide [6, 7,9,] and specially diagnosis of chest pain of various reasons may need to identify and exclude cardiac disease first[9].

As a universal rule, the frequency of taking cardiology consultation before going to surgery (specially under GA) was much higher than other reasons[5].This is why, in our study interpreting ECG was also an interesting cause of referral; - Because all those patients were completely asymptomatic and there ECG findings were alsonormal. We think these were as a part of routine cardiac checkup before OT. Some referred non cardiac cases drew our attention. Among them – pneumonia, hypothyroidism, bronchial asthma, COPD, COPD with cor-pulmonale, were common. Interestingly a good number of cardiac cases with atypical presentation were also found. 04 (four) cases of AMI were found with upper abdominal pain and vomiting, 02 (two) cases were silent ischemia. It is common for long term diabetic and elderly patients to present with atypical symptom of ACS[7]. There are some

observations, regarding referred cases of hypertension – Initial drug selection and doses were not according to the international guidelines, practiced in our country. Some patients were referred to control BP without any initial primary drug. But it can be practiced by all registered graduate physician.

Conclusion:

This study can give an idea to both the cardiologists as well as other doctors about the pattern of referral. We emphasize the non-cardiology doctors to identify the cardiac emergencies as well as non-cardiac critical conditions mimicking cardiac disease to avoid catastrophe. This will synchronize the workload among all departments, regarding patient management in a tertiary care hospital like National Institute of Traumatology and Orthopedics Rehabilitation.

Limitations:

This study has some study limitations. First, this was an observational study. Analytical study may reveal some associations, which may alter the management plan. Second, this was a single center study. Third, no associated co - morbidities were included in our study. If these were included, the magnitude of the problem and prognosis of many cases could be predicted.

Conflict of interest:

The authors stated there is no conflict of interest in this study.

Funding:

No funding.

Ethical consideration:

Ethical measures were taken throughout the study period to maintain a high standard of confidentiality and anonymity of the participants. Formal approval was taken from the ethical committee of National Institute of Traumatology and Orthopedics Rehabilitation, Dhaka, Bangladesh

Acknowledgement:

The authors were grateful to the staff of the cardiology department of National Institute of Traumatology and Orthopedics Rehabilitation, Dhaka, Bangladesh

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

CLINICAL EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE IN ADVANCED CHRONIC KIDNEY DISEASE PRIOR TO DIALYSIS TO A TERTIARY CARE CENTRE IN BANGLADESH

MD YOUSUF ALI[1], AMINUR RAHMAN[2], KAZI ISMAT ZAKIA[3], SANJOY KUMAR PAUL[4], MAISHA ZERIN MIM[5]

Abstract

Background: *Patients with advanced CKD stages exhibit a markedly elevated risk of cardiovascular disease. Patients with chronic kidney disease (CKD) exhibit an elevated cardiovascular risk manifesting as coronary artery disease, heart failure, arrhythmias, and sudden cardiac death .The main objective of this study was to observe the clinical epidemiology of cardiovascular disease in advanced stages of CKD prior to dialysis to a tertiary care centre in Bangladesh.* ***Methods:*** *This was a cross-sectional observational study on 150 cases of diagnosed advanced stages (4&5) of CKD patients in the indoor Department of Medicine of Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh from July 2022to January2023 for 6 months. Data was analyzed SPSS 25.* ***Results:*** *Out of the total group, 62.0% are male, 38.0% are female, and the average (mean) age of the entire group was 55.2 ±10.3. Patients are compared in terms of their relative percentages and the associated cardiovascular disease (CVD) risk, with the hypothesis that lower hemoglobin levels (<9 mg/dL), common in advanced CKD, may be associated with higher CVD risk. A statistically significant P-value (0.036) indicates a significant association between lower hemoglobin levels and increased risk of CVD. Hypertension is the most common risk factor in both stages showing (80%) in stage 4 and 86.6% in Stage -5 of CKD respectively that increasing prevalence as stages of CKD increases . Other factors like diabetes 50.6%) and 53.3% , dyslipidemia 61.3% and 66.7% , and family history of cardiovascular disease (CVD) 40% and 46.6% also in prevalence from Stage 4 to Stage 5. However, the differences in the prevalence of these risk factors between the two stages are not statistically significant, as indicated by the P-values. The prevalence of Congestive Heart Failure rises from 44% in Stage 4 to 52% in Stage 5, and a similar trend is observed in Coronary Artery Disease from 40% in Stage 4 to 48% in Stage 5 and for other diseases, albeit with lesser increments. The provided p-values, which assess statistical significance, indicate that the differences in disease prevalence between the two stages are not statistically significant, suggesting that the progression from Stage 4 to Stage 5.* ***Conclusion:*** *This study stated that increased prevalence and progression of cardiovascular risks in advanced CKD stages.*

Keywords: *Clinical epidemiology Chronic kidney disease (CKD), Cardiovascular, prior to dialysis*

Received: 19.04.2024 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72777

Citation: *Ali MY, Rahman A, Zakia KI, Paul SK , Mim MZ. Clinical epidemiology of cardiovascular disease in advanced chronic kidney disease prior to dialysis to a tertiary care centre in Bangladesh.. Bangladesh J Medicine 2024; 35: 96-100.*

Introduction:

Chronic kidney disease (CKD) represents a global health burden affecting millions worldwide, with its prevalence increasing owing to the aging population and rising rates of its primary risk factors, such as diabetes and hypertension. CKD is characterized by a gradual loss of kidney function over time and is classified into various stages based on the severity of kidney damage, with stages 4 and 5 being the most advanced and often requiring renal replacement

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therapies[1]. Among the numerous complications associated with CKD, cardiovascular diseases (CVD) are the most common and constitute the leading cause of mortality in this patient population[2].The interplay between CKD and CVD is complex and multifactorial. Kidney dysfunction promotes cardiovascular risk through various pathways including fluid overload, increased production of pro-inflammatory cytokines, and alterations in calcium and phosphate metabolism, which contribute to vascular calcification and arterial stiffness[3]. Furthermore, the retention of uremic toxins in CKD can exacerbate oxidative stress and endothelial dysfunction, further elevating the risk of cardiovascular complications[4]. Epidemiological studies consistently demonstrate an elevated prevalence of traditional cardiovascular risk factors such as hypertension, diabetes, and hyperlipidemia in CKD patients[5]. However, CKD itself is also independently associated with an increased risk of adverse cardiovascular outcomes, which suggests that kidney disease may directly contribute to cardiovascular pathology [6]. For instance, anemia, a common complication of CKD due to decreased erythropoietin production by the kidneys, has been linked to left ventricular hypertrophy and heart failure[7]. The relationship between hemoglobin levels and cardiovascular outcomes in CKD has garnered considerable attention. Lower hemoglobin concentrations have been associated with higher mortality and morbidity rates due to CVD in this population[8]. This association underscores the importance of monitoring and potentially managing anemia as part of the cardiovascular risk reduction strategy in CKD patients. The aim of this study to assess the risk factors cardiovascular diseases in advanced stages of chronic kidney disease patients.

Methods:

This cross-sectional observational study was conducted in the Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh from July 2022 to January 2023,to observe cardiovascular status in advanced stages (4 & 5) of CKD patients. The patients who attended the outpatient department of medicine or were admitted to the medicine ward were considered as the study population. A total of 150 patients were selected as study subjects as per inclusion and exclusion criteria. A purposive sampling technique was adopted in this study. The study aimed to investigate on adult patients with advanced chronic kidney disease (CKD), specifically those in stages 4 and 5, who were not undergoing dialysis or receiving hematinics. CVD was assessed in CKD through echocardiography, ECGs, biomarker analysis, and physical examination. Inclusion criteria encompassed adult patients of both sexes above 18 years old who met the specified CKD stage requirements and were willing to provide informed consent. However, certain individuals were excluded from the study, such as those under 18 years old, patients with CKD complicated by bleeding disorders, recent hemorrhage, chronic liver disease (CLD), or malignancy. Additionally, individuals who were already undergoing dialysis, receiving hematinics, recombinant human erythropoietin, or had received blood transfusions were excluded. Patients with psychological abnormalities or those who declined to participate were also excluded.CKD staging was done according to the US National Kidney Foundation Kidney Disease Quality Outcomes Initiative 2002. Data collection was done through face-to-face interviews with the selected patients with the help of a structured questionnaire. Data were entered in the IBM Statistical Package for Social Science (SPSS) 25 for Windows 10. Statistical analysis was done using SPSS 25 on Windows 10. To establish a relationship between variables chi-square analysis, student t-test, and Fisher's Exact test were done in all cases. P value < 0.05 is considered significant. After analysis, the data were presented in tables. Ethical clearance was taken from the Institutional Ethical Review Committee (ERC).The informed consent of the patients was taken. All information was kept confidential.

Definition of hypertension, diabetes, and cardiovascular disease events[8]

Hypertension at entry was defined as either systolic blood pressure >140 mmHg, or diastolic blood pressure >90 mmHg (confirmed by at least three elevated readings taken at least 1 week apart), or use of antihypertensive medications, or any self-reported history of hypertension. In addition, 24-hour ambulatory blood pressure was measured for every participant. Diabetes mellitus was defined as either a fasting glucose g"7.0 mmol/L, or HbA1c g" 6.5%, or use of insulin or oral anti-diabetic medications, or any self-reported history of diabetes. CVD was defined as a history of myocardial infarction, hospitalization for congestive heart failure, serious cardiac arrhythmia incidents (resuscitated cardiac arrest, ventricular fibrillation, sustained ventricular tachycardia, paroxysmal ventricular tachycardia, atrial fibrillation or flutter, severe bradycardia or heart block), peripheral arterial disease (PAD), or cerebrovascular events (cerebral infarction, transient ischemic attack, cerebral hemorrhage or subarachnoid hemorrhage). Reporting of CVD was based on both the patients' self-report and review of their medical records by trained staff on the same date of the baseline interview.

Definition of stages of CKD [9]

The stages of CKD are classified as follows :Stage 1: Kidney damage with normal or increased GFR (>90 mL/min/1.73 m 2), Stage 2: Mild reduction in GFR (60-89 mL/min/1.73 m 2), Stage 3a: Moderate reduction in GFR (45-59 mL/min/1.73 m 2),Stage 3b: Moderate reduction in GFR (30-44 mL/min/1.73

m 2)Stage 4: Severe reduction in GFR (15-29 mL/min/ 1.73 m 2) abd Stage 5: Kidney failure (GFR < 15 mL/ min/1.73 m 2 or dialysis)

Results:

Table1

Sex and age of the patients (N= 150)

Variables	n	%
Male	93	62.0
Female	57	38.0
Mean age (years)	55.2 ±10.3	

Out of the total group, 62.0% are male, 38.0% are female, and the average (mean) age of the entire group was 55.2 ±10.3. [Table I].

Table II

Hemoglobin Levels in Advanced Stages of CKD Patients and Associated Cardiovascular Risk (N=150)

Hemoglobin (mg/dL)	Number of Patients n (%)	Associated CVD Risk	P-value
≥9	105 (70.0)	High	0.036
> 9	45 (30.0)	Low	
Mean ± SD	7.61 ± 2.54		
Range	4.8 - 10.6		

Patients are compared in terms of their relative percentages and the associated cardiovascular disease (CVD) risk, with the hypothesis that lower hemoglobin levels (<9 mg/dL), common in advanced CKD, may be associated with higher CVD risk. A statistically significant P-value (0.036) indicates a significant association between lower hemoglobin levels and increased CVD risk in this cohort. [Table II]

Table III

Risk factors of Cardiovascular diseases in Advanced Stages of CKD (N=150)

Cardiovascular Risk Factors	CKD Stage 4 (n=75)	CKD Stage 5 (n=75)	P-value
Hypertension	60(80%)	65(86.7%)	0.218
Diabetes	38(50.7%)	40(53.3%)	0.741
Hyperlipidemia	46(61.3%)	50(66.7%)	0.425
Family History of CVD	30(40%)	35(46.7%)	0.310
Elevated Body Mass Index (>30)	28(37.3%)	31 (41.3%)	0.562
Physical Inactivity	32 (42.7%)	36 (48%)	0.462
Smoking	20 (26.7%)	22 (29.3%)	0.689

Hypertension is the most common risk factor in both stages showing (80%) in stage 4 and 86.6% in Stage -5 of CKD respectively that increasing prevalence as stages of CKD increases ,. Other factors like diabetes 50.6%) and 53.3% , dyslipidemia 61.3% and 66.7% , and family history of cardiovascular disease (CVD) 40% and 46.6% also in prevalence from Stage 4 to Stage 5. However, the differences in the prevalence of these risk factors between the two stages are not statistically significant, as indicated by the P-values [Table III]

Table IV

Prevalence of Specific Cardiovascular Diseases in advanced CKD (N=150)

Cardiovascular Disease	CKD Stage 4 (n=75)	CKD Stage 5 (n=75)	P-value
Congestive Heart Failure	33(44%)	39(52%)	0.217
Coronary Artery Disease	30(40%)	36(48%)	0.248
Atrial Fibrillation	20(26.7%)	24(32%)	0.339
Peripheral Arterial Disease	15(20%)	19(25.3%)	0.410
Stroke	12 (16%)	16 (21.3%)	0.295

The prevalence of Congestive Heart Failure rises from 44% in Stage 4 to 52% in Stage 5, and a similar trend is observed in Coronary Artery Disease from 40% in Stage 4 to 48% in Stage 5 and for other diseases, albeit with lesser increments. The provided p-values, which assess statistical significance, indicate that the differences in disease prevalence between the two stages are not statistically significant, suggesting that the progression from Stage 4 to Stage 5. [Table IV]

Discussion:

Our study systematically evaluated the intersection between cardiovascular diseases and advanced stages of chronic kidney disease (CKD), showcasing varied prevalence and associations that resonate with findings from prior studiesThis study reflects the demographics of this study population, comprising a majority of males (62%) with an average age of 55.2 years. These findings are consistent with previous research, such as the study by Zhang et al., which noted a higher prevalence of CKD in males, potentially due to higher rates of risk factors like hypertension and diabetes in this demographic.[10] A significant proportion of our CKD patients (70%) had hemoglobin levels ≤9 mg/dL, associated with a higher cardiovascular risk, a finding echoing Jankowska et al., who reported anemia as a common comorbidity in CKD and a significant predictor

of cardiovascular morbidity[11,12]. The statistical significance (p=0.036) underscores the critical nature of managing anemia in CKD to potentially mitigate associated cardiovascular complications. Hypertension is the most common risk factor in both stages showing (80%) in stage 4 and 86.6% in Stage -5 of CKD respectively that increasing prevalence as stages of CKD increases ,. Other factors like diabetes 50.6%) and 53.3% , dyslipidemia 61.3% and 66.7% , and family history of cardiovascular disease (CVD) 40% and 46.6% also in prevalence from Stage 4 to Stage 5. Although changes in our study did not reach statistical significance, they suggest a worsening trend that demands vigilant clinical attention .This trend aligns with the study by Thomas et al., which noted that as renal function declines, the prevalence and severity of hypertension tend to increase, thereby escalating the overall cardiovascular risk.[12]. Another study stated that patients with kidney disease are deemed to be at highest cardiovascular risk. CVD, defined as the presence of either congestive heart failure (CHF), ischemic heart disease (IHD), or left ventricular hypertrophy (LVH), is prevalent in cohorts with established CKD (8–40%). The prevalence of hypertension, a major risk factor for coronary artery disease (CAD) and LVH is high in patients with CKD (87–90%). At least 35% of patients with CKD have evidence of an ischemic event (myocardial infarction or angina) at the time of presentation to a nephrologist. [13,14] the another study showed that The percentage of different CVD subtypes among the subset of patients with CVD was MI 20.6%, CHF 9.0%, cerebrovascular disease 69.1%, and PAD 10.1%, respectively and stage 3 & 4 CKD are significantly associated with the prevalence of CVD[8]. The prevalence of specific cardiovascular conditions was observed, where Congestive Heart Failure (CHF) and other cardiovascular diseases showed an increased prevalence with advancing CKD stages, though without statistical significance. This observation supports the findings from Briasoulis et al. , indicating that the burden of cardiovascular diseases such as CHF increases with the progression of renal impairment, largely due to shared risk factors such as hypertension and diabetes.[14] ,[15]in our study , we found the prevalence of Congestive Heart Failure rises from 44% in Stage 4 to 52% in Stage 5, and a similar trend is observed in Coronary Artery Disease from 40% in Stage 4 to 48% in Stage 5 and for other diseases, albeit with lesser increments.

Limitations of the Study:

The study was carried out in a single hospital with a small sample size and for a short duration. So, the results may not represent the whole community.

Conclusion:

This study highlights that a significant correlation between advanced stages of CKD and increased risks of CVD. The findings emphasize the progression of cardiovascular risks in advanced CKD stages.

Conflict of Interest:

The authors stated there is no conflict of interest in this study.

Funding:

No funding.

Ethical Consideration:

Ethical measures were taken throughout the study period to maintain a high standard of confidentiality and anonymity of the participants. Formal approval was taken from the ethical committee of Sir Salimullah Medical College Mitford Hospital.

Acknowledgement:

The authors were grateful to the staff of the Department of Medicine at Sir Salimullah Medical College Mitford Hospital.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

CASE REPORT

A YOUNG MAN WITH HEREDITARY MOTOR AND SENSORY NEUROPATHY: A RARE GENETIC ASSOCIATION

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Abstract:

Hereditary motor and sensory neuropathies with early onset are uncommon conditions that include Dejerine-Sottas neuropathy, which begins in infancy, and congenital hypomyelinating neuropathy, which manifests in the early postnatal period. However, these two historically defined disease entities are only small parts of the clinical spectrum. It is well recognized that very early onset hereditary neuropathies are frequently caused by de novo dominant mutations in PMP22, MPZ, and EGR2. In addition, mutations in several other dominant and recessive genes for Charcot-Marie-Tooth disease may lead to similar phenotypes. A 20-year-old boy had complaints of weakness of both lower limbs for 1 year, followed by wasting and foot drop, which subsequently involved the upper limbs. Nerve conduction velocity and electromyography of both lower limbs revealed demyelinating sensory motor polyneuropathy. Histological examination of the sural nerve revealed a nerve trunk with perineural soft tissue, with the nerve bundles being irregular and separated by fibrous tissue bands. The later reveals small perivascular infiltration of chronic inflammatory cells, and no granuloma or AFB is seen. The genetic test of whole exome screening for heriditatory neuropathy showed pathogenic (PM2, PVS, PP5) with a gene impact of (NF2: c.363+1G>T), which is a rare entity in our case study to consider the diagnosis despite negative family history. We highlight this rare disease in young man with a high index of clinical suspicion for its diagnosis.

Keywords: *Hereditary Motor and Sensory Neuropathy, Genetic association.*

Received: 17.04.2024 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72747

Citation: *Twinkle FQ, Rahman A, Hakim KM, Shapnil AA, Mishu MH, Islam MR et al. A Young Man with Hereditary Motor and Sensory Neuropathy: A Rare Genetic Association. Bangladesh J Medicine 2024; 35: 101-105*

Introduction:

Hereditary motor-sensory neuropathy (HMSN), also as Charcot-Marie-Tooth neuropathy, is a common hereditary peripheral neuropathy that primarily manifests as progressive limb muscle weakness and muscle atrophy. [1] As the disease progresses, symptoms of sensory and vegetative involvement may occur.[1] According to clinical and electrophysiological characteristics, it can be categorized as demyelinating type, axonal type, or intermediate type. At present, the most common genetic pathogenic loci include PMP22, GJB1, MFN2, and MPZ, and this account for more than 90% of all subtypes of the disease. [2] In recent years, with the development and application of gene sequencing technology, more than 90 pathogenic genes from other mutation sites and families have been discovered and reported.[3] The prevalence is unknown, mainly due to the inexistence of detailed

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epidemiological studies, and it has been estimated at 2–16/100000. [4] The disease is associated with deletions in chromosome 17p11.2, where the peripheral myelin protein 22 (PMP22) gene is localized. [5] The authors report a case of a 20-year-old man who had complaints of weakness of both lower limbs for 1 year, followed by wasting and foot drop, which subsequently involved the upper limbs.

Case report:

A 20-year-old male non-diabetic, normotensive right handed person was admitted to our neurology department in September 2023 with the complaints of weakness of both lower limbs for 1 year, wasting of both lower limbs for 7 months, weakness and wasting of both upper limbs for 3 months, and bodyache for 3 months (Figure:1).

Figure: *20 year old male with wasting of limbs.*

One year ago, the patient developed weakness in both lower limbs, whose onset was insidious and gradually progressive. Gradually, he noticed wasting of both lower limbs for 7 months, which started in the distal part of the lower limb. Then he also developed weakness and wasting of both upper limbs in the form of difficulty holding objects. Initially, these limb weaknesses did not hamper his daily activities, gradually impairing them. He also developed generalized bodyache, which is severe in nature, persists all day long, is aggravated by walking, and is relieved by taking rest. He feels tingling and numbness in his lower limbs. He was diagnosed with peripheral neuropathy in his local hospital and was given therapy with vitamin B1 and cobalamine. His symptoms were not alleviated, and then he was referred to our department. He is a non-smoker and non-alcoholic with normal bowel and bladder function and no H/O parental consanguinity, and none of his family members have this type of illness. He was immunized completely.

The patient has no anemia, lymphadenopathy, or thyromegaly. In his neurological examination, he found higher cerebral function, including speech, and the cranial nerve intact. There was wasting of almost all groups of muscles in both the distal and proximal groups of both lower limbs, more marked distally. There is wasting of the thenar and hypothenar muscles of the hands. Mainly, wasting is prominent in the left upper limb, followed by the right. Foot drop is present on the left. There was weakness (4/5) in the upper limb both proximally and distally, 3/5 in the distal, and 4/5 in the lower limbs. Tendon reflexes were decreased in all the extremities, and the Babinski signs were absent. All modalities of sensation are impaired in the lower limb up to the mid thigh and the upper limb up to the mid-forearm in the gloves and stockings pattern. There is the presence of Romberg's sign. The bilateral finger-to-nose test and heel-knee-shin test were normal. The signs of meningeal irritation were negative, and the gait was high, stepping to the left. There is no nerve thickening.

An extensive laboratory test was performed (white blood cells and platelets count, sedimentation , C-reactive protein, liver function, phosphorous, calcium, magnesium, muscular enzymes, folic acid and vitamin B12, thyroid function, immunoglobulins, auto-antibodies, viral markers, and syphilis and CSF study) with normal results (Table I). Lower limb and foot X-rays were normal, as was the magnetic resonance of the vertebral column. Nerve conduction velocity and electromyography of both lower limbs revealed demyelinating sensory motor polyneuropathy. Histological examination of the sural nerve revealed a nerve trunk with perineural soft tissue, with the nerve bundles being irregular and separated by fibrous tissue bands. The later reveals small perivascular infiltration of chronic inflammatory cells, and no granuloma or AFB is seen. The genetic test of whole exome screening for heriditatory neuropathy showed pathogenic (PM2, PVS, PP5) with a gene impact of (NF2: c.363+1G>T) (Table-II).

Laboratory Findings and Analysis:

Table-I

Interpretation of laboratory findings

LaboratoryInvestigation	Result	Normal Level
CBC	Hb%14g/dl, ESR- 20 mm	12 to 16 g/dl
Serum Calcium	6.6 mg/dL	9 – 10.5 mg/dL
Phosphorus	8 mg/dL	2.4 – 4.1 mg/dL
Alkaline phosphatase (IU/L)	244	145-420
Magnesium (mg/dL)	1.9	1.5-2.3
Albumin (g/dL)	4.8	4.0-5.3
Parathormone (PTH)	8 pg/mL	10 – 65 pg/mL
SGPT	24 U/ L	7 - 56 U/ L
25-hydroxyvitamin D	25 ìg/L	>30 ìg/L
Vit B12	432(pg/ml)	60 to 950 (pg/ml)
Folic acid	7.1(ng/mL)	2.7 to 17.0 (ng/mL)
S.TSH	1.5 mIU/L.	0.5 to 5.0 mIU/L.
Vit D level	34 nmol/L	>30 nmol/L
CPK	88U/L	39 – 308 U/L
RA test	5 IU/ml.	0-20 IU/ml.
HbS Ag	Negative	
VDRL	Negative	
CSF Study	Protein 20 0/dl mL	15 to 60 mg/dl
	Cell count: 1-2/HPF.	Cell:<3 lymphocyte
	Lymphocyte	

Table - II

Whole exome sequencing on the illumina Novaseg 6000 NGS platform

Pathogenic variant detected related to the clinical phenotype					
Key findings					
Gene & Transcript	**Location**	**Variant**	**Gygositty/ Inheritance**	**OMIM phenotype Significant**	**Clinical**
BF2(+) NM_000268.4	Intron 3	c.363+1G>T (Splice donor variant)	Heterozygous /Autosomal Dominant	Schwannomatosis 1/ Neurofibromatosis type 2	Pathogenic (PM2,PVS1,PPS)
Genetic test results are reported based on the recommendations of American College of Medical Genetics					

Discussion:

HMSN, also known as Charcot-Marie-Tooth neuropathy (CMT neuropathy), which was first described by Charcot, Marie, and Tooth in 1886, is a group of heterogeneous motor and sensory genetic neuropathies. 6 The pathology of reduced nerve conduction velocity, hypertrophic demyelination, and axonal lesions are the main pathological features of HMSN. Clinical symptoms include progressive weakness of the limb muscles, atrophy of the muscles, difficulty walking, and deformity of the feet. In a later stage, there is also evident damage to the sensory and vegetative nerves. [7] Physical therapy and rehabilitation therapy are the only ways to control the disease, as there is currently no effective cure.

Early diagnosis can therefore positively and accurately guide HMSN patients to modify their lifestyle in order to minimize neurological damage to the greatest extent possible, thereby delaying or preventing the disease's disability rate. [8] HMSN is a genetic illness that manifests itself in various ways. Autosomal dominant inheritance, autosomal recessive inheritance, X-linked dominant inheritance, and recessive inheritance are the genetic modes associated with HMSN. As of right now, the incidence of this disease has been linked to about 90 gene mutations, and its overall prevalence is about 1/2500.[9] Several subtypes can be distinguished based on genetic loci and pathogenic genes. With over 70% of all subtypes, CMT1A is the most prevalent subtype, is caused by a mutation in the PMP22 gene, and is the most common subtype, accounting for more than 70% of all subtypes. The pathogenic loci GJB1, MFN2, and MPZ are also frequently found.[10] In recent years, a few familial and sporadic HMSN cases caused by rare site mutations have been reported due to the widespread use of gene sequencing technology.[11]

This case study features a young man who initially had subtle lower limb weakness that progressively worsened. Over the course of seven months, he gradually noticed wasting in both lower limbs, beginning in the distal region. Then, he experienced wasting and weakness in both upper limbs. Higher cerebral function, including speech, and intact cranial nerves were observed in his neurological examination. Nearly all of the proximal and distal muscle groups in both lower limbs showed signs of wasting, with the distal wasting being more pronounced. The hands' thenar and hypothenar muscles are wasting away. The left upper limb is more affected by wasting than the right. There was 3/5 distal weakness and 4/5 lower limb weakness, with the upper limbs weaker (4/5) both proximally and distally. All extremities had reduced tendon reflexes, and there were no Babinski signs. When wearing gloves and stockings, all sense modalities are compromised in the lower limb up to the mid-thigh and the upper limb up to the mid-forearm. There is a Romberg sign present. Both the heel-knee-shin test and the bilateral finger-to-nose test were normal. Meningeal irritations were negative, and the patient's gait was left-sided high stepping. No thickening of the nerves occurs. The patient's clinical symptoms and the aforementioned physical and clinical examinations supported the diagnosis of motor and sensory neuropathies. Extensive biochemicals had been done, which were negative. Nerve conduction velocity and electromyography of both lower limbs revealed demyelinating sensory motor polyneuropathy. Histological examination of the sural nerve revealed a nerve trunk with perineural soft tissue, with the nerve bundles being irregular and separated by fibrous tissue bands. The later reveals small perivascular infiltration of chronic inflammatory cells, and no granuloma or AFB is seen.

These findings indicate that the lower motor neuron was affected. An electrophysiological study indicated demyelinating sensory-motor polyneuropathy. Routine biochemistry and ganglioside antibodies in cerebrospinal fluid were negative. The above physical and clinical examinations, in conjunction with the clinical symptoms the patient had, supported a diagnosis of peripheral neuropathy. The genetic test of whole exome screening for heriditatory neuropathy showed pathogenic (PM2, PVS, PP5) with a gene impact of (NF2: c.363+1G>T) is classified as a pathogenic variant. This result does support the previous report, as this variant may be an uncommon genetic sequence in Southeast Asia, like Bangladesh, and further study is to be done to support the study. The final diagnosis was young-onset hereditary motor and sensory neuropathy without family history with a rare genetic association. These findings indicate that the lower motor neuron was affected. An electrophysiological study indicated demyelinating sensory-motor polyneuropathy. Routine biochemistry and ganglioside antibodies in cerebrospinal fluid were negative. The above physical and clinical examinations, in conjunction with the clinical symptoms the patient had, supported a diagnosis of peripheral neuropathy. The genetic test of whole exome screening for heriditatory neuropathy showed pathogenic (PM2, PVS, PP5) with a gene impact of (NF2: c.363+1G>T) is classified as a pathogenic variant. This result does support the previous report, as this variant may be an uncommon genetic sequence in Southeast Asia, like Bangladesh, and further study is to be done to support the study. The final diagnosis was young-onset hereditary motor and sensory neuropathy without family history with a rare genetic association.

Conclusion:

The clinical manifestations and electrophysiological results of this patient are consistent with the characteristics onset hereditary motor and sensory neuropathy with rare a genetic association (PM2, PVS, PP5) with gene Impact of (NF2: c.363+1G>T). It is a rare possible that this mutation is linked to hereditary motor and sensory neuropathy.

Conflict of Interest:

The author stated that there is no conflict of interest in this study

Funding:

No specific funding was received for this study.

Consent for publication:

Informed written consent was taken from the patient to publish details relevant to the disease and management**.**

Acknowledgement:

Thankful to all doctors, nurses and medical stuff of Department of Neurology, Anwer Khan Medical College Hospital, Dhaka, Bangladesh for their best and kind support for collection of data for this study.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

CASE REPORT

NON-OCCLUSIVE MESENTERIC ISCHEMIA – A RARE BUT DEADLY CONDITION

CARLA CADET B.S.[1], FARZANA HOQUE [2]

Abstract:

Non-occlusive mesenteric ischemia is a rare but often fatal condition that occurs due to spasms in the splanchnic arteries leading to hypoperfusion, cellular death, bowel ischemia, and eventually perforation. Having a high clinical suspicion in the correct setting is crucial to identifying and treating the medical condition quickly. This is a unique case of an 82-year-old Caucasian male who presented with peritonitis secondary to acute mesenteric ischemia caused by hypotension leading to the eventual finding of bowel ischemia and perforation.

Keywords: *Nonexclusive mesenteric ischemia, (NOMI)Acute mesenteric ischemia (AMI), bowel necrosis, laparotomy, hypoperfusion.*

Received: 17/11/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.70151

Citation: *Cadet BSC, Hoque F. Non-occlusive Mesenteric Ischemia – A Rare but Deadly Condition. Bangladesh J Medicine 2024; 35: 106-109*

Introduction:

Mesenteric ischemia is a serious clinical condition that arises from decreased blood flow to the small intestines, resulting in cell death. The superior and inferior mesenteric arteries primarily supply blood to the small intestine, complemented by an extensive network of collateral vessels that safeguard tissue viability under conditions of inadequate main arterial flow.[1]Mesenteric ischemia manifests primarily in two forms: acute and chronic. Acute mesenteric ischemia is a surgical emergency that demands immediate identification and intervention. Various factors can lead to acute mesenteric ischemia, such as arterial embolism, arterial thrombosis, and non-occlusive mesenteric ischemia (NOMI).[1]Non-occlusive mesenteric ischemia (NOMI) typically affects critically ill patients with severe cardiovascular disease, those on vasoconstrictive medications, or individuals experiencing sepsis, renal failure, recent cardiopulmonary bypass, or prolonged hypotension.[2,7]Diagnosing mesenteric ischemia is often challenging due to its nonspecific symptoms such as mild abdominal pain, nausea, and vomiting. Additionally, the condition may be masked by underlying issues like hypotension and hypovolemia.[2]

Case report:

We report a case of an 82-year-old Caucasian male with a history of COPD, aortic ectasia, hypertension, chemotherapy-induced cytopenia, andinvasive bladder cancer status post neoadjuvant chemotherapy followed by open radical cystectomy with pelvic lymph node dissection and ileal conduit who presented on the internal medicine service for additional management of bilateral lower extremity edema and pain worse on the left. Of note, surgical findings during open radical cystectomy included significant adhesions, as well as a small enterotomy primarily repaired during that same procedure. The patient had been complaining of ongoing mildly hindering left inner thigh pain since the day after surgery that was treated with Tylenol, lidocaine patch, and subsequently Ketorolac. The patient was set to be discharged on postoperative day 7 to an SNF but was unable to leave due to inadequate left inner thigh pain control. On postoperative day 8, he had new chest pain, shortness of breath, and worsening left inner thigh pain with right lateral thigh pain. The EKG performed showed a new right bundle branch block, troponin level within normal range, and

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a chest X-ray with mild atelectasis as well as concern for intraperitoneal free air that was thought to be related to the recent surgery. Bilateral venous doppler were also performed with the right showing no acute deep vein thrombosis and the left showing left incomplete peroneal deep vein thrombosis. The patient was then started on Apixaban 10 mg BID for the acute DVT. On postoperative day 9, the patient had worsening bilateral thigh pain, which led to the primary team ordering an MRI (Magnetic Resonance Imaging) of the thoracic and lumbar as well as creatinine phosphokinase (CPK). The MRI was negative for epidural hematoma, and the creatine kinase was within normal limits ruling out myopathy. The internal medicine team was also consulted that same day for additional management of the worsening bilateral lower extremity edema and pain. During the evaluation by the internal medicine team, significant abdominal pain to light palpation was noted. A stat CT was recommended to evaluate the patient for possible post-surgical complications including PE. The CT was delayed until the next day when a rapid response was called on to the patient due to dyspnea, acute hypoxia, and diffuses abdominal pain. CT PE protocol, Abdomen, and Pelvis were conducted for evaluation of PE and pneumoperitoneum. CT revealed no PE but was significant for the thickening of multiple small bowel loops in the lower abdomen with decreased enhancement with areas of pneumatosis as well as extensive mesenteric and portal venous gas which were findings concerning bowel necrosis (figure 1).

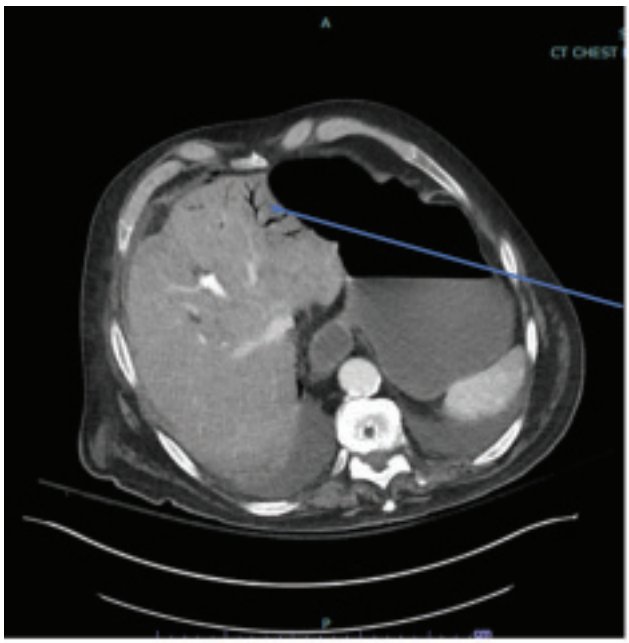

Figure 1: *A blue arrow pointing to portal venous gas in the left hemi-liver noted as peripherally located branching gaseous foci.*

The patient was then transferred to the anesthesiology critical care service for a higher level of care. There the wound drainage was evaluated for concern that output was from an intrabdominal source. A nasogastric tube was inserted and placed on low intermittent wall suction with drainage of over 700 ml of feculent/bilious drainage. The patient was then taken for an urgent laparotomy where it was discovered that the patient had a perforated small intestine just distal to a previous intestinal anastomosis. An ischemic appearing 10cm bowel segment distal to anastomosis was observed. The ischemic portion was resected, and the bilateral ureteral intestinal anastomoses were broken down and repaired.Post-laparotomy imaging showed the interval resolution of the previous portal venous gas that indicated ischemia (figure 2). The patient was left in discontinuity with two further attempts at abdominal closure. The patient was in the intensive care unit (ICU) for 15 days with worsening medical status including maximum ventilatory support, bilateral nephrostomy catheter placement due to a persistent urinary leak, and bridging vicryl mesh placement as temporary abdominal closure. The patient eventually passed away after the family decided to opt for comfort care after discussing the patient's wishes.

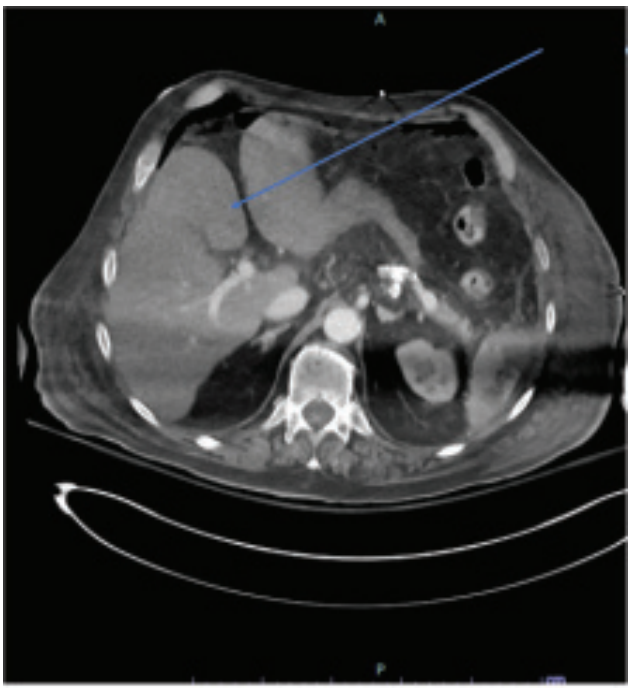

Figure 2: *Post exploratory laparotomy: blue arrow showing interval resolution of previously seen portal venous gas in the left hemi-liver.*

Discussion:

Acute mesenteric ischemia (AMI) is a serious condition with a poor prognosis, often resulting in death from

multiorgan failure. Acute mesenteric ischemia (AMI) can manifest through various mechanisms, including the rare but potentially fatal non-occlusive mesenteric ischemia (NOMI), which commonly affects critically ill patients in intensive care units.[1]It is often caused by spasms of the mesenteric arteries leading to hypoperfusion of the tissue and cellular death with prolonged and inadequate blood flow.[1,3,5,6] The symptoms of NOMI are often nonspecific and include mild abdominal pain accompanied by bloating sensation, nausea, and vomiting. The literature has shown that up to 1/3 of patients do not have abdominal pain and that the peritoneal signs of rebound tenderness and guarding often are not present on clinical presentation with just the ischemia. Unfortunately, in NOMI, transmural infarction often occurs at the time peritonitis presents itself, rendering only salvageable interventions.[3,7] Our patient reported indigestion four days before the peritonitis presentation, which is the only nonspecific sign of NOMI that was present after a careful chart review.[7] The patient had persistent left inner thigh pain since the day after surgery and an incomplete peroneal DVT developed from that same leg 8 days after surgery. The patient was started on subcutaneous heparin on postoperative day 4.The CTA did show patent superior mesenteric artery, inferior mesenteric artery, and celiac vessels, however, it cannot be ruled out that embolic or thrombotic causes did not contribute.[4,8]This patient did not have most of the overt risk factors that increased the risk of NOMI such as CHF, history of pancreatitis, use of vasospastic medications, cardiotonic medications, hemodialysis, and cardiac surgery.[4,9] The NOMI risks for that patient were fluctuated intraoperative hypotension, post-operative overnight hypotension, older age, and major abdominal surgery.[4]Nonocclusive mesenteric ischemia due to intestinal hypoperfusion accounts for about 20% of those admissions.[3,9] Individuals who do not have the over-risk factors but have the risk of bowel injury during surgery should be carefully monitored and a low threshold for imaging should be in place to promptly identify and intervene to minimize morbidity and mortality. Overall, it is important to consider the diagnosis in the setting of all open abdominal surgeries. In managing non-occlusive mesenteric ischemia (NOMI), the promptness and accuracy of diagnosis are crucial for effective treatment, yet there has been no significant improvement in prognosis over the past decades due to the absence of adequate diagnostic tools.[10] Current real-life diagnostic approaches combine physical examinations, various biomarkers, imaging, and endoscopy to assess different severities of NOMI. However, research typically focuses on only a few of these elements at a time. With the advent of artificial intelligence (AI), which can integrate thousands of variables into complex longitudinal models, there is potential for developing cutting-edge tools that could significantly enhance the accuracy of NOMI diagnoses.[10]

Conclusion:

Nonocclusive mesenteric ischemia is a rare yet frequently lethal condition that leads to intestinal necrosis and perforation of the intestinal wall. Swift identification of symptoms and timely interventions are crucial, emphasizing the importance of maintaining a heightened level of suspicion in individuals at risk of developing this condition.

Financial support and sponsorship: None

Conflicts of interest: None

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

CASE REPORT

AUTOSOMAL DOMINANT HEREDITARY SPHEROCYTOSIS IN AN ELDERLY PATIENT

NAZMUN NAHER[1], CHOWDHURY ADNAN SAMI[2], SAJID SOHAN[1], MD. MIZANUR RAHMAN KHAN[1], MUJAHIDA RAHMAN[3], ABED HUSSAIN KHAN[1], SHOHAEL MAHMUD ARAFAT[1]

Abstract:

Hereditary spherocytosis (HS) is an autosomal dominant inherited hemolytic anemia that usually manifests in early adolescence. A very small proportion (5%) may undergo de novo mutations and present at an elderly age without any positive family history. The disease is characterized by anemia, jaundice, splenomegaly, and the presence of spherocytes in peripheral blood, which are osmotically fragile. A 55-year-old elderly male presented with generalized weakness and a history of repeated blood transfusions for 5 months. He had recurrent jaundice for 8 years. There was no relevant family or drug history. He was anemic, icteric, and had mild splenomegaly. Investigation revealed persistently low Hb with normal red cell indices. There were a lot of spherocytes with polychromasia on the peripheral blood film. There was also evidence of hemolysis with a high reticulocyte count and higher levels of total and indirect bilirubin. Autoimmune hemolysis was excluded by negative direct and indirect Coomb's tests, and Hb defect was excluded by normal Hb electrophoresis. We also ruled out other infectious causes. The ultrasound confirmed splenomegaly. The osmotic fragility test showed increased osmotic fragility of the patient's red cells. History, symptoms, and test results strongly point to autosomal dominant hereditary spherocytosis with new mutations. An eosin-5-Maleimide binding test was advised, along with family screening of the patient.

Keywords: *Autosomal Dominant, Hereditary Spherocytosis, inherited hemolytic anemia*

Received: 17.04.2024 *Accepted: 22.04.2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72174
Citation: *Naher N, Sami CA, Sohan S, Khan MMR, Rahman M, Khan AH, Arafat SM. Autosomal Dominant Hereditary Spherocytosis in an Elderly Patient. Bangladesh J Medicine 2024; 35: 110-113*

Introduction:

Hereditary spherocytosis (HS) is typically an autosomal dominant trait[1]. It is more common among people of northern European descent[2]. It is a disease of red blood cell morphology, characterized by a stiff, spherical form of RBC. This morphological alteration confines and subsequently eliminates the cells within the spleen, resulting in hemolysis and anemia [3,4]. Hereditary spherocytosis commonly presents itself in the early stages of adolescence.

However, it can manifest in the senior population, particularly those over the age of 65, as a new mutation without any prior family history. The severity of membrane protein abnormalities (spectrin and ankyrin) correlates with the manifestation. The characteristic clinical features are anemia, jaundice, and splenomegaly [5]. Spherical red blood cells in peripheral blood and increased RBC osmotic fragility are the hematological features. In cases of mild hemolysis or when hemolysis is effectively compensated, not all classical symptoms are always present due to the bone marrow's ability to enhance red cell production [6]. Stress or other infections can sometimes lead to an elevation in hemolysis, resulting in temporary anemia or jaundice. Patients with undetected latent HS may only exhibit transitory anemia or jaundice as their initial manifestation. If there is clinical suspicion of HS, the peripheral blood

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smear is the most straightforward and essential diagnostic. Patients with HS may experience severe medical conditions due to the presence of two comorbidities, even though HS itself is not considered a life-threatening condition. The most worrisome concomitant disease in patients with HS is parvovirus B19 infection [7].

Case report:

A 55-year-old normotensive, nondiabetic man presented to our hospital with generalized weakness, a history of repeated blood transfusions, and mild abdominal pain for 5 months. He also gave a history of recurrent jaundice for 8 years, which subsided spontaneously on each occasion. Routine blood investigations incidentally diagnosed him with severe anemia following a 4-day episode of dry cough and fever, which manifested his weakness. He then received multiple blood transfusions in the form of 2 units of whole blood and 8 units of red cell concentrate over the next 5 months, but his symptoms did not subside. He did not reveal any history of bleeding, chronic diarrhea, constipation, weight loss, altered bowel habits, high-colored urine, rash, or joint pain. Recently, his elevated serum creatinine and ultrasonography (USG) evidence of renal parenchymal disease led to a diagnosis of chronic kidney disease (CKD). He has no family history of hemolytic diseases. On query, he did not give any drug history of antimalarials, antibiotics, dapsone, anticonvulsants, etc., or any history of chemical exposure or burns. On examination, the patient had a generalized dark complexion, was moderately anemic, mildly icteric, had a temperature of 98 °F, a blood pressure of 140/70 mmHg, and a pulse of 80 bpm with the presence of drop beats. There was no bone tenderness, lymphadenopathy, or skin rash. The abdomen was soft and non-tender, and the spleen was enlarged 1 cm from the left costal margin towards the right iliac fossa along its long axis. The rest of the systemic examination revealed no abnormalities.

On investigation, Hb was found to be persistently low, the lowest being 5.5 g/dL, while MCV: 84.4 fL; MCH: 27.9 pg, and MCHC: 33 g/L; there was eosinophilia with an absolute count of 2,200/cmm. PBF-dimorphic with plenty of spherocytes (Fig. 1), with polychromasia. WBCs were mature, with eosinophilia and an adequate number of platelets. A reticulocyte count of 12.29%, a raised total bilirubin of 3.01 mg/dl, anindirect bilirubin of 1.71 mg/dl, an uric acid of 10 mg/dL, and an LDH of 156 U/L revealed evidence of hemolysis. Transferrin saturation was 60%, with a very high serum ferritin level of 2579.81 ng/mL. Autoimmune hemolytic anemia was excluded by negative direct and indirect

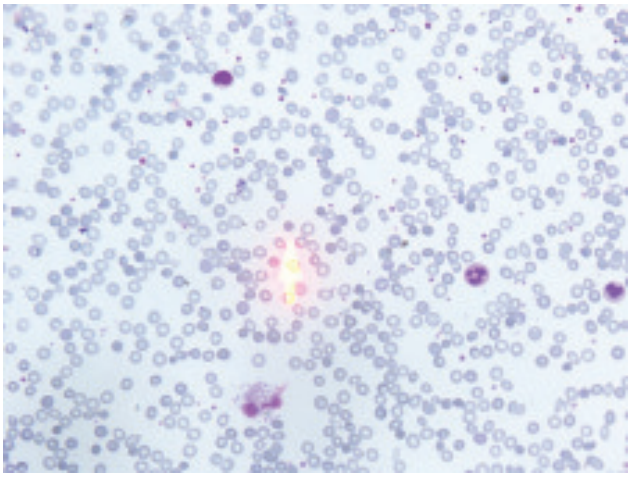

Figure 1: *Hereditary spherocytosis on peripheral blood film*

Coomb's tests. ANA was negative. Osmotic fragility test was done which was increased osmotic fragility (Table 1). Stool OBT, fecal calprotectin, CEA, CA-19.9, and colonoscopy were normal, while upper gastrointestinal endoscopy revealed antral gastritis. Other causes of anemia were excluded by normal Hb electrophoresis, serum vitamin B12 (596 pg/mL), and folate assay (>20 ng/mL). S. creatinine was 1.84 mg/dL with normal urine R/E, and HbA1C was 5.7%. USG revealed splenomegaly (14 cm) with a Grade 1 fatty liver and poor cortico-medullary differentiation of both kidneys. The ECG revealed premature atrial contraction, but the echocardiogram and chest X-ray were normal.

Table-I

Osmotic fragility test

Osmotic fragility test of fresh blood sample of the patient	Osmotic fragility of patient's blood sample- g/L NaCl	Normal Range- g/L NaCl
Initial Lysis	4.5	5.0
Complete Lysis	4.5	3.0
MCF (50% Lysis)	5.25	4.0-4.5
Comment	Increased Osmotic Fragility	

Other conditions associated with hemolysis, such as infectious mononucleosis, malaria, and Weil syndrome (leptospirosis), were tested negative. For eosinophilia, anthelminthic was prescribed orally, and ICT for filaria was negative. Based on the clinical features and peripheral blood smear findings, HS was strongly suspected. We prescribed oral folic acid to the patient, advised an Eosin-5 Maleimide binding test, and recommended family screening for HS.

Discussion:

HS is a prevalent hereditary form of hemolytic anemia characterized by the atypical shape of red blood cells (RBCs). A mutation in one of the five genes responsible for encoding proteins crucial for the cytoskeleton of the phospholipid bilayer in the RBC membrane causes the spherical shape of red blood cells (RBCs). The protein deficits that occur most frequently are band 3 and spectrin [8]

Autosomal dominant accounts for about 70% of HS cases, autosomal recessive for 25%, and de novo mutations account for 5% [9] For years, HS patients with modest hemolysis may go undetected.Timely detection will aid in the surveillance of an individual with hereditary spherocytosis, thereby diminishing the likelihood of difficulties in the future. Older children and adults may exhibit hemolytic anemia, high indirect bilirubin, splenomegaly, and cholelithiasis. Additionally, they may experience an aplastic crisis accompanied by infection [8]Patients can be diagnosed with HS without additional testing if they have a positive family history, clinical features of anemia, jaundice, splenomegaly, and a raised MCHC and reticulocyte level, as well as the presence of spherocytes.

Hemolysis, which is a result of an increased rate of red blood cell turnover and an enhanced concentration of pigments in the liver, can lead to gallstone formation [5,6] The treatment for people with clinically severe HS is splenectomy, however, it can be safely postponed in patients with mild, uncomplicated HS (hemoglobin level > 11 g/dL). Splenectomy typically leads to complete management of HS, exceptfor the atypical autosomal recessive form of the condition [10.]

Conclusion:

Hereditary spherocytosis is a disease of adolescence. But when elderlypatientsare present with unexplained anemia HS shouldn't be ruled out merely just because of age. We want to enlightenthe possibility of HS occurring in older people.

Conflict of Interest:

The author stated that there is no conflict of interest in this study

Funding:

No specific funding was received for this study.

Consent for publication:

Informed written consent was taken from the patient to publish details relevant to the disease and management.

Ethical consideration:

The study was conducted after approval from the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The confidentiality and anonymity of the study participant was maintained

Acknowledgement:

Thankful to all doctors, nurses and medical stuff of Department of Internal Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh for their best and kind support for collection of data for this study.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

CASE REPORT

ACUTE COPPER SULFATE POISONING: A CASE REPORT

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Abstract:
Copper Sulfate known as a powerful oxidizing agent and it can lead to widespread cellular damage, depending upon the dose ingested. The systemic effects of poisoning are seen primarily on red blood cells, gastrointestinal system, kidneys and cardiovascular system. The ingestion of poison can be lethal in severe cases. We reported the case of a 16-year-old girl who presented to the emergency department after ingestion of an unknown amount of copper sulfate 3 days earlier. On admission to the hospital, she had upper abdominal pain, vomiting and red colored urine with a normal serum copper level. She underwent symptomatic treatment and was monitored for 3 days. The outcome was favorable, and she had no signs and symptoms of organ failure.

Keywords: *Copper sulfate, Poisoning, Intravascular haemolysis, Penicillamine*

Received: 13/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72627

Citation: *Khan R, Rishad MM, Idris MA, Rubel AMSMS, Islam QT. Acute Copper Sulfate Poisoning: A Case Report. Bangladesh J Medicine 2024; 35: 114-117.*

Introduction:

Copper Sulfate, $CuSO_4$, mainly used as a fungicide, bactericide which is an inorganic compound, a potent oxidant. It is also used to kill animals like snails for agriculture.[1] Although copper (Cu) is an essential mineral, it is very harmful in excess.[2]

Copper (II) sulfate is a large, bright blue crystal containing five water molecules ($CuSO_4$'''$5H_2O$) and is also named blue vitriol or blue stone which is a salt containing $copper^{2+}$ as the metal ion, created by treating cupric oxide with sulfuric acid. Copper sulfate was used in burn wound debridement until cases of systemiccopper poisoning were reported [3]. Copper damages the cell membranes of the tissue by making them swollen and causes cell death. [4] It causes haemolysis by affecting red blood cells; causes rhabdomyolysis by damaging myocytes andacute hepatitis by destroying hepatocytes. These are tissues commonly affected. [5] After absorption in plasma copper occur in plasma as ceruloplasminexcreted largely in faeces. If it exceeds its biological half life which is 13-33 days, it gets deposited mainly in the liver [6]. Copper Sulfate Poisoning (CSP) is rare, but it has significant entity because of its higher risk of mortality even with smaller doses of ingestion. Features of toxicity can manifest even with a dosage of 1 g and dose of 10-20 g could even be lethal. [7]

Case report:

A young 16 year old female student admitted to PMCH medicine department with history suicidal attempt by taking copper sulfate. Stomach wash was given on the dayof ingestion in another hospital. Although she was alert, but presented more than 72 hours after ingestion, with yellowish discoloration ofsclera, mucous membrane along with vomiting and epigastric pain.

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On arrival in hospital she was conscious, oriented and stable vital parameters. Her vital signs included a pulse rate of 80/min, blood pressure of 110/70 mmHg, SpO_2 of 97%. Jaundice was present on general examination and there was also epigastric tenderness. Although tender, there were no signs of peritonitis on abdominal examination. She had normal neurological function. Her past medical history includes GTCE, reflex epilepsy. For which she has been taking Levetiracetam.Patient developed red-colored urine (haemoglobinuria) (Figure:1).

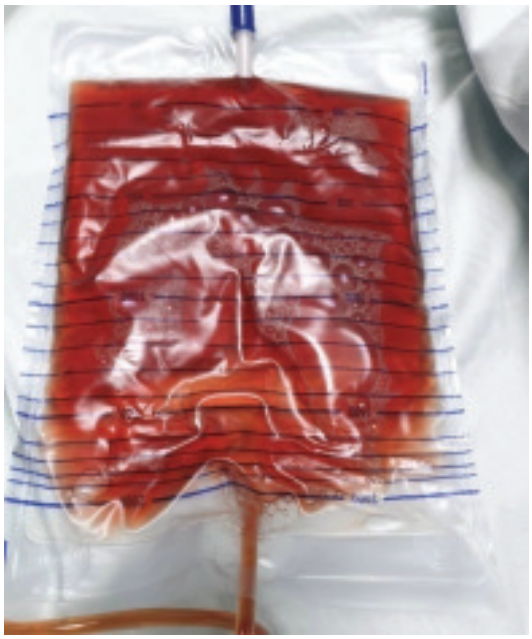

Figure 1: *Red color urine on the day of admission (3rd day of ingestion)*

Routine investigations were done. Arterial blood gas (ABG) on admission revealed metabolic alkalosis with a pH of 7.51, $PaO_2$108, $PaCO_2$ 29.9, $HCO_3$25 mmol/L. Haemoglobin reduced to 5.60 g/dL, MCV 88 fl; for which 2 units of Packed Red Blood Cell (PRBC) were given on the next day. CPK was 438 U/L and Bilirubin was also raised to 6.70 mg/dL. LDH was high as 2001 U/L.S.Ammonia, B.Urea, S.lipase, S.creatinine, S. Electrolytes, Prothrombin time, ALP, ALT were normal.Serum copper was 82.80 microgram/dL. Other haematological& biochemical investigations were normal. ECG and Echocardiography revealed no abnormality.

The treatment started with maintaining hydration of the patient with intravenous saline and antiemetic drugs. Oral loading dose of D-penicillamine 4 tablet stat orally (1 gm) then maintenance dose (250gm, thrice daily) was given as a copper chelator. Methylene blue 2 TSF, thrice daily was prescribed to the patient.Intravenous infusion of omeprazole was started suspecting gastric erosions. LDH and liver function tests were done on every alternate day to monitor the patients. The patient gradually improved with the given treatment and yellow color urine on 4th day of admission (Figure:2). Just the day before discharge all parameters were in normal range and those which previously abnormal ones are as follows: Haemoglobin 9.80 g/dL, MCV 85.8, Bilirubin 0.90 mg/dL; CPK 140 U/L, LDH 509 U/L.

Figure :2: yellow color urine on 4th day of admission

Discussion:

Poisoning by copper sulfate is a rare but often fatal, mainly related to suicide attempts. The route of administration of this substance is usually oral. Our case represents a rare and novel poisoning and it is the first case reported in Popular medical college hospital, Dhaka in which digestive system discomfort and features of haemolysis were the only sign and symptoms presented, contrary to our expectations.

There are few case reports where patient with copper sulfate poisoning presented with multi-system involvement. Such as hepatic and gastrointestinal effects, acute renal failure, cardiovascular events, methaemoglobinaemia, rhabdomyolysis. [8]

A case report was published in March 2009 a case of accidental copper Sulfate poisoning developed renal failure, intravascular haemolysis where the patient was treated with dimercaprol, penicillamine and peritoneal dialysis [9].

Copper plays a vitalrole in protecting cells against oxidative stress as it acts aco-factor for oxidative enzymesincludingperoxidase, catalase, glucose-6 phosphate dehydrogenase,glutathionereductase andcytochromeoxidase.[10]In the serum, copper exists in two forms; bound to ceruloplasmin (93%) and bound to albumin (7%).[11] Liver is the main organ that stores copper. The main mechanism of excretion is via fecal route, whereas only about 4% is excreted via urine. [12] Features of toxicity occur when there is ingestion of more than 1g of copper Sulfate. [13] It is associated with higher mortality when the dose is more than 10g and it is considered to be lethal. [14]

There are some mechanisms by which copper sulfate causes damage at cellular level. In this article we are discussing only the mechanism by which rhabdomyolysis and hemolysis occurs after acute intoxication. Copper sulfate-induced rhabdomyolysis occurs by Na^+/K^+-ATPase pump inhibition and subsequent increase in myocyte permeability in the skeletal muscle. [15]

Copper sulfate degrades red cell membranes and denatures their hemoglobin content thus it can lead to hemolysis by accumulating in red blood cells.[16] It may disrupt the activity of various cellular enzymes such as erythrocyte glucose 6-phosphate dehydrogenase (G6PD) [17], glutathione reductase, and catalase[18]

Conclusion:

Though acute copper poisoning is very rare, it has a high mortality rate. The management is mainly supportive.

Conflict of Interest:

The authors stated that there is no conflict of interest in this study.

Funding:

This research received no external funding.

Consent for publication:

Informed written consent was taken from the parents of the patient to publish details relevant to the disease and management.

Acknowledgments:

The authors were grateful to the staffs of the Department of Medicine, Popular Medical College Hospital, Dhaka, Bangladesh.

Authors' contributions:

All authors were involved in the management of the patient.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

SHORT REVIEW

ANAEMIA IN DIABETES MELLITUS

UMMEY MAIMUNA

Abstract:
Anaemia in Diabetes Mellitus should be addressed properly. Because, anaemia in this immunocompromised state may deteriorate the physical status of this group of patients. Multiple factors have been found to be associated with anemia in Diabetes mellitus. This review article contains basic and updated concepts as well as recent studies regarding anaemia with diabetes mellitus.

Keywords: *Anaemia; Diabetes Mellitus; nephropathy*

Received: 08/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.7266

Citation: *Anaemia in Diabetes Mellitus. Maimuna U. Bangladesh J Medicine 2024; 35: 118-121.*

Introduction:

Anaemia is a common hematological disorder among the diabetic patients.Globally, above 400 million adults live with Diabetes mellitus (DM).[1] According to International Diabetes Federation (IDF) the number is 473 million.[1] Mortality rates remain unacceptably high in Africa, with over 70% of all-cause mortality occurring in people living with DM under the age of 60 years.[2]

Importance of anaemia in diabetic patients:

Anaemia may occur invariably in chronic diseases. DM itself is an immunocompromised state. Therefore, superimposed anaemia may worsen the physical status of the patient.

Anaemia is associated with an increased risk of microvascular and macrovascular disease. Anaemia may also be significant in determining the outcome of heart failure and hypoxia-induced organ damage in diabetes.[3-5]

Factors associated with anemia among diabetic patients:

- Prevalence of anaemia in diabetic patients is linked with some factors like ethnicity ,age, sex, other microvascular complications, associated comorbities etc.[1,2]
- Obesity, duration of time, albuminuria, hypertriglyceridemia have been reported as associated factors. [4]
- In CKD, both absolute and relative iron deficiency are common. Absolute iron deficiency is defined as a depletion of tissue iron stores evidenced by a serum ferritin level <100 ng/ml or a transferrin saturation of <20%.[5] The most powerful predictors are transferrin saturation and GFR, acounting for 22% and 10% of the variance in Hb, respectively.[5]

Pathophysiology:

The chronic hyperglycemia of diabetes, especially when poorly controlled, causes long-term damage, dysfunction, and failure of different organs. [6-9] Hyperglycemia causes the development of an inflammatory condition showed by the increased expression of proinflammatory cytokines such as IL-6, TNF-á, and NFêB.(9) IL-6 causes antierythropoietic effect [9] This cytokine changes the sensitivity of progenitors to erythropoietin (erythroid growth factor) and also promotes apoptosis of immature erythrocytes.[9] In chronic hyperglycemia, RBCs display morphological, enzymatic, and biophysical change.[10]

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Studies relevant to anaemia with DM:

Table I

Studies relevant to DM with anaemia
Summary from these studies:

Year of publication	Place of the study	Mode of the study	Sample size	Important findings
2021(1)	Ethopia	Systematic Review and Meta-analysis	1978	The pooled prevalence of anemia among diabetic patients was 24.81%.Age, glomerular filtration rate, and duration of being diabetic are factors significantly associated with the occurrence of anemia in diabetic patients.
2023 (6)	Iran	Cross-sectional	416	21.5% were anemic
2014(7)	Iran	Cross-sectional	305	total of 93 patients (30.4%) had anemia including 46 (15.1%) with normochromic normocytic, 44 (14.4%) with hyperchromic microcytic, and 3 (1%) with hyperchromic macrocytic
2021(3)	Ethopia	Systematic Review and Meta-analysis	2889	prevalence of anaemia in type I and type II DM patients was 16.78% [95% CI: 11.53-22.04] and 31.12% [95% CI; 9.66-52.58] respectively
2022 (8)	Ethopia	Cross sectional	261	Total WBC, neutrophils, Monocyte, were significantly higher in poor glycemic and complicated T2DM
2021(2)	Africa	Systematic Review and Meta-analysis	5913	The pooled prevalence of anemia was 35%,whereas the pooled prevalence was 56% in the patients with diabetic foot.The prevalence of anemia was higher in patients with type II DM than type I DM (35% vs 26%).
2023(13)	Global survey	Systematic Review and Meta-analysis	19,118	higher prevalence of anemia was observed in Africa region
2019(11)	Ethopia	Cross-sectional	249	One out of five T2DM patients had anemia. Poor glycemic control, decreased eGFR, presence of DM complications, duration of DM >10 years, and age >60 years were significantly associated with the occurrence of anemia among T2DM.
2023(4)	South Asia	Systematic Review and Meta-analysis.	14,194	This studyfound variation in pooled prevalence estimates of anemia considering the type of DM, such as type 1 reported 2% (95% CI: 0.00–4.00), type-2 reported 48% (95% CI: 40.0–56.0, I2 = 98.94%)

This article included mostly recent studies on diabetes mellitus with anaemia. According to the literature, 20%-25% diabetic patients are anaemic.Most of this population have diabetic nephropathy. Duration of DM,age and obesity are proportionaly related to anaemia. Interestingly, most of the studies conductrd in Africa. The underlying cause of geographical variation of prevelance of DM with anaemia is unknown. Microcytic, normocytic, macrocytic- all the morphology of anaemia has been reported. Studies mainly emphasized on type 2 DM.

Anaemia & HbA1c:

An increase in circulating RBC age can contribute to high HbA1c levels, Among patients with T2DM, iron deficiency anemia may misrepresent the glycemic status of patients due to elevated HbA1c levels [10,11]

Treatment of anaemia:

Treatment should be individual pattient-centered.It can vary with serum creatinine,age,level of hemoglobin, patient's adherence to therapy. Oral and injectable form of iron are available as primary options.Partial

anaemia correction became the standard of care. Because, trials showed near-normal haemoglobin levels impose a higher risk of adverse cardiovascular events.[12,13]

Controlled clinical trials of anemia treatment with erythropoietin stimulating agents (ESAs) demonstrated improved quality of life (QOL).[5]

New update:

- Hypoxia-inducible factor prolyl hydroxylase inhibitors (HIF-PHIs) are small molecules than can be formulated into orally active pills. They simulate reduced tissue oxygen pressure, thus stimulating the production of endogenous erythropoietin (Epo) by the kidneys and liver. [14]
- According to a recent study in 2020,Treatment with dapagliflozin can correct anaemia in T2D . A gradual increase in hemoglobin beyond week 4 may indicate an erythropoiesis-stimulatpatientsing effect of sodium-glucose cotransporter 2 inhibition.[12]

Conclusion:

Anaemia in diabetic patients should be addressed appropriately with consideration of microvascular and macrovascular complications. Further multinational studies can add valuable evidence.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

SHORT COMMUNICATION

SCOPE OF PRACTICE: SHARED DECISION-MAKING FOR PATIENT-CENTERED CARE

FARZANA HOQUE

Abstract:

Shared decision-making (SDM) represents a collaborative model of healthcare decision-making, contrasting the traditional unidirectional approach where physicians solely determine medical choices. SDM engages patients in evaluating options based on individual goals and values. In various clinical scenarios, SDM proves indispensable, enhancing patient satisfaction, treatment adherence, and reducing the likelihood of blaming physicians for adverse outcomes. Illustrated by the BRAN questions in the UK, SDM serves as a tool to explore benefits, risks, alternatives, and the option of doing nothing. Notwithstanding its benefits, SDM encounters implementation challenges, including time constraints and varying patient priorities. Elderly patients may face cognitive barriers, exacerbated by limited clinical trials catering to diverse geriatric needs. Nevertheless, SDM offers significant advantages, fostering strong patient-physician relationships, aligning with patient-centered care principles, and yielding positive outcomes. Physicians must integrate SDM consciously into clinical practice, recognizing its potential to improve patient satisfaction, quality of life, and overall healthcare outcomes.

Keywords: *Shared decision-making (SDM), Patient satisfaction, Patient-centered care, Clinical practice*

Received: 03/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72532

Citation: *Hoque F. Scope of Practice: Shared Decision-Making for Patient-Centered Care. Bangladesh J Medicine 2024; 35: 122-123.*

Definition of Shared Decision-Making:

Shared decision-making (SDM) stands as an interactive approach that establishes a structured framework for physicians to engage in collaborative discussions with patients, enabling them to collectively determine healthcare decisions aligned with the patient's goals, preferences, and values.[1] The conventional approach to decision-making follows a unidirectional path, wherein the physician makes the final decision and communicates it to the patient. Despite patients being well-informed, their involvement often extends only to providing consent, which may or may not align with their preferences. Most patients express a preference for active participation in their medical decision-making, yet many perceive physicians as the primary decision-makers.[1,2] By engaging in collaboration with patients to assess potential benefits, risks, alternatives, and outcomes, physicians can empower patients to make informed decisions rooted in evidence and congruent with their values.

Advantages of Shared Decision-Making:

In various clinical situations where multiple viable options exist, the decision-making process can be inherently complex. Even for experienced clinicians, navigating the intricacies of identifying the most suitable medical or surgical treatment to optimize outcomes poses a significant challenge.Shared decision-making (SDM) emerges as an invaluable tool, enabling physicians to initially comprehend patients as individuals, fostering the delivery of safe and patient-centered care. As evidenced by a study in JAMA, SDM correlates with heightened patient satisfaction and increased adherence to treatment.[2] Patients actively involved in SDM not only rated their physicians more positively but also exhibited a reduced tendency to attribute adverse outcomes to them, in contrast to those not engaged in SDM.[1,2,3] The significance of SDM becomes apparent in situations where patients must carefully assess the benefits and risks of treatment, making an informed decision about whether to proceed. A commonly faced clinical situation is the deliberation on anticoagulation for a patient with atrial fibrillation,

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facing a substantial risk of bleeding despite a high CHA2DS2-VASc score. SDM facilitates the exploration of patient and family preferences, allowing for an informed decision by weighing the risks of bleeding against thromboembolic stroke. This interactive approach enhances physicians' understanding of patient preferences and values, fostering improved communication, trust, and ultimately, better health outcomes.[2,4]In the UK, the BRAN questions serve as a SDM tool, fostering and promoting active engagement in collaborative decision-making.[3,4]

1. What are the **B**enefits?
2. What are the **R**isks?
3. What are the **A**lternatives?
4. What if I do **N**othing?

Studies indicate that discussing healthcare priorities and goals with older adults during SDM enhances the professional relationship between physicians and patients.[5]Engaging in SDM not only strengthens relationships with patients but extends to their families as well.[4,5]Research underscores that facilitating SDM correlates with improved patient outcomes and quality of life.[4,7] A meta-analysis highlights the remarkable impact of SDM in enhancing patient knowledge and reducing decisional conflict.[6,7]

Implementation Challenges of Shared Decision-Making:

Both patients and physicians may perceive shared decision-making as time-consuming, potentially leading to reluctance to engage in the process. The primary hurdle to implementing SDMoften lies in time constraints.[1,2,4, 8]For example, physicians are estimated to dedicate a substantial amount of time each day to provide preventive care, chronic disease management, acute care, and documentation. The challenge arises in attempting to address patients' needs, concerns, and facilitating informed decision-making aligned with their preferences within the limited timeframe of a physician's visit.Some patients may perceive SDM as time-consuming and may prioritize other aspects of their visits, while others may not feel comfortable asking numerous questions.[2,4,8] The elderly population is diverse, ranging from highly independent individuals to those with multiple chronic conditions requiring significant assistance. A scarcity of clinical trials involving specific patient cohorts, such as the geriatric population, makes it challenging to tailor SDM practices to diverse patient needs.The presence of undiagnosed cognitive impairment in elderly patients can further complicate SDM during clinical encounters. Disabling hearing impairment may sometimes be mistaken for cognitive impairment. Clinicians may unintentionally adopt a paternalistic approach, viewing advanced age as a barrier to patient participation and understanding of SDM.Additionally, low health literacy, prevalent among older adults, can impede SDM discussions. SDM becomes crucial for the geriatric population with multiple chronic conditions, as the optimal treatment for each disease may not align with the best approach for an elderly patient as a whole. Conversations with elderly patients, their family members, and medical teams should emphasize SDM to guide discussions and treatment options based on preferred health outcomes, patient preferences, and values.

Despite these challenges, SDM has demonstrated remarkable benefits for patient satisfaction, quality of life, and overall outcomes. SDM fosters a collaborative environment, strengthening the relationship between physicians and patients. This collaboration is built on open communication, trust, and mutual respect.It is imperative for physicians to consciously integrate SDM into their clinical practice, aligning with the fundamental principle of patient-centered care in delivering evidence-based management to patients.

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

PHYSICIAN ON PRACTICE

JOURNEY OF BECOMING A CONSULTANT

Received: 19/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72774

Citation: *Rahman A. Physicians in Practice. Bangladesh J Medicine 2024; 35: 124*

Doctors' lives are different from others, and their experiences in life are also challenging. Every day, doctors have to face difficult situations in life with patients. Their challenges with patients are so adventurous. They learn up to the end of their lives. One of the most tragic memories of my life that I ever remembered in my mind. When I was an intern doctor in 1998, one day I had duty on the surgery ward. I was so energetic and enthusiastic during that period that I could manage all emergencies. I was overconfident that I could manage the night shift of the surgery ward. My assistant registrar and other colleagues went for the emergency OT, and I was in charge of managing the ward that night. A road traffic accident happened in the distance to Sylhet. I got the patient in the surgery ward at midnight, which was referred from the emergency room. I examined the patient, and there were multiple superficial wounds in the body. The patient was conscious, well-oriented, and vital, which were normal. I was confident that I could repair the wound and managed accordingly. I was assisted by the surgery ward boy and all the doctors busy with operations in the operation theater. So I could not inform the patient through my assistant registrar or other doctors. I was going to repair the wound and talk with the patient about how that accident happened, his family condition, and so on. The patient was very cooperative, and I was able to use IV saline to heal the majority of the body's wounds. At the end of the closure, the patient was silent and refused to communicate with me. I was really worried about what had happened to the patient. I again examined the patient, and there were no recordable vitals. The patient probably died due to hypovolemic shock. From the patient, I had the experience of managing the patient first with hypovolemic shock and the surgical intervention. Still, I remembered the memory that if a proper hypovolemic was managed, the patient might have survived.

Another experience was when I was a resident in medicine during my post-training period. During my training period, I was totally responsible for managing all patients admitted on my admission day. I was totally worried about the management of the patients in my training, as the local people were so chaotic for the management. An elderly patient admitted through the emergency department in the evening with multiple comorbidities came into the ward unconscious, with a huge mob in the hospital locality. The patient attendants were so chaotic and shouting for the management of the patient. The patient was diabetic. The patient attendants wanted to shift the patient to the ICU ward. At that time, ICUs were limited in the hospital. I examined the patient thoroughly, and his GCS were 6/15 with planter reflexes that were bilateral extensor, and there were no other lateralizing signs. I checked the blood glucose of the patient and found his blood glucose was too low. I managed the hypoglycemia of the patient. The patient regained his consciousness within a short period of time and started talking with his relatives. The attendants were so happy to get the treatment. They thanked me and our colleagues, as we were like magicians. The next day, the patient was released with a gift of boxes of sweets.

Another experience was when I was resident of neurology I had experienced patients with multiple comorbidities. One fine morning I was in the ward round I got a young patient with weakness of the limbs. The patient was referred from the distant Upazilla hospital. I examined the patient and found weakness of the limbs, which was sudden onset and bilateral extensor of the limbs. I think the patient might be diagnosed with acute transverse myelitis. The girl was so young that she was worried about her illness. On ward round of my professor said that please go through the patient again and properly investigate. I had done an MRI of the spine, which was not characteristic of acute transverse myelitis, and then MRI of brain, which was not a characteristic finding. Then I worried about what happened to the patient and what her diagnosis was. My professor gave me clue for a spinal stroke that I did not mind. I searched it properly and finally reached the diagnosis of anterior two third syndrome. That was the one best learning from my respected mentor Prof. Firoz Ahmed Quraishi, and we published her first case report in a reputed neurology journal Bangladesh in 2006 and remembered his contribution to my academic journey.

Key words: Physicians, Doctors' life, In Practice

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

CLINICAL IMAGE

MEDICAL QUIZ: IMAGE-1

AMINUR RAHMAN

Received: 20/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72812

Citation: *Rahman A. Medical Quiz: Image-1. Bangladesh J Medicine 2024; 35: 125*

Clinical scenario:

A 58-year-old woman was transferred from the district hospital with complaints of headache, barely perceptible speech, and weakness in the right sided of body, with a week of onset, associated with partial seizures in the right upper limb. He had comorbidities were non-insulin-treated type 2 diabetes mellitus, medicated glaucoma, treated gastric cancer, smoking, and daily alcohol abuse. He was also presented for dental pain and reported urgently a week ago but no regular dental follow-up.

During admission, at the Emergency Department, the patient presented a Glasgow Score ´ of 15, fundus normal, right sided muscle power grade 3, and angle of mouth deviated to the right. No other changes in physical examination were sought. Magnetic resonance investigation (MRI) revealed (Fig. 1A-D) with a lesion and MRS (E-F) was also done .Please answer the following question.

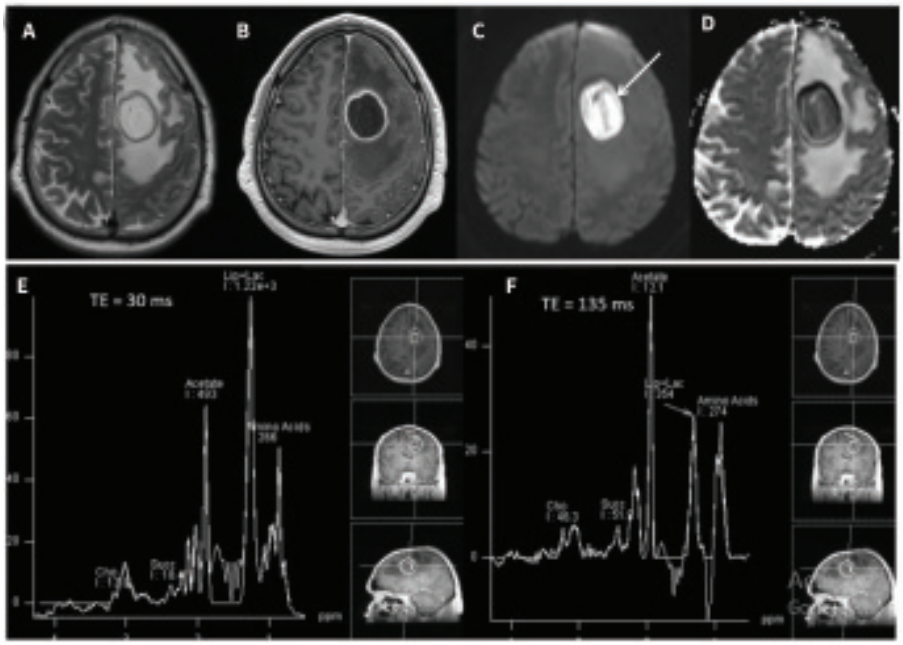

Figure (A-D) Conventional MRI: and MRS (E-F)

Questions:

1. What are the MRI findings?
2. What is diagnosis
3. What are the differentials?
4. What are the MRS findings?
5. Then above MRI+MRS findingS what is your diagnosis
6. How you confirm the diagnosis?

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Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

CLINICAL IMAGE

MEDICAL QUIZ: IMAGE-2

MUHAMMAD ABDUR RAHIM

Received: 20/04/2024 *Accepted: 22/04/2024*
DOI: https://doi.org/10.3329/bjm.v35i2.72880

Citation: *Rahim MR. Medical Quiz: Image-2. Bangladesh J Medicine 2024; 35: 126*

A 65-year-old lady, diagnosed with type 2 diabetesmellitus,hypertensionand chronic kidney disease stage 4 presented with a 5-day history of high-grade fever with chills, vomiting and right loin pain.She was febrile with a temperature of 103° F, had tachycardia (pulse 116/min) and there was right renal angle tenderness. She had neutrophilicleukocytosis (total white cells 17,260/cmm of bloodwith 70.2% neutrophils) and urine routine andmicroscopic examination revealed plenty of pus cells/high power field (HPF) and 4-6 red cells/HPF. Urine and blood cultures were requested.

A non-contrast abdominal computed tomography (CT)scan was performed. An axial and a coronal section is shown (Fig.1A & B). Study the films and answer followingquestions.

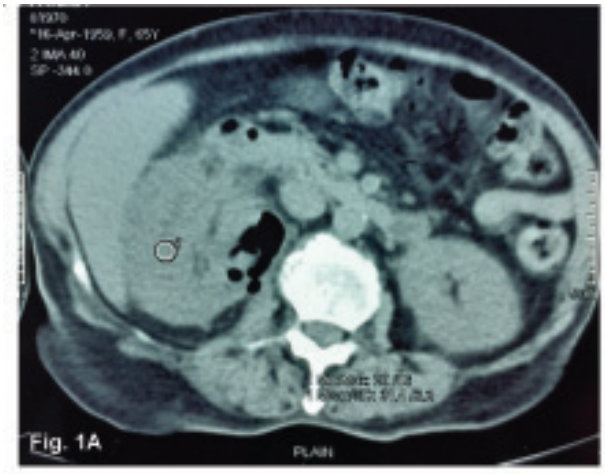
Fig. 1A

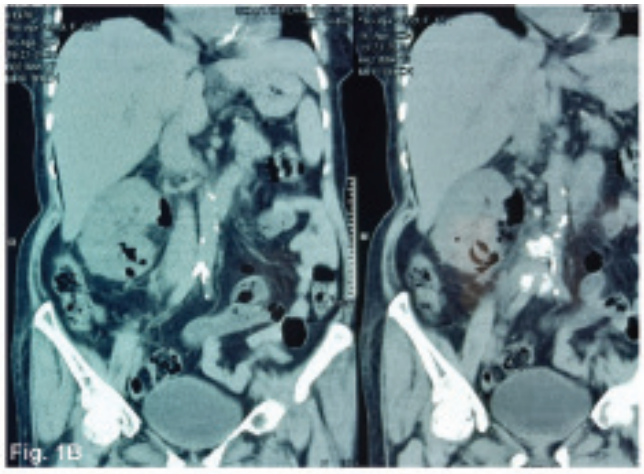
Fig. 1B

Questions

Q 1. Mention abnormal CT findings.

Q 2. What is the radiological diagnosis?

Q 3. Mention one risk factor that might havecontributed to the condition in this case.

Q 4. Mention principles of management.

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Answer to Medical Quiz - 1

Answer

1. (I)A left parietal cystic tumor, surrounded by cerebral edema, showing ring enhancement following contrast administration (B)
   (II)C, D DWI and ADC sequences show High DWI and low ADC (600 × 10"6 mm2 s”1, arrow) throughout the lesion
2. Cerebral abscess
3. Differentials: primary necrotic tumours, tuberculoma, cerebral metastases.
4. MRS shows (E,F) high lipid as well as the presence of amino acid, acetate and succinate peaks .
5. These characteristic MRS findings in combination with the very low ADC are diagnostic of abscess.
6. Diagnosis was confirmed on aspiration

Discussion:

- Cerebral abscesses account for 1–8% of intracranial mass lesions [1]. Diagnosis can be challenging as abscesses on conventional imaging can mimic primary necrotic tumours and metastases. By using MRS and DWI, the sensitivity/specificity for diagnosis is up to 100% [2, 3].
- Multiparametric MRI features of abscess are uniformly low ADC due to the higher viscosity of fluid. The ADC values are typically less than 700 × 10"6 mm^2 s”1 [4], which is lower than expected to be seen in high-grade tumours or metastases (700–780 × 10"6 mm2 s”1).
- In 1H spectroscopy, the major peaks are due to N-acetyl aspartate (NAA), choline-containing compounds (Cho), Cr and myoinositol (ml)[5].
  - NAA is contained almost exclusively within neurons in adult brain and therefore provides an indication of neuronal/axonal dysfunction, damage, or loss.
  - Cho are prominent in membranes.
  - Myoinositol may act as an osmolyte.
  - Creatine (Cr) is found in cell energy stores
- Smaller peaks from glutamate, glutamine, and ã-aminobutyric acid (GABA) may be detectable when short echo times and spectral editing techniques are used. Lactate may appear when anaerobic metabolism is occurring, and peaks due to mobile lipids, which are small in normal brain on short echo studies, may become prominent in acute demyelinating lesions, probably as a result of myelin breakdown.
- 1H-MRS could be useful in distinguishing between different bacteria responsible for the **abscess** and in choosing an appropriate therapy. There are three different spectra to consider[6]:
  - **Type A:** presence of lactate, amino acids, alanine, acetate, succinate and lipids related to the presence of obligate anaerobes with or without facultative anaerobes;
  - **Type B:** presence of lactate, amino acids and occasionally lipids related to obligate aerobes and facultative anaerobes;
  - **Type C**: presence of lactate alone, associated with Streptococcus and with treated abscesses.
- After medical therapy, abscesses show a non-specific peak of lipids and lactate that are also present in cystic tumors. For this reason, it is critical to use spectroscopy before the medical treatment.

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Answer to Medical Quiz - 2

Answers:

Ans. 1. Right kidney is swollen with multiple air pockets withing its parenchyma and right psoas is also swollen specially in upper part.

Ans. 2. Class 3B emphysematous pyelonephritis (right) with psoas abscess.

Ans. 3. Diabetes mellitus.

Ans. 4. Resuscitation (if in shock), intravenous broad-spectrum antibiotic, glycaemic control (usinginsulin), release of urinary flow obstruction(if any), surgery (in selected cases) along withsupportive measures like antipyretics.

Review:

Emphysematous pyelonephritis is a rare, acute, necrotizing infection of the renal parenchyma, collectingsystem and/or peri-nephric area and is characterized bygas accumulation within these anatomic locations. Patients with diabetes mellitus,immunosupressed condition and those having urinary tract obstruction are at increased risk of developingemphysematous pyelonephritis.[1] The spectrum ofmicro-organisms responsible emphysematous pyelonephritis are the same of acutepyelonephritis with *Escherichia coli* being thecommonest.[2] Hypoxic conditions and fermentationof glucose by enteric microorganisms produce gases.[1]

Clinical presentation is like that of acute pyelonephritis.[3]Classification is based of CT findings.[1] Treatmentmodality has changed over the previous decades;broad-spectrum antibiotics,interventional approaches and multi-disciplinaryteam approaches have contributed to these changes andnephrectomy is less preferred option.[1-4] One recent retrospective study demonstrated that class 3 disease, patients complicated by acute kidney injury and thrombocytepaenia required nephrectomy.[3]

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