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# GREEN LIFE MEDICAL COLLEGE JOURNAL

**Vol. 10, No. 1, January 2025**

**Published in 2025**

## Journal Committee



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# ABOUT THE JOURNAL


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|---|---|---|
| Full Name of the Journal | : | Green Life Medical College Journal |
| Short Name | : | GMCJ |
| Nature of Publication | : | Bi-annual |
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**AIMS & SCOPE:**

The Green Life Medical College Journal is an english language scientific papers dealing with clinical medicine, basic sciences, epidemiology, diagnostic, therapeutics, public helath and healthcare in relation to concerned specialities. It is an official journal of Green Life Medical College and is published bi-annually.

This Joural is recognized by Bangladesh Medical & Dental Council (BM&DC).

The Green Life Medical College Journal of Bangladesh intends to publish the highest quality material on all aspects of medical science. It includes articles related to original research findings, technical evaluations and reviews. In addition, it provides readers opinion regarding the articles published in the journal.

**INSTRUCTION TO AUTHORS:**

**Papers:**

The Green Life Medical College Journal (published bi-annually) accepts contributions from all branches of medical science which include original articles, review articles, case reports, and letter to the Editor.

The articles submitted are accepted on the condition that they must not have been published in whole or in part in any other journal and are subject to editorial revision. The editor preserves the right to make literary or other alterations which do not affect the substance of the contribution. It is a condition of acceptance that the copyright becomes vested in the journal and permission to republish must be obtained from the publisher. Authors must conform to the uniform requirements for manuscripts submitted to biomedical journals (JAMA 1997; 277: 927-34).

**Legal considerations:**

Authors should avoid the use of names, initials and hospital numbers which may lead to recognition of a patient. A table or illustration that has been published elsewhere should be accompanied by a statement that permission for reproduction has been obtained from the author(s) or publisher(s).

**Preparation of manuscript:**

Each manuscript should indicate the title of the paper, and the name(s) and full address(es) of the author(s). Contributors should retain a copy in order to check proofs and in case of loss. Two hard copies of each manuscript (double-spaced) should be submitted. If a manuscript is accepted for publication in the GMCJ, the editor responsible for it and may request a soft copy (a CD or via internet) for the revision. Each paper will be reviewed for possible publication. The Editor may wish to see the raw data (electronic form) if necessary.

In preparing the manuscript, use double spacing throughout, including title, abstract, text, acknowledgement, references, table and legends for illustrations and font type and size 'Times New Roman 12'. Begin each of the following sections on a separate paper. Number pages consecutively.

**The standard layout of a manuscript:**

- Title page
- Abstract, including Keywords
- Introduction
- Methods
- Results
- Discussion
- Acknowledgements
- Funding
- List of references
- Tables & Figures
- Illustrations

The pages should be numbered in the bottom right-hand corner and the title page being page one, etc. Start each section on a separate page.

**Title page:**

A separate page which includes the title of the paper. Titles should be as short and concise as possible (containing not more than 50 characters). Titles should provide a

reasonable indication of the contents of the paper. This is important as some search engines use the title for searches. Titles in the form of a question, such as 'Is drinking frequent coffee a cause of pancreatic carcinoma?" may be acceptable.

The title page should include the name(s) and address(es) of all author(s). Details of the authors' qualifications and post (e.g., professor, consultant) are also required. An author's present address, if it differs from that at which the work was carried out, or special instructions concerning the address for correspondence, should be given as a footnote on the title page and referenced at the appropriate place in the author list by superscript numbers ([1, 2, 3] etc.) If the address to which proofs should be sent is not that of the first author, clear instructions should be given in a covering note, not on the title page.

**Abstract:**

The 'Abstract' will be printed at the beginning of the paper. It should be on a separate sheet, in structured format (Introduction/Background; Methods; Results; and Conclusions) for all Clinical Investigations and Laboratory Investigations. For Reviews and Case Reports, the abstract should not be structured. The Abstract should give a succinct account of the study or contents within 350 words. The results section should contain data. It is important that the results and conclusion given in the 'Abstract' are the same as in the whole article. References are not included in this section.

**Keywords:**

Three to six keywords should be included on the summary page under the heading Keywords. They should appear in alphabetical order and must be written in United Kingdom English spelling.

**Introduction:**

The recommended structures for this section are:

- Background to the study/Introduction
- What is known/unknown about it
- What research question / hypothesis you are interested in
- What objective(s) you are going to address

The introduction to a paper should not require more than about 300 words and have a maximum of 1.5 pages double-spaced. The introduction should give a concise account of the background of the problem and the object of the investigation. It should state what is known of the problem to be studied at the time the study was started. Previous work should be quoted here but only if it has direct bearing on the present problem. The final paragraph should clearly state the primary and, if applicable, secondary aims of the study.

**Methods:**

The title of this section should be 'Methods' - neither 'Materials and methods' nor Patients and methods'. The Methods section should give a clear but concise description of the process of the study. Subjects covered in this section should include:

- Ethics approval/license
- Patient/population
- Inclusion/exclusion criteria
- Conduct of the study
- Data handling
- Statistics
- Cognitive Task Analysis (CTA)

**Ethical clearance:**

Regardless of the country of origin, all clinical investigators describing human research must abide by the Ethical Principles for Medical Research Involving Human Subjects outlined in the Declaration of Helsinki, and adopted in October 2000 by the World Medical Association. This document can be found at: http://ohsr.od.nih.gov/guidelines/helsinki.html. Investigators are encouraged to read and follow the Declaration of Helsinki. Clinical studies that do not meet the Declaration of Helsinki criteria will be denied peer review. If any published research is subsequently found to be non-compliant to Declaration of Helsinki, it will be withdrawn or retracted. On the basis of the Declaration of Helsinki, the Green Life Medical Journal requires that all manuscripts reporting clinical research state in the first paragraph of the 'Methods' section that:

- The study was approved by the appropriate Ethical Authority or Committee.
- Written informed consent was obtained from all subjects, a legal surrogate, or the parents or legal guardians for minor subjects.

Human subjects should not be identifiable. Do not disclose patients' names, initials, hospital numbers, dates of birth or other protected healthcare information. If photographs of persons are to be used, either take permission from the person concerned or make the picture unidentifiable. Each figure should have a label pasted on its back indicating name of the author at the top of the figure. Keep copies of ethics approval and written informed consents. In unusual

circumstances the editors may request blinded copies of these documents to address questions about ethics approval and study conduct.

The methods must be described in sufficient detail to allow the investigation to be interpreted, and repeated if necessary, by the reader. Previously documented standard methods need not be stated in detail, but appropriate reference to the original should be cited. However, any modification of previously published methods should be described and reference given. Where the programme of research is complex such as might occur in a neurological study in animals, it may be preferable to provide a table or figure to illustrate the plan of the experiment, thus avoiding a lengthy explanation. In longitudinal studies (case-control and cohort) exposure and outcome should be defined in measurable terms. Any variables, used in the study, which do not have universal definition should be operationalised (described in such terms so that it lends itself to uniform measurement). Where measurements are made, an indication of the error of the method in the hands of the author should be given. The name of the manufacturer of instruments used for measurement should be given with an appropriate catalogue number or instrument identification (e.g. Keyence VHX-6000 digital microscope). The manufacturer's town and country must be provided, in the case of solutions for laboratory use, the methods of preparation and precise concentration should be stated.

**Single case reports:**
Single case reports of outstanding interest or clinical relevance, short technical notes and brief investigative studies are welcomed. However, length must not exceed 1500 words including an unstructured abstract of less than 200 words. The number of figures/tables must not be more than 4 and references more than 25.

**Animal studies:**
In the case of animal studies, it is the responsibility of the author to satisfy the board that no unnecessary suffering has been inflicted on the animal concerned. Therefore, studies that involve the use of animals must clearly indicate that ethical approval was obtained and state the Home Office License number or local equivalent.

**Drugs:**
When a drug is first mentioned, it should be given by the international non-proprietary name, followed by the chemical formula in parentheses if the structure is not-well known, and, if relevant, by the proprietary name with an initial capital letter. Dose and duration of the drug should be mentioned in sufficient details. If the drug is already in use (licensed by appropriate licensing authority), generic name of the drugs should preferably be used followed by proprietary name in brackets.

Present the result in sequence in the text, table and figures. Do not repeat all the data in the tables and/or figures in the text. Summarize the salient points. Mention the statistics used for statistical analysis as footnote under the tables or figures. Figures should be professionally drawn. Illustration can be photographed (Black and White glossy prints) and numbered.

**Discussion:**
Do not repeat the data in detail, already given in the results. Give implications of the findings, their strengths and limitations in comparison to other relevant studies. Avoid un-qualified statements and conclusions which are not supported by the data. Avoid claiming priority.

**Conclusion:**
Comments on the observation of the study and the conclusion derived from it. New hypothesis or implications of the study may be labeled as recommendations.

**References:**
References should be written in Vancouver style, numbered with arabic numerals in the order they appear in the text. The reference list should include all information, except for references with more than six authors, in which case give the first six names followed by et al.

**Examples of correct forms of references:**
Dorababu M, Prabha T, Priyambada S, Agrawal VK, Aryaa NC, Goel RK. Effect of Azadirachta indica on gastric ulceration and healing of bacopa monnierang in experimental NIDDM rats. *Indian J Exp. Biol 2004; 42: 389-397.*

**Chapter in a book:**
Hull CJ. Opioid infusions for the management of postoperative pain. In: Smith G, Covino BG, eds. Acute Pain. London: Butterworths. 1985,1 55-79.

All manuscripts for publication should be addressed to the executive editor.

**LETTER TO THE EDITOR:**
Any reader can provide feedback regarding published articles by writing letter to editor. The reader can also share any opinion in relation to medical science.

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**Prof. Dr. ABM Bayezid Hossain**
Editor-in-chief
Green Life Medical College Journal and
Principal
Green Life Medical College

# ABOUT THE COLLEGE

## INTRODUCTION

In 2005, about fifty distinguished physicians of the country started a hospital to give specialized care in the private sector. They named it Green Life Hospital and it turned out to be a great success. So in 2009, they decided to establish a medical college which will be a non-government, non-profit, self-financing project and will serve the humanity.

This College came into existence in 2009. The college commences its activities with the enrollment of 51 students in the 1st batch in 2010. Since inception, the college has undergone tremendous development and became a splendid centre for learning and development. At present we are enrolling 110 students each year. Among them, numbers of seats are reserved for overseas students.

We continue to evaluate and improve our programme to ensure the best medical education for the students. Our educational strategy is to create a conducive learning environment and to steer our students to acquire adequate knowledge, skills and temperament to practice medicine and be a competent health care professional group.

Green Life Medical College (GMC) is approved by the Ministry of Health and Family Welfare (MOHFW), Government of Bangladesh and Bangladesh Medical and Dental Council (BMDC) and affiliated to the University of Dhaka.

## AIMS AND OBJECTIVES OF THE COLLEGE

**Aims:**

To create a diverse and vibrant graduate scholars in medical discipline and to create highly competent and committed physicians for the country.

**Objectives:**

- To provide an appropriate learning environment where medical students can acquire a sound theoretical knowledge and practical skills with empathetic attitude to the people.
- To carry out research in medical sciences to scale up the standard of medical education in the country.

## LOCATION

The campus is located at 31 and 32, Bir Uttom K. M. Shafiullah Sarak (Green Road), Dhanmondi, Dhaka. The location is at the heart of the mega city Dhaka and is facilitated with very good communication networks.

The Medical College and the Hospital complexes have been raised in a multistoried fully air-conditioned building with an arrangement of approximately 500 patients. The building is equipped with state-of-the-art infrastructure, excellent with an out-patient department and adequate in-patient facilities.

## *EDITORIAL*

# Dengue and Its Prevention

**Introduction:**

Over the past three decades, there has been dramatic global increase in the frequency of dengue fever, dengue haemorrhagic fever and dengue shock syndrome and their epidemics. It is found tropical and subtropical regions around the world, predominantly in urban and semi-urban areas, and is now spreading to rural areas.

Dengue, an infection caused by the dengue virus, is transmitted through the bite of infected Aedes mosquitoes. Dengue infection can range from mild to severe, with symptoms including high fever, severe headache, joint and muscle pain, rash, and bleeding tendencies in severe cases.

Infants and elderly, obesity, pregnancy, peptic ulcer disease, woman have abnormal bleeding, haemolytic disease, congenital heart disease, chronic disease, patients on steroid or NSAID treatment contribute to more severe disease and its complication.

About 3.9 billion people in 128 countries are at risk of infection with dengue viruses.[1] Worldwide, annually about 500,000 people with dengue haemorrhagic fever requires hospitalization. Approximately 90 percent of them are children aged less than five years, and about 2.5 percent of those affected die.

Dengue and dengue haemorrhagic fever is endemic in more than 100 countries in the WHO regions of Africa, the Americas, Eastern Mediterranean, South-East Asia and Western Pacific. The South-East Asia and Western Pacific regions are most seriously affected.[2]

**Dengue virus:**

There are four serotypes which are designated as DENV-1, DENV-2, DENV-3 and DENV-4. Infection with any one serotype confers lifelong immunity to that virus serotype.[3] Secondary infection with dengue serotype 2 or multiple infection with different serotypes lead to severe form of dengue (dengue haemorrhagic fever/dengue shock syndrome).[2] The first infection probably sensitizes the patient, while the second infection with different serotype appears to produce immunological catastrophy.

**Aedes Mosquito:**

Aedes aegypti and aedes albopictus are the two most important vectors of dengue. Aedes aegypti is responsible for clustering of dengue cases in the cities, on the contrary, Aedes albopictus partly invades peripheral areas of urban cities.

Once the mosquito becomes infective, it remains so for life. The genital tract of the mosquito gets infected and transovarian transmission of dengue virus occurs when virus enters fully developed eggs at the time of oviposition.

Due to climate change, temperature remains favourable for the breeding of Aedes mosquitoes all year round. The population of Aedes aegypti fluctuates with rainfall and water storage. Its life span is influenced by temperature and humidity, survives best between 16ÚC- 30ÚC and a relative humidity of 60-80 per cent. A 2ÚC increase in temperature more infected mosquitoes are available for a longer duration and thus increase man-mosquito contact.[2, 4]

**Prevention:**

There is no specific treatment for dengue, however early detection and proper clinical management can lower case fatality below 1%. Prevention of dengue primarily involves mosquito control measures, including the reduction of mosquito breeding sites and the use of insecticides. In near future vaccination can often be a potential preventive measure.

The vectors of dengue fever breed in artificial collection of water in and around houses. In principle it can be controlled by individual and community action, using antiadult and antilarval measures. The environmental measurements are detection and elimination of mosquito breeding places, management of roof tops, porticos and sunshades, proper covering of stored water, observation of weekly dry day. Isolation of the patient under bed-nets during the first few days prevents dengue transmission. The personal protective measures are wearing of full sleeves shirts and full pants; use of mosquito repellent creams, liquids, coils, mats etc.; use of bed nets for sleeping infants and young children during day time to prevent mosquito bite as they bite chiefly during the day.

Mineral oils, paris green and synthetic insecticides are the commonly used larvicides. DDT is the insecticide of choice for adult mosquito. In areas where DDT resistence is encountered, malathion and propoxur, and a to a lesser extent lindane are recommended.

Some fish such as Gambusia affinis and Lebister reticulatus can be used in ornamental ponds, cisterns and farm ponds as they feed readily on mosquito larvae.

Many countries including Singapore, Sri Lanka, Indonesia, Malaysia, Thailand, Vietnam and Brazil are opting for the Wolbachia method for dengue control. Under the method, lab-grown male Aedes aegypti mosquitoes infected with the naturally occurring Wolbachia bacteria are released into the wild. The bacteria compete with viruses inside the mosquito, thus hindering viral replication and transmission of diseases like dengue, Zika, chikungunya and yellow fever.[5]

Till now two Dengue vaccines, Qdenga and Dengvaxia have been approved and implemented in some countries. One more vaccine, TV005 is under clinical trial and shown some promising result.[6]

**Conclusion:**

The failure of urban authorities to provide civil amenities and poor public health infrastructure raises the potential for the vector to breed at high level and makes the environment transmission conducive. The rural spread of the vector is relatively recent occurrence associated with the development of rural water supply schemes, improved transport systems, scarcity of water and life style changes.

Dengue is a global threat that requires a global response. A well-coordinated surveillance system, robust vector control measures and a strong & resilient management system is paramount to contain this public health threat.

***Journal of Green Life Med. Col. 2025; 10(1): 1-2***

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1. WHO (2020), Fact Sheet, 23 June, 2020
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6. National Bulletin of Public Health (2024), An Update on Dengue, IEDCR, March 2024

## *ORIGINAL ARTICLE*

# Pattern of Chest Pain in Long COVID Syndrome

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***Abstract***

***Introduction: The COVID-19 pandemic has persisted for over four years, resulting in numerous complications, including myocardial infarction, stroke, heart failure, and thromboembolism. These occur via various mechanisms, such as endothelitis, multisystem inflammatory syndrome, cytokine storm, and activation of the coagulation cascade. Despite recovery, many patients experience persisting symptoms, including chest pain and fatigue. However, the specific complications that arise and their underlying causes remain largely unclear. This study aimed to examine the frequency and pattern of chest pain in this population and thus unveiling the underlying pathophysiology.***

***Methods: This is an uni-center, prospective observational cohort study, conducted in Department of Cardiology, Bangabandhu Sheikh Mujib Medical University (BSMMU), from July 2021-June 2023. Patients presenting within 7 days of positive RT-PCR COVID-19 report, were screened for this study. Among them, 382 patients were enrolled in the study, following inclusion and exclusion criteria. Relevant history (breathlessness, chestpain, palpitation, ankle edema, syncope,pulse, BP, JVP, lungbase, edema, NYHA Class, 6MWD) & cardiac investigations (Trop I, NT Pro-BNP, S.Creatinine, S.Electrolytes, S.Albumin, S.TSH, CBC, CRP, CXR, ECG, Echocardiography) were done at baseline. Patients were followed up in Cardiology OPD Clinic,BSMMU, after 3 months of enrollment, with same clinical, laboratory and cardiac investigations. Data were collected in a semi structured data sheet via personal interview. The variables included were, age, sex, chest pain, palpitation, breathlessness, ankle edema, syncope, pulse, systolic and diastolic blood pressure, raised JVP, lung base crackles and functional capacity (NYHA Classification and 6 Minute Walk Distance), S. Troponin-I, S. NT-proBNP, S. Creatinine, S. Albumin, TSH,$FT_4$, CXR P/A view, ECG, Resting Transthoracic Echocardiography. Data analysis was done using IBM SPSS® 29.0.***

***Results: The study showed, 59% of the populations presented with cardiac symptoms at 3 months follow up. Most of the symptomatic populations were between 60-69 years of age, male were more affected than female. Commonest cardiac manifestation were palpitation (79%), chest pain (53%) & breathlessness(48%). Chest pain was due to unstable angina (70%) and myocardial infarction (30%).***

***Conclusion: At the end of 3 months, a significant proportion of Long COVID-19 patients developed cardiac symptoms, specially chest pain due to coronary artery disease. So, further research in the field of Long COVID-19 is necessary to find out further impacts of this condition on cardiovascular syste.***

***Keywords: Long COVID-19, Chest Pain, Unstable angina, Myocardial Infarction, Chronic coronary syndrome, Cardiovascular effect***

***Journal of Green Life Med. Col. 2025; 10(1): 3- 7***

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**Introduction:**

Long COVID-19 is a complex condition with a range of symptoms that are not yet fully understood. A huge number of people are suffering from Long COVID-19. An estimated 150 million people worldwide, including 65 millions in Asia, have Long COVID-19. About 1 in 100 US children and 7 in 100 US adults are suffering from Long COVID-19. But still, research data are very limited in this field. Proper diagnostic tools, treatment plans, rehabilitation centers are also inadequate. Through multiple mechanisms, COVID-19 can affect the pulmonary, cardiovascular, digestive, urinary, hepatic, and central nervous systems.[1] Cardiovascular manifestations are one of the most critical factors affecting the morbidity and mortality caused by COVID-19. It's proven that, coronary artery disease (CAD), heart failure (HF), hypertension (HTN), and arrhythmias lead to a higher mortality rate in COVID-19 patients in short term.[2] Therefore, it seems there is a mutual relationship between COVID-19 and cardiovascular disease. . A meta-analysis indicated that 60% of COVID-19 patients were symptomatic after twelve weeks past the beginning of the infection[2]. But, what is mostly unknown is, exactly what manifestations and complications arises in this period, what the underlying pathophysiology is and what are the complications that may arise over the upcoming years. So, it is of utmost importance to know the full impact of COVID-19 on the cardiovascular system. This cohort study, aimed to investigate the cardiovascular manifestations of Long COVID-19 specially frequency & pattern of chest pain in these population. By analyzing the results of this study, we hoped to gain a better understanding on the pattern, frequency and pathophysiology of chest pain as a consequence of COVID-19. This will help us to develop appropriate treatment and rehabilitation plan for those who have been affected.

**Methods:**

This prospective observational study was conducted in Department of Cardiology,BSMMU, in Dhaka, Bangladesh, from July 2021 to June 2023. The study was initiated after receiving approval from the ithical review committee. During this period, patients who visited the outpatient department (OPD) within seven days of a positive RT-PCR COVID-19 report were screened for eligibility to participate in the study. To be included in the study, patients had to meet specific inclusion and exclusion criteria. Patients within 7 days of positive RT-PCR COVID-19 report and Adult of Both sexes and age more than 18 years. Patients suffering from cardiac problems before beginning of the study (Palpitation, Chestpain, Breathlessness, Ankle edema, Syncope), Patients suffering from Cardiovascular risk factors (DM, Hypertension, Dyslipidemia, Obesity, Smoking, Hypothyroidism, CKD, Connective Tissue Disease), Patients unwilling to get enrolled in this study. Total 382 samples were collected by purposive sampling method; data were collected in semi structured questionnaire by personal interview. All 382 patients who were enrolled in the study were eligible to participate. Before proceeding, the purpose of the study was explained in detail to each participant, and informed written consent was obtained. After obtaining consent, demographic data like age and sex, symptoms like typical cardiac chest pain and breathlessness, signs like pulse and blood pressure, and investigation results like serum troponin-I and ECG were recorded in a semi-structured data sheet. All patients were advised to notify the researchers via telephone call if they received a negative RT-PCR COVID-19 test result between the first and second visit. Interestingly, all patients became RT-PCR COVID-19 negative within two weeks of their first visit. The patients were then called back for a follow-up visit at cardiology OPD clinic. However, 9 patients refused to return for the follow-up visit, and 1 patient died after the initial visit. As a result, a total of 372 patients attended the follow-up visit at the cardiology OPD clinic after three months. Data from both the initial and follow-up visits were entered and analyzed using IBM SPSS 29.0. Descriptive analysis was performed, and the results were reported as frequency and percentage. Statistical analysis was conducted using Paired Samples Test and Chi-Square Tests. By comparing data from the baseline and after three months, final results were prepared.

**Results:**

**Distribution of Presentations after 3 months among the Study Subjects:** Following a three-month period, over 50 percent of the subjects exhibited various cardiovascular symptoms.

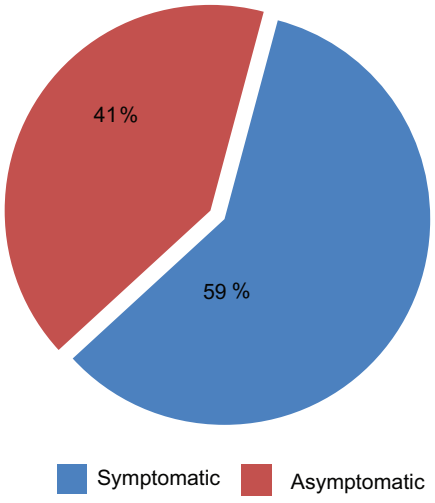


**Fig. 1:** Distribution of Presentations at 3 months

**Distribution of Positive Symptoms after 3 months among the Study Subjects:** Palpitation, Chest pain and breathlessness were statistically significant (p value < .05) positive symptoms observed after three months.

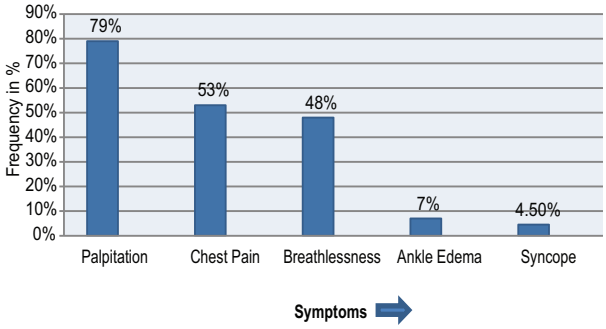


**Fig. 2:** *Distribution of presenting symptoms at 3 months*

**Distribution of Age among the Study Subjects:** The majority of the symptomatic group fell within the 60-69 years age range, while the asymptomatic group primarily consisted of individuals between 50-59 years old.

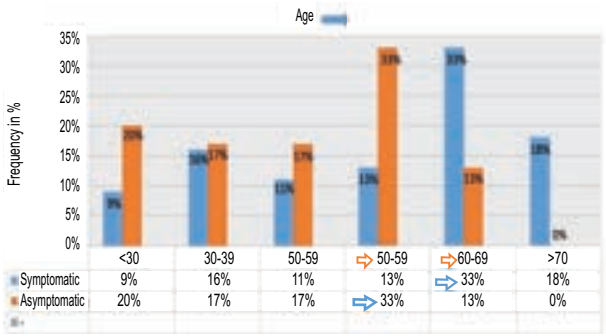


**Fig. 3:** *Distribution of Age among Symptomatic and Asymptomatic group of study subjects*

**Distribution of Sex among the Study Subjects:** The majority of the study population in both symptomatic and asymptomatic groups were male.

**Characteristics of Subjects Presenting with Chest Pain at 3 months:** Almost two third (70%) of the chest pain population were unstable angina and chronic coronary syndrome evidenced by normal Trop I. Remaining one-third (30%) of the subjects experiencing chest pain had acute myocardial infarction, as evidenced by elevated Troponin I. Among the myocardial infarction population, most (17%) presented with ST-elevation myocardial infarction. 13% presented with NSTMI. Among the ST-elevation myocardial infarction subjects, 8 percent were below 30 years of age.

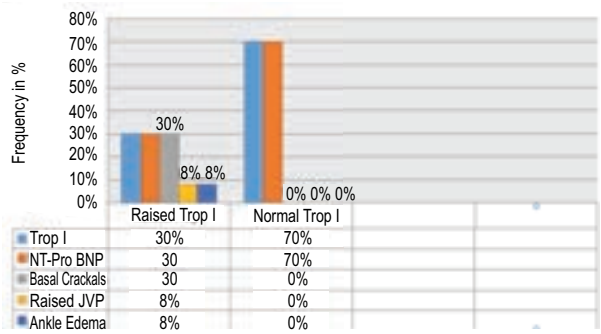


**Fig. 4:** *Clinical Characteristics of Chest Pain in symptomatic Subject*

**Characteristics of ECG in Study Subjects after 3 months:** The most common ECG presentations among symptomatic subjects were non specific ST-T changes (37%), followed by, ST depression (26%), ST elevation (17%) .

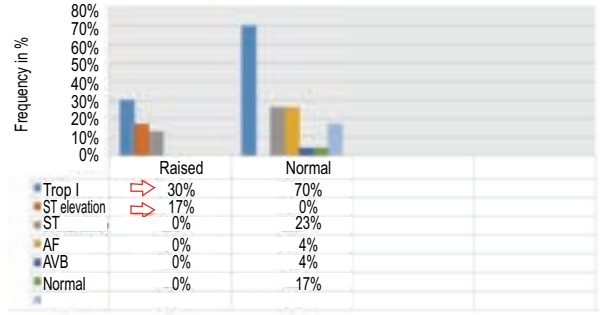


**Fig. 5:** *ECG patterns among subjects presenting with Chest Pain at 3 months follow up*

**Characteristics of 2D Resting TTE Findings among Symptomatic Subjects:** Most subjects (70%) presented with preserved ejection fraction, no regional wall motion abnormalities, Grade I diastolic dysfunction, and absence of pulmonary hypertension, again indicating unstable angina and chronic coronary syndrome as the main cause of chest pain in this population.

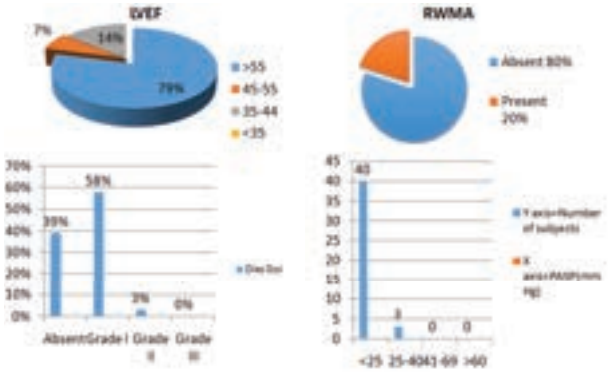


**Fig. 6:** *Characteristics 2D Resting TTE findings among symptomatic subjects at 3 months*

**Discussion:**

Three months into our study, a striking 59% of our participants exhibited symptoms of Long COVID-19. This mirrors the findings of Püntmann et al. (2020)[3], who reported that 60% of patients developed cardiovascular manifestations of Long COVID-19 within the same timeframe. This prevalence underscores the commonality of cardiovascular issues in Long COVID-19 patients.

Delving deeper, we discovered that chest pain , breathlessness and palpitation were the most prevalent symptoms in our study. Notably, the elderly were more susceptible to developing cardiac manifestations of Long COVID-19. Our data showed that a substantial 33% of symptomatic subjects fell within the 60-69 age group, echoing the findings of Huang et al. (2020)[4], who observed that cardiac manifestations are more common above 60 years of age.

However, our study showed that, there was no significant ($p = >0.05$) correlation between age and individual symptoms, except palpitation and chest pain. Hossain et al. (2021),[5] also found that, there was no significant correlation between age & individual symptoms.

While there was no significant correlation between age and individual symptoms, except for palpitation and chest pain, our study revealed that males were more affected by Long COVID-19 than females. This aligns with the results of Nasserie et al. (2021)[6] in Bangladesh. However, a contrasting study by Pelà et al. (2022)[7] in Italy found that females were more likely to develop symptoms. This disparity may be attributed to the disparity in tertiary healthcare facilities available to female populations in our country.

Despite this, our study did not uncover any significant sex-related differences in individual symptoms of Long COVID-19, a finding supported by Di Toro et al. (2021).[8]

Chest pain emerged as a common symptom, affecting 53% of our population, a figure corroborated by other studies, which reported 48% of Long COVID-19 patients experiencing chest pain.[9]

Further analysis revealed that 30% of our chest pain population had myocardial infarction. We also found that chest pain was a significant positive symptom, closely correlated with age but not sex differences.

Our study characterized chest pain as largely non-specific, with myocardial infarction being uncommon. Among the non-infarction population, ST depression was the most common ECG feature. Moreover, our data showed that the most frequent ECG presentation was non specific ST-T changes, echoing the findings of Long et al. (2020b).[10]

The majority (70%) of our subjects presented with preserved ejection fraction, no RWMA, normal LV diameter, and Grade 1 diastolic dysfunction. This mirrors the findings of Huang et al. (2023)[4], who reported that 55% of Long COVID-19 syndrome patients presented with preserved ejection fraction. The higher percentage in our study may be attributed to our smaller sample size.

Among the myocardial infarction population, STEMI was more common than NSTMI. Notably, 8% of the STEMI subjects were below 30 years of age, suggesting possible thrombotic manifestations causing MI in the Long COVID-19 population, rather than atherosclerosis. This is is often due to the activation of coagulation cascades and thrombosis.[11,12]

**Conclusion:**

This study revealed a significant correlation between Long COVID-19 and cardiovascular manifestations, particularly chest pain. The elderly and male populations exhibited a higher likelihood of experiencing these manifestations. Recent studies provide emerging evidence that suggests the burden of Long COVID-19 patients will increase in the future. Therefore, we recommend conducting further research on Long COVID-19 to determine the exact pathophysiology, which can provide valuable insights and facilitate the identification of novel therapeutic targets.

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**Author Contributions :** All authors participated in idea generation, data collection, data processing, manuscript preparation, revising and drafting.

**Conflict Of Interest:** The authors have none to declare.

**Data & Materials:** Available from the corresponding author, on reasonable request.

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*ORIGINAL ARTICLE*

# An Evaluation of the Acromion Process of Left Scapula

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***Abstract***

***Introduction: Acromion process projects forward almost at right angles from the lateral end of the spine and over-hangs the glenoid cavity. The medial acromial border is short, bearing anteriorly a small, oval facet for articulation with the clavicle's lateral end. Morphological types of acromion process are helpful for orthopaedic surgeons in surgical repair of shoulder joint. The anatomical and morphological variations of the acromion and related structures of shoulder joint have clinical importance. This study was carried out to observe the morphological variation of acromion process.***

***Methods: This cross-sectional study was conducted in the department of Anatomy, Dhaka Medical College, Dhaka, during the period of July 2017 to June 2018. Shoulder radiograph of lateral view and oblique view were taken from 100 adult male & female attending the Radiology & Imaging Department of Dhaka Medical College & Hospital, Dhaka, aged between 25 to 50 years. From these images morphological measurements, length of acromion process, breadth of acromion process, acromio-coracoid distance, acromio-glenoidal distance were measured.***

***Results: The length & breadth of the acromion process, the acromio-coracoid distance & the acromio-glenoidal distance were significantly higher in male than female.***

***Conclusion: The present study reveals significant difference in morphological measurements of acromion process. The various dimensions of adult acromion process will serve as a reference and will assist the surgeon to be used in the operative technique.***

***Key words: Acromio-coracoid distance, acromio-glenoidal distance, shoulder impingement syndrome.***

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**Introduction:**

In human anatomy, the acromion (from Greek: akros, "highest", ômos, "shoulder", plural: acromia) is a bony process on the scapula (shoulder blade). Together with the coracoid process it extends laterally over the shoulder joint. The acromion is a continuation of the scapular spine, and hooks over anteriorly.

It articulates with the clavicle (collar bone) to form the acromioclavicular joint. Dimensions of acromion process are important to show linkage to the shoulder girdle pathologies.[1] Morphometric analysis of acromion process would be helpful for surgeons while performing surgical procedures on the shoulder joint.[1] Also anatomic changes in the acromion have been considered a main cause of the pathogenesis of impingement syndrome of the shoulder joint and rotator cuff diseases.[2] The length of the acromion has an effect on the acromion-glenoid distance and a shortening of this distance can predispose to impingement syndrome.[3]

The knowledge regarding the various distances of the acromion process might benefit the orthopaedicians during surgical repair around the shoulder joint.[2] It is also helpful to Anthropologists during their study on evolution of acromion.

So, anatomy of the acromion process have a great importance. It is also useful for suitably interpretating the radiological images, during surgical procedures and in pathologies associated with shoulder joint.

**Methods:**

This cross-sectional study was conducted in the Department of Anatomy, Dhaka Medical College, Dhaka, during the period from July 2017 to June 2018. Hundred adult Bangladeshi people, 50 males and 50 females, age ranging from 25 to 50 years were included in this study. The subjects

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of this study were selected from the Radiology & Imaging Department of Dhaka Medical College & Hospital, Dhaka for the shoulder radiograph of anterior –posterior view advised by their physicians. At the beginning of the study, each subject was briefed about the total plan and purpose of the study. Written informed consent was taken after racial confirmation from them without exploiting any of their weakness or creating undue pressure. Subjects were assured of the confidentiality of the study. The radiograph of anterior-posterior view, oblique and lateral view of left scapula were taken. Then these images were transferred to CD of DVD and different dimensions of acromion process were measured from x-ray film with the help of computer image measuring software. Different variables of acromion process measured by computer with image measuring software (DICOM viewer). The study was approved by the Ethical Review Committee (ERC) of Dhaka Medical College, Dhaka.

**Procedure of measurement of length of acromion process**

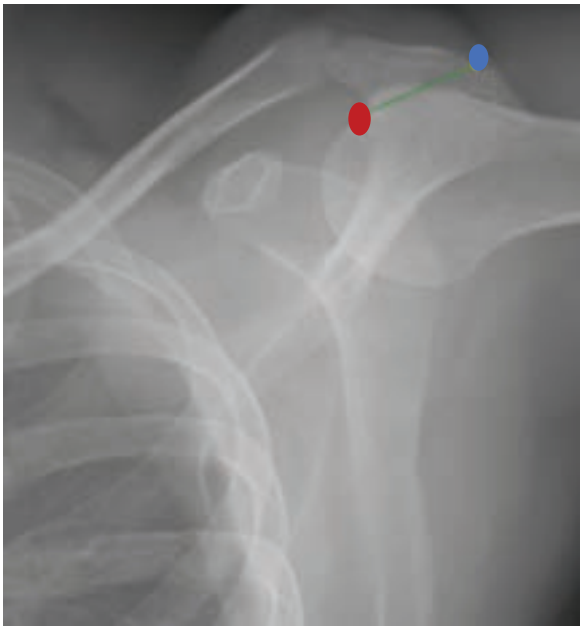
The length of acromion process was measured by drawing a vertical line from most superior point and most inferior point of the acromion process.[5] & it was measured on the lateral view of x-ray of left shoulder. This procedure was done by using measurement tool box of DICOM software with length option.

Red dot : Marked on the medial side of the acromion process
Blue dot : Marked on the lateral aspect of the acromion process
Green line : Showing breadth of acromion process

*Procedure of measurement of breadth of acromion process*

**Procedure of measurement of acromio-coracoid distance**

The acromio-coracoid distance was measured from one point on the tip of acromion process and another point on the tip of the coracoid process, then a line was drawn joining by these two point. This distance was measured on the oblique view of the left scapula.[6] This procedure was done by using measurement tool box of DICOM soft ware with help of length option. Measurement was taken in cm and then converted into mm by calibration.

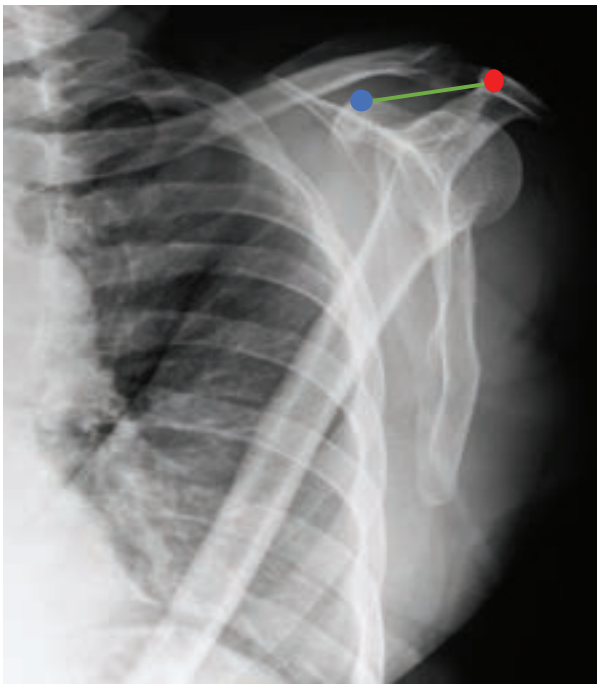


Red dot : Marked on the medial side of the acromion process
Blue dot : Marked on the lateral aspect of the acromion process
Green line : Showing breadth of acromion process

*Procedure of measurement of breadth of acromion process*

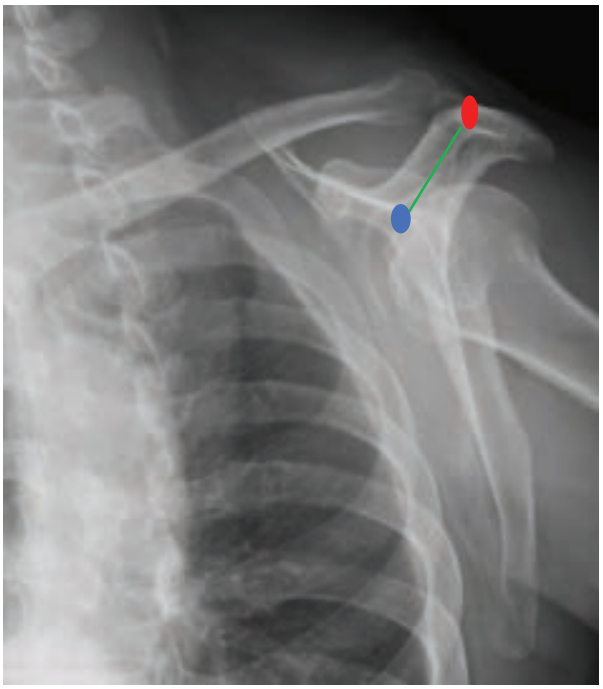
**Procedure of measurement of acromio-coracoid distance**

The acromio-coracoid distance was measured from one point on the tip of acromion process and another point on the tip of the coracoid process, then a line was drawn joining by these two point. This distance was measured on the oblique view of the left scapula.[6] This procedure was done by using measurement tool box of DICOM soft ware with help of length option. Measurement was taken in cm and then converted into mm by calibration.



Red dot: Showing on the tip of acromion process
Blue dot: Showing on the tip of coracoid process
Green line: Showing acromio-coracoid distance

*Procedure of measurement of acromio-coracoid distance*



Red dot: Showing on the tip of acromion process
Blue dot: Showing on the tip of supraglenoid tubercle
Green line: Showing acromio-glenoidal distance

*Procedure of measurement of acromio-glenoidal distance*

**Procedure of measurement of acromio-glenoidal distance**

The acromio-glenoidal distance was measured by one point taken on the tip of the acromion process and another point on the tip of supraglenoid tubercle. Then joining these two points by a transverse line was the acromio-glenoidal distance. This distance was done on the oblique view of left scapula.[4] This procedure was done by using measurement tool box of DICOM soft ware with length option.

All data were checked and edited after collection. Statistical tests such as Unpaired Student's 't' tests and proportion tests were done. Statistical significance was accepted at p- value equal to or less than 0.05 ($p \leq 0.05$).

**Results:**

In male, length of acromion process ranged from 31.40 mm to 40.20 mm and the mean length was 35.62±2.16. In female, length of acromion process ranged from 30.20 mm to 38.40 mm and the mean length was 34.30±2.29 mm. Difference was significant between mean length of acromion process in male and female ($p < 0.004$) (Table-1).

The mean (±SD) breadth of acromion process was 25.91±2.64 mm and 22.83±1.74 mm in male and female respectively. The range of breadth of acromion process was 20.20 mm to 29.90 mm in male and 19.30 mm to 26.50 mm in female. Significant difference ($p<0.000$) of mean breadth of acromion process was observed between male and female. (Table-1).

**Table I**

*Length and breadth of acromion process of left scapula in male and female*

| Variables | Male (n=50) | Female (n=50) | p value |
|---|---|---|---|
| Length of acromion process (mm) | 35.62±2.16 | 34.30±2.29 | 0.004* |
| (Mean±SD) | (31.40-40.20) | (30.20-38.40) | |
| Breadth of acromion process(mm) | 25.91±2.64 | 22.83±1.74 | 0.000* |
| (Mean±SD) | (20.20-29.90) | (19.30-26.50) | |

Comparison of values between male and female was done by Unpaired Student's 't'-Test.
*= significant ($p<0.000$) n= sample size.

**Table II**

*Acromio-coracoid distance and acromio-glenoidal distance of left scapula in adult male and female*

| Variables | Male(n=50) | Female(n=50) | p value |
|---|---|---|---|
| Acromio-coracoid distance(mm) (Mean±SD) | 35.07±1.91 | 26.87±2.27 | |
| | (32.10-39.80) | (24.20-32.40) | 0.000* |
| Acromio-glenoidal distance (mm) (Mean±SD) | 25.13±2.36 | 19.89±2.18 | |
| | (21.30-30.20) | (16.10-24.80) | 0.000* |

Comparison of values between male and female was done by Unpaired Student's 't'-Test.
*= significant (p<0.000) n=sample size.

The range of acromio-coracoid distance was 32.10 mm to 39.80 mm in male and 24.20 mm to 32.40 mm in female. The mean acromio-coracoid distance was 35.07±1.91 mm and 26.87±2.27 mm in male and female respectively. The acromio-coracoid distance of left scapula was significantly higher (p<0.000) in male than female (Table-II).

In male, acromio-glenoidal distance ranged from 21.30 mm to 30.20 mm and the mean distance was 25.13±2.36 mm. In female, acromio-glenoidal distance ranged from 16.10 mm to 24.80 mm and the mean distance was 19.89 ±2.18 mm. Significant (p<0.000) difference was observed between male and female in mean acromio-glenoidal distance (Table-II).

**Discussion:**

There are morphological variations in the different parameters of acromion process.

In the present study, the mean length of acromion process was significantly higher in male than female. Morsi, et al[5] reported that mean length of acromion process was significantly (p<0.000) higher in male than female. Singroha, et al[2] performed the study at Department of Anatomy, Haryana. They found that mean length of acromion process was significantly higher in male than female & mean breadth of acromion process was significantly (p<0.000) larger in male than female. They stated the mean length was 47.7±5.85 mm in male and 40.5±3.36 mm in female. The value was higher than present study. Sitha, et al[14] reported that there was difference in mean breadth of acromion process between male and female. Singroha, et al[2] carried out a study in Haryana, they reported mean breadth of acromion process was 26.8±2.58 mm in male and 23.2±2.32 mm in female, value was close to present study.

Singroha, et al[2] reported that mean acromio-coracoid distance was significantly longer in male. The mean distance was 39.4±4.07 mm in male and 34.8±5.99 mm in female. The value was higher than present study.

Sitha, et al[14] also reported that mean distance was significantly (p<0.001) longer in male than female, which was close to our study. The mean value of acromio-glenoidal distance was significantly longer (p<0.000) in male than female. Kavita, et al[9] reported that the mean acromio-glenoidal distance was 26.6 ±0.44 in right side and 27.6±0.36 mm in left side. They did not separate the value between male and female. Sitha, et al[14] stated that the mean value was significantly longer (p<0.026) in male than female in Thai population which was not similar to present study, due to racial cause.[11,12,13]

Sultana, A[10] reported that the acromio-coracoid distance was 36.72 (±5.86) mm and 32.95(±4.09) mm, the acromio-glenoid distance was 29.98 (±3.97) mm and 27.17 (±3.38) mm in male and female respectively, which was close to present study.

Review of existing literature reveals that few works have been done on this topic in other countries. As there is only one published work is available in our country. So, the result of the present study was compared with the findings of other researchers of abroad.

**Conclusion:**

Significant morphometric differences present in male and female acromion process of left scapula. So, Knowledge of the morphometric parameters of acromion process is important for Orthopaedicians, Anthropologists and Anatomists. Forensic experts might be used this data for the determination of gender. It may also help the Radiologists to carry out the interpretation of images of shoulder joint & its associated disorders.

**Limitations:**

The present study was conducted only a single institute, at the Radiology Department of Dhaka Medical College Hospital. So the result of the study may not be fully representative of whole community of Bangladesh.

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## *ORIGINAL ARTICLE*

# Risk Factors for Osteoporotic Fracture: A Case Control Study

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***Abstract***

***Introduction:*** *Osteoporosis is a global problem and affects every geographical area. Estimates indicate that as many as 50% of Americans older than 50 years will be at risk for osteoporotic fractures during their lifetimes. Hip fracture is also a major public health problem in Asia. It has been projected that by the next century, 50% of all hip fractures in the world will occur in Asia. Rates for women are higher than those for men and rates for all demographic groups increase with age. Older persons have much higher fracture rates than younger persons with the same bone density because of increasing risks from other factors, such as bone quality and tendency to fall. All types of fractures are associated with higher mortality rates. Men are more likely than women to die in the year after a hip fracture, with mortality rates for men estimated at up to 37.5%. This study was done with the aim to find out the risk factors for osteoporotic fracture in Bangladeshi population as there is no such previous studies in Bangladesh.*

***Methods:*** *A case control investigation was done comprising 181 cases admitted with osteoporotic fracture into two tertiary hospitals in Dhaka with 1:1 ratio of age and sex matched controls from July 2017 to June 2019. Information from all subjects was obtained through a questionnaire-based interview.*

***Results:*** *There was a significant increase in the number of cases of osteoporotic fracture with increasing age comprising 88.5% in 61–80-year age group. There were significantly more women (60.7%) than men (39.3%). Univariate analysis identified use of steroid, thyroid medication, loop diuretics, history of previous fracture, kidney disease, arthritis, immobilization, family history of osteoporosis, loss of height and lack of consumption of adequate dairy products (<3 servings/day) as the risk factors of osteoporotic fracture. As expected in multivariate modeling, numerous risk factors had a reduced effect after adjustment for potentially correlated covariates. The statistically significant factors were – use of steroid (OR 3.19, CI 1.10 – 9.22), loop diuretics (OR 5.00; CI 1.29 – 19.46), arthritis (OR 3.49; CI 1.49 – 8.18), family history of osteoporosis (OR 5.45; CI 1.29 – 23.13) and loss of height (OR 2.96; CI 1.27 – 6.88).*

***Conclusions:*** *This study has demonstrated some risk factors associated with osteoporotic fracture such as use of steroid and loop diuretics, arthritis, family history of osteoporosis and loss of height. But some known risk factors for osteoporotic fracture, e.g. lack of physical exercise, immobility, inadequate intake of diet rich in calcium content, caffeine, smoking, immature menopause, etc. were not found statistically significant in this study may be due to small study sample, selection bias or recall bias.*

***Keywords:*** *Osteoporosis, Fragility fracture, Bone mineral density*

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**Introduction:**

Osteoporosis is a systemic skeletal condition characterized by low bone mass and micro architectural deterioration of bone tissue that increases bone fragility and risk for fractures.[1] Osteoporosis is diagnosed in persons on the basis of presence of a fragility fracture or by bone mass measurement criteria. Osteoporosis is diagnosed when the bone mineral density (BMD) at the spine, hip or wrist is 2.5 or more standard deviations (SDs) below the reference mean (T-score of -2.5 or less), and low bone density or mass is diagnosed when BMD is from 1.0 to 2.5 SDs below the reference mean.[2]

Osteoporosis is a global problem and affects every geographical area. Estimates indicate that as many as 50% of Americans older than 50 years will be at risk for osteoporotic fractures during their lifetimes.[1] It has been projected that by the next century, 50% of all hip fractures in the world will occur in Asia.[2] Rates for women are higher than those for men; rates vary by race, with the highest rates in white persons; and rates for all demographic groups increase with age.[3-6] Older persons have much higher fracture rates than younger persons with the same bone density because of increasing risks from other factors, such as bone quality and tendency to fall.[7] All types of fractures are associated with higher mortality rates.[8-11] Men are more likely than women to die in the year after a hip fracture, with mortality rates for men estimated at up to 37.5%.[12] Osteoporosis may occur due to specific disorders (hyperthyroidism, hyper-parathyroidism, prolonged immobilization, chronic liver disease) or drug. There are several other risk factors for osteoporosis like thin built, sedentary lifestyles, diet low in calcium and vitamin D, excess alcohol consumption, cigarette smoking/tobacco use, premature or surgical menopause, etc. Others include a family history of osteoporosis or atraumatic fractures.[13]

In our country osteoporotic fracture is not uncommon but there is no published data about the risk factors. The aim of this study was to determine the risk factors of osteoporotic fracture in the Bangladeshi population, as a first step in preparing public health measures and to enable later monitoring and evaluation of the governmental strategy.

**Methods:**

This case-control study was carried out in National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) & Shaheed Suhrawardy Medical College Hospital (ShSMCH) for a period of 2 years from 1st July, 2017 to 30th June, 2019. Admitted cases of confirmed osteoporotic fracture was selected for the study. Those who had other types of fracture admitted in the hospital or healthy attendants of the patients were controls. As there was no known prevalence in our country, measuring the power of the study at 20% with significance level set at 0.05, the sample size was calculated 181 for each case and control group. The sampling technique was convenience sampling and this sampling technique was used as per inclusion and exclusion criteria. Difficulty getting up from a chair was used as proxy for testing agility on both cases and controls. If the subject gave a history of not being able to get up from a chair effortlessly or without external assistance (prior to sustaining hip fracture), he or she was classified as positive.[14]All the patients aging e" 50 years who had osteoporotic fracture in neck of femur, spine or Colles' fracture within the last 3 months were included and debilitated, non-cooperative, patients with dementia or psychiatric illness and patients not willing to enter into the study were excluded from the study. Ethical clearances were obtained both from NITOR and ShSMCH ethical review committees and informed written consents from the patient and control were secured. Data collection form was filled by interrogating the patient or care giver. All data were recorded systematically in preformed data collection form (questionnaire) and quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency distribution and percentage. During analysis Chi-square test was done for the comparison of qualitative variables and student t test was used for the comparison of continuous variables. Multivariable linear regression was used to assess the significance of covariate-adjusted relations between the continuous variables. Multivariate logistic regression was performed to measure the odds ratio (OR) among qualitative variables. Regression models were crude, age and sex adjusted and fully adjusted. Statistical analysis was performed by using windows based computer software devised with Statistical Packages for Social Sciences (SPSS-20) (SPSS Inc, Chicago, IL, USA). A p value of 0.05 (two-tailed) or a 95% confidence interval (CI) not including the null point was regarded as statistically significant.

**Results:**

General characteristics of both case and control subjects are shown in Table I. There were no significant differences between the case patients and control subjects with regard to age. More cases than controls appeared to be on long term medication for chronic illnesses. The distribution of osteoporotic fractures between the sexes was interesting as 60.7% of the fractures occurred in females and only 39.3% in males. Age between 61-80 years appeared to be a major risk group with 88.5% of the osteoporotic fractures studied occurring in this age group.

**Table I**

*Characteristics of Cases and Controls*

| Variables | | Case (%) | Control (%) |
|---|---|---|---|
| Note: Plus - minus values are Means ± Standard Deviations | | (N=181) | (N=181) |
| Sex Distribution | Male | 71 (39.3) | 71 (39.3) |
| | Female | 110 (60.7) | 110 (60.7) |
| Mean Age | | 67.9 ± 5.8 | 65.0 ± 5.1 |
| | Male | 68.6 ± 5.7 | 65.0 ± 5.7 |
| | Female | 67.4 ± 5.9 | 65.0 ± 4.8 |
| Marital Status | Married | 157 (86.9) | 153 (84.4) |
| | Others | 24 (13.1) | 28 (15.6) |
| Occupation | Housewife | 98 (54.1) | 95 (52.5) |
| | Business | 39 (21.6) | 27 (14.9) |
| | Service | 15 (08.3) | 27 (14.9) |
| | Others | 29 (16.0) | 32 (17.7) |
| Socio-Economic Status | Upper | 12 (06.6) | 15 (08.3) |
| | Middle | 30 (16.6) | 39 (21.5) |
| | Lower | 139 (76.8) | 127 (70.2) |

**Univariate Analysis**

The OR and 95% CI estimated by univariate logistic regression modelling for variables identified by previous research as possible risk factors for osteoporotic fractures in other populations are presented in Table II.

**Diet and lifestyle**

Assessing the risk factors regarding dietary habit and lifestyle, the factors looked for were diet containing high protein, vegetarian diet, dairy products, consumption of caffeinated beverages (tea or coffee) and alcohol and above all exercise habit.

**Table II**

*Distribution and Analysis of Selected Variables in Cases and Controls*

| Variables | Case (%) n = 181 | Control (%) n = 181 | Odds Ratio (95% CI) | P-value |
|---|---|---|---|---|
| Steroid | 56 (31.0) | 21 (11.6) | 3.49 (1.34 – 9.08) | 0.008 |
| Thyroid medication | 24 (13.3) | 3 (1.7) | 9.06 (1.10 – 74.81) | 0.015 |
| Loop diuretics | 39 (21.5) | 12 (6.6) | 3.86 (1.18 – 12.62) | 0.019 |
| Previous fracture | 51 (28.2) | 12 (6.6) | 5.51 (1.73 – 17.53) | 0.002 |
| Liver disease | 21 (11.6) | 6 (3.3) | 3.82 (0.76 – 19.21) | 0.163 |
| Kidney disease | 39 (21.5) | 12 (6.6) | 3.86 (1.18 – 12.62) | 0.034 |
| Diabetes mellitus | 53 (29.3) | 36 (19.9) | 1.71 (0.74 – 3.95) | 0.207 |
| Gastrectomy | 12 (6.6) | 3 (1.7) | 4.21 (0.46 – 38.81) | 0.365 |
| Arthritis | 101 (55.8) | 51 (28.2) | 3.26 (1.53 – 6.93) | 0.002 |
| Immobilization | 30 (16.6) | 6 (3.3) | 5.78 (1.21 – 27.63) | 0.030 |
| Family h/o osteoporosis | 42 (23.2) | 9 (5.0) | 5.76 (1.56 – 21.24) | 0.007 |
| Loss of height | 101 (55.8) | 59 (32.6) | 2.58 (1.23 – 5.39) | 0.011 |
| Smoking | 59 (32.6) | 47 (26.0) | 1.37 (0.63 – 3.00) | 0.427 |
| Lack of high protein diet | 134 (74.0) | 131 (72.4) | 1.09 (0.49 – 2.42) | 0.839 |
| Vegetarian | 15 (8.3) | 6 (3.3) | 2.63 (0.49 – 14.13) | 0.439 |
| Dairy product consumption(<3 meals/week) | 145 (80.1) | 116 (64.1) | 2.30 (1.02 – 5.23) | 0.043 |
| Tea/Coffee drinking(>3 cups/day) | 71 (39.2) | 68 (38.0) | 1.07 (0.52 – 2.22) | 0.852 |
| Inadequate exercise(<3 times/week) | 83 (45.6) | 68 (37.6) | 1.40 (0.68 – 2.89) | 0.359 |

Among these factors, only inadequate dairy product consumption (<3 meals/week) was found to be statistically significant (OR 2.30; 95% CI 1.02 – 5.23; p = 0.043). None of the subjects in case and control gave any history of alcohol consumption. Though vegetarian diet had an OR of 2.63, the 95% CI was ambiguous (0.49 – 14.13). Similarly smoking, tea/coffee drinking and inadequate exercise (<3 times/week) did not give any statistically significant result.

**Illnesses and medications**

To assess the risk factors regarding illnesses and medications, several chronic illness, e.g. liver disease, thyroid disorder, kidney disease, epilepsy, diabetes mellitus, gastrectomy, rheumatoid (or other) arthritis, prolonged immobilization, Paget's disease, etc. and long term medication history, e.g. steroid (prednisone, cortisone etc.), thyroid medication, anticonvulsants, loop diuretics, heparin, chemotherapy, etc. were obtained. Among the risk factors, several factors were found statistically significant.

They were steroid (OR 3.49; CI 1.34 – 9.08; p = 0.008), thyroid medication (OR 9.06; CI 1.10 – 74.81; p = 0.015), loop diuretics (OR 3.86; CI 1.18 – 12.62; p = 0.019), history of previous fracture (OR 5.51; CI 1.73 – 17.53; p = 0.002), kidney disease (OR 3.86; CI 1.18 – 12.62; p = 0.034), rheumatoid (or other) arthritis (OR 3.26; CI 1.53 – 6.93; p = 0.002), immobilization (OR 5.78; CI 1.21 – 27.63; p = 0.030). None from the study population gave history of using heparin, anticonvulsant or any chemotherapeutic agent. Liver disease, diabetes mellitus and history of gastrectomy gave statistically non-significant results.

**Others**

Among other risk factors, family history of osteoporosis and loss of height were found to be statistically significant risk factor [(OR 5.76; CI 1.56 – 21.24; p = 0.007) and (OR 2.58; CI 1.23 – 5.39; p = 0.011) respectively]. Some risk factors only for the female participants, e.g. immature menopause, hysterectomy, oophorectomy, etc. were assessed none of which were statistically significant. (Table III)

**Multivariate Analysis**

Table IV presents the adjusted odds ratios, 95% confidence intervals, and p values of a multivariate logistic-regression model determined by stepwise selection. As expected in multivariate modelling, numerous risk factors had a reduced effect after adjustment for potentially correlated covariates. The factors that were statistically significantly associated with osteoporotic fracture were – use of steroid (adjusted OR 3.187; CI 1.102 – 9.220; p = 0.032), loop diuretics (adjusted OR 5.002; CI 1.286 – 19.459; p = 0.020), rheumatoid (or other) arthritis (adjusted OR 3.492; CI 1.491 – 8.177; p = 0.004), family history of osteoporosis (adjusted OR 5.452; CI 1.285 – 23.134; p = 0.021) and loss of height (adjusted OR 2.961; CI 1.274 – 6.882; p = 0.012).

**Table III**

*Distribution and Analysis of Selected Variables in Cases and Controls (Females only)*

| Variables | Case (%) n = 110 | Control (%) n = 110 | Odds Ratio (95% CI) | P-value |
|---|---|---|---|---|
| Immature menopause | 21 (19.1) | 6 (5.5) | 4.08 (0.79 – 21.16) | 0.075 |
| Hysterectomy | 12 (10.9) | 9 (8.2) | 1.37 (0.29 – 6.61) | 1.000 |
| Oophorectomy | 12 (10.9) | 9 (8.2) | 1.37 (0.29 – 6.61) | 1.000 |
| Uterine malignancy | 12 (10.9) | 9 (8.2) | 1.37 (0.29 – 6.61) | 1.000 |

**Table IV**

*Multivariate Analysis of Risk Factors for Osteoporotic Fractures*

| Variables | Adjusted Odds Ratio (95% CI) | p - value |
|---|---|---|
| Steroid | 3.187 (1.102 – 9.220) | 0.032 |
| Loop diuretics | 5.002 (1.286 – 19.459) | 0.020 |
| Arthritis | 3.492 (1.491 – 8.177) | 0.004 |
| Family h/o osteoporosis | 5.452 (1.285 – 23.134) | 0.021 |
| Loss of height | 2.961 (1.274 – 6.882) | 0.012 |

**Discussion:**

Osteoporotic fracture is increasingly becoming a major health problem in Bangladesh and knowledge about risk factors is essential for its prevention. Although many large scale studies have been reported in White and Asian (other than Bangladeshi) populations, there is currently no research available on variables that increase the risk of osteoporotic fracture in the Bangladeshi population. This case control study revealed many vital risk factors for an urban Bangladeshi population.

Risk factors were assessed by interview through a standardized questionnaire. This analysis focused on identifying risk factors for osteoporotic fracture in the univariate and multivariate setting. A number of risk factors that were significant in the univariate analysis were not included in the final model produced by the stepwise selection routine. This is anticipated as the correlation between the risk factors may reduce their relative importance. In addition, effect modification may be present amongst the risk factors based on a comparison of odds ratios yielded by the univariate and multivariate models. For example, the effect loop diuretics is significantly elevated in the multivariate model. This suggests that the effect of loop diuretics is modified by the presence of another risk factor in the multivariate model. Future investigations may include an in-depth analysis of interactions.

In this study, in univariate analysis, it was found that use of steroid, thyroid medication, loop diuretics, history of previous fracture, kidney disease, rheumatoid (and other) arthritis, immobilization, family history of osteoporosis, loss of height and lack of dairy product consumption were associated with risk of osteoporotic fracture. Whereas in multivariate analysis, only risk factors found to be significant were use of steroids, loop diuretics, rheumatoid (and other) arthritis, family history of osteoporosis and loss of height.

In the Mediterranean osteoporosis study conducted in Europe, it was found that late menarche, poor mental function, low BMI, lack of physical activity, low exposure to sunlight, and low consumption of calcium and tea to be significantly associated with the risk of hip fracture.[15] In the Asian osteoporosis study, low dietary calcium intake, lack of physical activity, alcoholism and cigarette smoking found to be risk factors for hip fracture.[16] Similarly, in Japan, one study found a low BMI, regular alcohol intake, prevalent vertebral fracture, having 5 or more children, a low milk intake and later age at menarche to be associated with risk of hip fracture.[14] Unlike the American and European population where the prevalence of osteoporotic fractures in women is more than twice than that of men in any age group,[17] the ratio in the Bangladeshi population appears to be 60.7% to 39.3%. Future research could explore this discrepancy. One possible reason could be the disparity in life expectancies in the different populations. In the year 2019, life expectancy at birth was 70.71 years for Bangladeshi males and 75.09 years for Bangladeshi females.[18] However the life expectancy at birth was 75.2 years for American males and 80.4 years for American females.[19] In this study, the BMI could not be assessed as most of the cases were bed-ridden and they did not have previous data regarding measurements of weight or height to calculate the BMI which is a strong risk factor for osteoporotic fracture. According to the previous research,[20-23] men and women with a lower BMI are at a significantly higher risk for osteoporotic fracture than their heavier counterparts. It has been suggested by these prior studies that this protection is a result of increased adipose tissue-based production of estrogen, more padding around the hips that may decrease the energy transmission from the impact of the fall to the proximal femur, and the greater gravitational forces on bone mass.[22,24] However, this study did not examine the body distribution of adipose tissue as well. In contrast with previous research, lack of physical activity was not found to be a risk factor for osteoporotic fracture.[16,22,25] As a major portion of both cases (45.6%) and controls (37.6%) acknowledged that they were not accustomed to any kind of physical exercise even as less as three times per week which may be an effect of rapid urbanization of the country and lack of knowledge of importance of physical exercise. Dietary calcium was assessed qualitatively in this study by food frequency questionnaire. If the participant consumed less than 3 dairy products a day (1 serving = 8 oz. milk, 1 oz. cheese, container of yogurt or serving of ice cream), he/she was identified as having less calcium than required. It has been determined as one of the risk factors not only in this study but also in other Asian studies involving the Chinese, Malaysian, Singaporean, Thai and Philippino populations.[16,26] A European study has shown that the risk of hip fracture increases with diminishing calcium intake in subjects whose daily intake was <500 mg. In an Asian study, it was also found that diet calcium intake < 498 mg/d increases the risk of hip fracture. But in multivariate analysis in this study, it was not included as a risk factor. So future study involving more population and quantitative assessment of dietary calcium is required. Given that dietary calcium intake in most Asian countries is low; calcium supplements should have a considerable

impact on the reduction of osteoporotic fracture risk. Like physical activity, this variable is of great importance with respect to public health measures that can decrease the likelihood of osteoporotic fractures and thus relieve much of the morbidity and mortality associated with this condition in the Bangladeshi population. Much like calcium, adequate vitamin D is essential for bone strength, though it was not assessed in this study. Since vitamin D3 (with calcium) has been shown to reduce the risk of hip fractures in other elderly populations[27] and the fact that the Indian sub-continent population is considered Vitamin D deficient,[28-30] the effect of sunlight and other vitamin D containing foods should be examined for their effect on osteoporotic fracture incidence. The effect of caffeine was estimated mainly by the consumption of tea- an extremely popular beverage with the Bangladeshi population and coffee. But no association with osteoporotic fracture was found in this study. It is also important to separate subjects based on the quantity of milk in their tea as some individuals may enjoy black tea and others may like to add milk. In Bangladesh, the majority prefer to add milk, albeit in varying amounts to their tea. Although previous research indicates that the effect of habitual tea drinking on bone density is minor and does not significantly alter the risk of fractures in an American population,[31] this particular variable may be significant in the Bangladeshi population as 39.2% of the cases and 38.0% of the controls were regular tea/coffee drinkers. In many studies, a wide variety of medical conditions (e.g., multiple sclerosis, stroke, trauma-induced immobilization) and medications (e.g., immunosuppressant, oral glucocorticoids) were found to be associated with excess bone loss and fracture risk.[24,25,32] In this study, rheumatoid arthritis, chronic kidney disease, immobilization, use of steroids, thyroid medication and loop diuretics were identified as risk factors which are consistent with the previous studies. The most important risk factor for fracture, independent of bone mineral density, is a previous fragility fracture. This history increases the risk of future fractures by as much as a factor of 8; the risk is highest in the first year or two after the initial episode.[33,34] Silent vertebral fractures (identified radiologically) also increase the risk and should be looked for in patients who have lost more than 2 cm of height.[35] These two risk factors, e.g. previous history of fracture and loss of height along with family history of osteoporosis found significant in this study, may be used in mass population as screening for osteoporosis in a country like Bangladesh where most of the people are very poor to do any kind of laboratory test, let alone BMD. But a major limitation of the study is the relatively limited sample size which impacted the power to detect the effect of certain variables deemed relevant by previous literature such as alcohol consumption (none in case and control group), smoking and hormone replacement therapy (none in both group). Unlike many other studies, early or immature menopause, either physiologically or surgically, was not found significant in this study.

It is also important to mention that as with all case control investigations, there is a possibility of recall bias and it is not possible to validate the information provided by the subject. However, given these constraints, valuable information was retrieved from the analysis.

Unlike many previous studies that focused on women, this investigation included both males and females. The distribution of hip fracture by age and sex was found to be different from that in the western counterparts studied in other investigations.[18,19,30] Notwithstanding the high prevalence of osteoporosis and related fragility fractures in Bangladesh, and the resulting morbidity and mortality associated with the condition, there is no prior existing research on the risk factors of osteoporotic fractures in the Bangladeshi population. Given this formidable public health problem, the results of this study may be beneficial on a national level.

**Conclusion:**

This study has demonstrated some risk factors associated with osteoporotic fracture such as use of steroid and loop diuretics, arthritis, family history of osteoporosis and loss of height. But some known risk factors for osteoporotic fracture, e.g. lack of physical exercise, immobility, inadequate intake of diet rich in calcium content, caffeine, smoking, immature menopause, etc. were not found statistically significant in this study may be due to small study sample, selection bias or recall bias. Again this study may not represent the general population as it was done in hospital setting. So future study at the community level with larger sample size is recommended to find out the actual risk factors of osteoporotic fracture in the Bangladeshi population.

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*ORIGINAL ARTICLE*

# Patient Satisfaction Evaluation: Validated Tools for Emergency, Post-Operative, and Chronic Pain Management

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***Abstract***

***Introduction: Pain is a multifaceted experience, and its management remains a global healthcare challenge. Despite advances, pain is frequently undertreated in emergency, post-operative, and chronic pain settings. Accurate pain assessment and effective management strategies are essential to improve patient outcomes and satisfaction, particularly in resource-limited settings like Bangladesh. So, this article emphasis to throw some lights to evaluate pain reduction and patient satisfaction using validated tools in emergency, post-operative, and chronic pain settings.***

***Methods: A multicenter prospective observational study was conducted between 2016 and 2018 in the Department of Physical Medicine and Rehabilitation, Department of Obstetrics and Gynecology at Bangabandhu Sheikh Mujib Medical University, and Emergency Departments of Shaheed Suhrawardy Medical College Hospital. A total of 300 patients, divided equally among emergency (n=100), post-operative (n=100), and chronic pain (n=100) groups, were selected via random sampling. Pain was assessed using the Visual Analogue Scale (VAS), and patient satisfaction was measured using the MISS-21, APS-POQ-R, and PSRS scales. Data were analyzed using SPSS version 26.0.***

***Results: The mean baseline pain scores for the emergency, post-operative, and chronic pain groups were 7.63, 6.31, and 7.26, respectively. After proper intervention, pain scores were reduced significantly to 4.27, 4.47, and 5.02 ($p<0.05$ for all). The MISS-21 subscales for the emergency group showed strong satisfaction for distress relief (6.58±0.46) and rapport (6.50±0.41), but discomfort in communication comfort (1.32±0.46). Post-operative satisfaction using APS-POQ-R revealed "good" (54.12±1.43) and "excellent" (49.45±1.86) satisfaction levels. Chronic pain satisfaction assessed with PSRS showed 46% of participants had "good" satisfaction (scores 61–70). Pain intensity showed a moderate negative correlation with PSRS ($r=-0.328$, $p=0.001$) but not with MISS-21.***

***Conclusion: Validated tools effectively recorded significant pain reduction and patient satisfaction across emergency, post-operative, and chronic pain settings.***

***Keywords: Post-operative Pain management, Chronic Pain management, Visual Analogue Scale (VAS)***

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**Introduction:**

Pain is highly subjective, personal and multifaceted experience, encompassing psychological, behavioral, emotional, cognitive, and sensory dimensions.[1] In 1995, Dr. James Campbell, speaking before the American Pain Society, emphasized the critical importance of addressing pain by advocating for its recognition as the "fifth vital sign" (P5VS).[2] This landmark call underscored the urgent need to improve pain management in healthcare. Despite this, pain remains a frequently undertreated condition among hospitalized patients. In emergency settings, acute pain often arises from inflammation, tissue damage, or injuries, including neuropathic pain, which accounts for over 20% of patients visiting Emergency Departments (EDs).[3] Recent studies indicate a significant prevalence of moderate to severe postoperative pain, affecting 41–61% of patients in developed countries and 60–80% in

developing countries. Alarmingly, despite advancements in healthcare, the American Pain Society reports that this prevalence has remained persistently high, with more than 80% of patients experiencing inadequate pain relief after surgery.[4–6] On the other hand about 51.6 million people (20.9%) suffer from debilitating chronic pain.[7] Differentiating between types and severities of pain is essential, as effective management strategies must be tailored to the underlying cause and intensity.

Assessing pain accurately in critically ill patients presents unique challenges. This complexity often stems from factors such as altered levels of consciousness due to sedation, head trauma, or compromised physiological states. In such situations, clinicians are frequently compelled to rely on their interpretation of pain-related behaviors in the absence of appropriate assessment tools [1]. Traditional methods for evaluating pain, such as verbal or numeric rating scales and visual analogue scales (VAS), may not be applicable or effective in these circumstances, further complicating the assessment process.[8]

Downey and Zun (2010) highlighted a significant correlation between pain reduction and patient satisfaction levels among individuals presenting to the emergency department with pain as their primary complaint.[9] High levels of patient satisfaction are strongly linked to improved health outcomes, reduced frequency of medical visits, and shorter hospital stays.[10] Conversely, dissatisfaction with treatment, particularly medication, can have significant negative repercussions. It may increase the likelihood of patients filing formal complaints, pursuing legal action against healthcare providers, or spreading unfavorable opinions about a clinic or its services, potentially harming its reputation.[11] However, pain often remains undertreated due to several factors. These include insufficient knowledge of the fundamental pharmacokinetics and pharmacodynamics of opioids, as well as an overly cautious approach to their use, driven by unfounded fears of addiction, tolerance, or adverse effects that might prolong hospital stays. Additionally, pain is sometimes misinterpreted as anxiety or agitation, further complicating treatment. The lack of appropriate and validated tools for pain assessment also contributes to this persistent issue.[12]

Pain management remains a global concern, including in Bangladesh, where the current state of pain management in emergency departments, postoperative care, and chronic pain settings has not been adequately studied. A comprehensive understanding of the current status of pain management is required, encompassing medical education on the topic, prescribers' existing knowledge and perceptions about pain management medications, their prescribing behaviors, the outcomes of these therapies, and how these outcomes correlate with patient satisfaction levels. To achieve this, evaluation tools will need to be translated, validated, and implemented to assess the current pain management practices in Bangladesh.

This study aimed to evaluate pain reduction and level of patient satisfaction by selected tools in Emergency, Post-Operative, and Chronic Pain settings.

**Methods:**

The study was a multicenter, prospective observational study, conducted in the Department of Physical Medicine and Rehabilitation and the Department of Obstetrics and Gynecology at Bangabandhu Sheikh Mujib Medical University, as well as the Emergency Departments of Shaheed Suhrawardy Medical College Hospital. The study spanned from 2016 to 2018. The research protocol was submitted to the Institutional Review Board (IRB) of Bangabandhu Sheikh Mujib Medical University for a comprehensive review of its scientific and ethical aspects, ensuring the necessary approval was obtained prior to commencement. The participants of the study were selected by simple random sampling where random numbers were generated by computed program. The study included three distinct patient groups—those presenting with acute pain in the Emergency Department (n=100), patients experiencing post-operative pain (n=100), and individuals with chronic pain (n=100)—each with carefully defined inclusion and exclusion criteria to ensure consistency and reliability of the findings.

For the Emergency Department, eligible participants were patients aged 18 years or older presenting with acute abdominal pain managed conservatively, who were expected to remain in the emergency room for more than two hours. Patients had to be able to provide consent and communicate effectively with physicians. In the post-operative group, the study included patients aged 18 years or older who had undergone uncomplicated lower abdominal cesarean sections and were required to remain in the post-operative room for at least 12 hours. For the chronic pain group, participants were adults aged 18 years or older with a diagnosis of chronic low back pain attributed to conditions such as lumbar herniated discs, degenerative disc disease, or sacroiliac joint dysfunction.

Pregnant women, breastfeeding mothers, children, patients presenting with chest or labor pain, those requiring surgery or minimally invasive procedures for pain management,

individuals with chronic low back pain resulting from trauma, compression fractures, deformities, tumors, infections, or osteoarthritis, as well as patients treated with antidepressants or those unable to adequately respond to queries due to educational limitations were excluded from all 3 groups.

**Assessment of validated tools used[13]:**

1. Visual analogue scale (VAS)
2. Medical Interview Satisfaction Scale (MISS)
3. Revised American Pain Society Outcome Questionnaire (APS- POQ-R)
4. Participant Satisfaction Reporting Scale (PSRS)

After pain minimizing intervention, pain was assessed by VAS at 15 minutes, 30 minutes, 60 minutes and 90 minutes interval in ED and translated Bangla version of MISS- 21 was used after treatment and prior to the patients' discharge to assess the satisfaction level of pain. APS-POQ-R was used to assess patients' satisfaction with post-operative analgesia on the first post-operative day. PSRS was used for chronic pain satisfaction assessment.

For MISS-21 scale, subscale distress relief and rapport had categorization of >5: strong satisfaction, 3-5: moderate satisfaction and <2: dissatisfaction. For communication comfort and compliance, >4: excellent, 2-3: moderate and <1: discomfort/poor compliance.

For PSRS scale, categorization was done as: 41–50 (dissatisfaction or below-average satisfaction), 51–60 (moderate satisfaction), 61–70 (good satisfaction), 71–80 (high satisfaction), 81–90 (very high satisfaction).

All collected information was stored with confidentiality and coded, cleaned and analyzed by SPSS version 26.0.

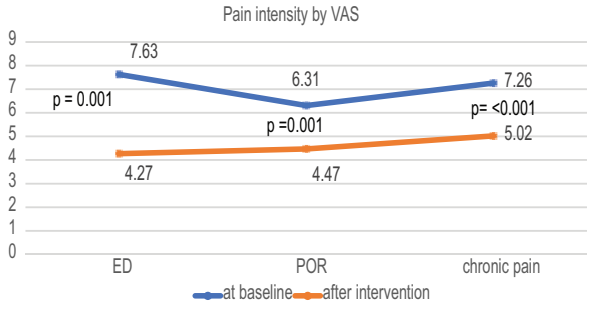
**Results:**

The demographic data for the three groups, Emergency Department (100 participants), Post-Operative Room (100 participants), and Chronic Pain Group (100 participants), are as shown in table 1: The mean age for the Emergency Department group was 32.03±11.65 years, for the Post-Operative Room group was 30.1±5.55 years, and for the Chronic Pain Group was 38.53±10.90 years. Regarding sex distribution, in the Emergency Department group, 48% were male and 52% were female. In the Chronic Pain Group, 36% were male and 64% were female

**Table I**

*Distribution of the participants according to demographic characteristics among 3 groups (n=300)*

| Demographic variables | Emergency department (100) | Post-operative room (100) | Chronic pain group (100) |
|---|---|---|---|
| Age (in years) | | | |
| <20 | 18 (18%) | 5 (5%) | - |
| 21-30 | 39 (39%) | 52 (52%) | 33 (33%) |
| 31-40 | 18 (18%) | 37 (37%) | 18 (18%) |
| 41-50 | 18 (18%) | 6 (6%) | 18 (18%) |
| >50 | 7 (7%) | - | 7 97%) |
| Mean±SD | 32.03±11.65 | 30.1±5.55 | 38.53±10.90 |
| Sex | | | |
| Male | 48 (48%) | - | 36 |
| Female | 52 (52%) | 100 | 64 |
| Total | 100 | 100 | 100 |




*Paired sample t-test*

**Figure 1:** *Distribution of the participants according to pain intensity (measured by VAS) among 3 groups (n=300)*

Figure 1 shows the mean values for three groups—Emergency Department (ED), Post-Operative Room (POR), and Chronic Pain—at baseline and after the intervention. At baseline, the mean values were 7.63 for ED, 6.31 for POR, and 7.26 for Chronic Pain. After the intervention, the mean values reduced to 4.27 for ED, 4.47 for POR, and 5.02 for Chronic Pain. All 3 groups showed statistical significance.

The satisfaction-related variables for the three groups are shown in table 2. In the Emergency Department group, the MISS-21 subscales showed the following mean scores: 6.58±0.46 for Distress Relief (DR), 1.32±0.46 for

**Table II**

*Distribution of the participants according to patient satisfaction (n=300)*

| Demographic variables | Emergency department (100) | Post-operative room (100) | Chronic pain group (100) |
|---|---|---|---|
| MISS-21 | | | |
| Distress relief subscale (DR) | 6.58±0.46 (strong satisfaction) | | |
| Communication comfort subscale (CC) | 1.32±0.46 (significant discomfort) | | |
| Rapport subscale (R) | 6.50±0.41 (strong satisfaction) | | |
| Compliance Intent subscale (CI) | 3.70±0.39 (moderate willingness) | | |
| Overall (21 items) | 5.12±0.24 | | |
| APS-POQ-R | | | |
| Satisfaction level: good | | 54.12±1.43 | |
| Satisfaction level: excellent | | 49.451.86 | |
| PSRS score | | | |
| 41-50 (below average satisfaction) | | | 8% |
| 51-60 (moderate satisfaction) | | | 33% |
| 61-70 (good satisfaction) | | | 46% |
| 71-80 (high satisfaction) | | | 11% |
| 81-90 (very high satisfaction) | | | 2% |

Communication Comfort (CC), 6.50±0.41 for Rapport (R), and 3.70±0.39 for Compliance Intent (CI). The overall score across all 21 items was 5.12±0.24.

For the Post-Operative Room group, satisfaction levels assessed using the APS-POQ-R revealed a mean score of 54.12±1.43 for participants who reported "good" satisfaction and 49.45±1.86 for those who reported "excellent" satisfaction. In the Chronic Pain Group, the distribution of PSRS scores was as follows: 8% scored between 41-50, 33% scored between 51-60, 46% scored between 61-70, 11% scored between 71-80, and 2% scored between 81-90.

For the MISS-21 scale, Pearson's correlation was -0.106 with a p-value of 0.292, indicating a weak negative correlation that is not statistically significant. For the PSRS scale, Pearson's correlation was -0.328 with a p-value of 0.001, indicating a moderate negative correlation that is statistically significant.

**Table III**

*Correlation of pain intensity with MISS- 21 and PSRS scale*

| Scales | Prearson's correlation | P value |
|---|---|---|
| MISS-21 | -0.106 | 0.292 |
| PSRS | -0.328 | 0.001 |

**Discussion:**

Pain management is difficult all over the world, which found to be more wearisome in Bangladesh. The present study was conducted to assess the quality of pain management in Bangladesh. In order to improve the situation, the developed countries establish guidelines or protocols and design strategies to treat pain appropriately.

The Emergency Department group had a mean age of 32.03±11.65 years but a few articles found a slightly higher mean of ages[14,15] in such department. The Post-Operative Room group had a mean age of 30.1±5.55 years. The Chronic Pain group, with a mean age of 38.53±10.90 years. For patients suffering from chronic pain, mean age was found to be 45.9 years [16]. The Emergency Department group showed a female dominance of 52%, while the Post-Operative Room group was entirely female-dominated at 100%, as we took post LUCS patients. In the Chronic Pain group, females were dominant as well, comprising 64% of the participants. Female dominance was similarly distributed in patients of chronic pain but not true for emergency department.[16] Male predominance was found in Emergency department.[12,14,15]

At baseline, the mean pain score in the Emergency Department group was 7.63, which significantly decreased to 4.27 after analgesia use; the baseline intensity of which was found similar to another original research on ED.[17] In the Post-Operative Room group, the baseline mean score

of 6.31 significantly reduced to 4.47 after analgesia. Similarly, in the Chronic Pain group, the baseline mean score of 7.26 significantly decreased to 5.02 following the use of analgesia. Similar observation was found for ED by a couple of original researches on ED.[18,19] Although a few of studies assessed main intensity before and after pain management but they used different tools than the present study.[20–22]

The pain management in the emergency department was dependent on analgesics supply of the hospital. The present study found that the satisfaction level of the patient was not dependent on the pain management. There were highly significant positive correlations between scores on the MISS-21[13] and all aspects of satisfaction depend on the intensity of pain. In this study, Pearson's Correlation of the subscale of MISS-21 was done. The overall (21 items) r value was (-0.106) which indicated that inverse relationship between pain severity and patient's satisfaction. This study also provided the evidence for MISS-21 psychometric properties which suggested that it was a valid and reliable instrument for the assessment patient satisfaction with pain management in emergency department. It means when pain intensity decreased the satisfaction level would be increased.

Phillips et al. (2013)[23] investigated the relationship between pain intensity and patient satisfaction by evaluating 88 patients who treated with opioid analgesics at a 1018-bed acute care institution. A 14-question survey was adapted from a questionnaire developed by the American Pain Society to assess patient pain control and overall satisfaction with our institution's pain management strategies. This study found no association between pain intensity score and patient satisfaction with overall pain management (Spearman's rank correlation coefficient = "0.31). The majority of the patients were satisfied or very satisfied with their overall pain management, regardless of their pain intensity score. MISS-21 was validated and its' sub scale rated the distress relief, communication comfort, rapport and compliance intent subscale which was focused on both the pain management and physician-patients relationship and more effective for use in emergency pain management.

In case of postoperative pain, APS-POQ-R was used to assess the patient satisfaction level after cesarean section. The cross-cultural research for validation of this tool was done. The mean value of patient satisfaction with the pain treatment was 7.42 ±1.34. In this study about 80% pain relieved in 53 patients, 70% in 26 patients, 60% in 4 patients, 50% in 7 patients, 30% in 4 patients and 90% pain relieved in 6 patients. Dolin et al. (2002)[24] mentioned in their study that different pain measurement tools provided comparable data. This study explained the evidence from published data which was related to the incidence of moderate to severe pain after surgery and suggested that used analgesics techniques were inappropriate to achieve the goal. Milutinovic et al. (2009)[25] used the SCQIPP (Strategic and Clinical Quality Indicators in Postoperative Pain) in their study, which contain 14 items. The mean score for the individual items of SCQIPP questionnaire was between 2.0 and 4.7 (scale range 1–5) and the percentage of patients answers "strongly agree" ranged from 4.4 to 77%. The present tools are easier to apply and items are more focused on the factors which are related to the patient satisfaction level during post-operative period.

Participant Satisfaction Reporting Scale (PSRS) was used to evaluate the satisfaction level in chronic low back pain. The purpose of this study was to develop a tool to evaluate the satisfaction with treatment of chronic low back pain, evaluate the reliability of this instrument, and then examine predictors and consequences of satisfaction. The correlation(r) value of PSRS score with pain severity after one week was -0.328. The result indicated inverse relationship between the pain severity and patients' satisfaction level. The patient's satisfaction level measured by PSRS score in 46 patients was about 61% to 70%.

The Pain Service Satisfaction Test (PSST)[10] was done in fifty adult patients receiving services for chronic low back pain in a university pain clinic completed the PSST as part of a survey mailed to their homes. Findings supporting the validity of the PSST included significant positive correlations between the management and satisfaction. These tools predicted that about 60% participants were satisfied with the treatment.[10] The PSRS was the tools which used in this study in outpatient department and this tool demonstrated correlation between the pain management and patient satisfaction.

The current study rated that satisfaction with care significantly higher than satisfaction with improvement. These differences suggested that patients discriminate between quality of care with more interpersonal impression and quality of treatment as a more outcomes-oriented hypothesis. This discrepancy between treatment and care may partly explain the often-inconsistent relationship between satisfaction and symptom relief in the pain patient, where patients express high levels of satisfaction despite limited pain relief.

**Conclusion:**

These three validated tools were able to record significant reduction of pain and associated patient satisfaction. The purpose of this study was to evaluate the patient satisfaction with treatment of pain and exploring the relationship between satisfaction and compliance. Patients rated satisfaction with care higher than satisfaction with improvement, highlighting a distinction between interpersonal aspects of care and treatment outcomes.

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**Conflict of interest:** none

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REVIEW ARTICLE

# Metabolic Dysfunction Associated Steatotic Liver Disease (MASLD): A Narrative Review

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*Abstract*

***Metabolic dysfunction associated steatotic liver disease (MASLD), formerly known as NAFLD (Non-alcoholic fatty liver disease), is an emerging prevalent disease affecting millions of people worldwide. The article aims to provide a comprehensive review of epidemiology, pathophysiology, diagnostic workups, evolving management options, and outcomes. Primarily factored by insulin resistance, the disease inflammation is affected later by oxidative stress. Patients often have concomitant morbidities such as diabetes, hypertension, obstructive sleep apnea, and obesity, although MASLD itself can be asymptomatic. Liver enzymes, particularly alanine transaminases (ALT), are elevated, along with some blood markers. Diagnostic evaluation includes ultrasound imaging, non-invasive biomarkers, fibroscan, and liver biopsy. To forecast a poor prognosis, fibrosis risk stratification is necessary. The gold standard diagnostic test is liver biopsy, which is limited in use due to invasiveness. The key treatment of MASLD is weight loss by diet and exercise, which are added with limiting alcohol and regular exercise. Therapeutic interventions are yet to be established, although few medications have a narrow spectrum of action. Obese patients may undergo bariatric surgery if the criteria are matched. All the cardiometabolic risk factors should be optimized with proper interventions. Affected individuals should be monitored at regular intervals to assess any changes toward hepatic cirrhosis and carcinoma. To sum up, increasing public awareness and the scopes of scientific research are essential to combat the emerging epidemic.***

***Keywords: MASLD, MAFLD, NAFLD, MASH, NASH, steatohepatitis, fibrosis, type 2 diabetes***

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**Introduction:**

Metabolic dysfunction-associated steatotic liver disease (MASLD) has emerged as the leading cause of chronic liver disease worldwide and its prevalence has been dramatically increasing affecting more than a third of the adult population. The presence of MASLD is strongly associated with type 2 diabetes, obesity and other cardiometabolic risk factors.[1]

MASLD is the new terminology proposed in 2023 by three multinational liver associations to replace the old term 'non-alcoholic fatty liver disease' (NAFLD).[2] This terminology is non-stigmatizing, accurately describes the pathophysiology highlighting the concept of metabolic dysfunction and acknowledges the overlapping disease mechanisms. Moreover, the revised nomenclature selected an overarching term of steatotic liver disease (SLD) to parse out MASLD from other causes of steatosis. Emerging research reveals that NAFLD and MASLD definitions are highly concordant, with more than 96% of NAFLD patients meeting MASLD criteria; thus, both categories can be used interchangeably.[3]

MASLD includes a spectrum of progressive steatotic liver conditions, ranging from isolated hepatic steatosis to metabolic dysfunction-associated steatohepatitis (MASH) with varying degrees of liver fibrosis, which may progress to cirrhosis.[4] MASLD is also associated with an increased risk of developing cardiovascular disease (CVD), chronic kidney disease (CKD), and certain types of extrahepatic cancers.[5]

**Prevalence**

MASLD affects nearly 30% of the general population, with a higher prevalence in males compared with females (40% versus 26%).[6] The prevalence of MASLD varies significantly among countries, with 31.2% in North America,

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28.0% in the Asia Pacific regions and 33.8% in South Asia.[1] 1 A study conducted in India found that MASLD is more common in urban areas (16–32%) compared to rural areas (9%).[7] In Bangladesh, MASLD was identified in 18.5% of cases on an ultrasound-based study. Among them it was detected in 36.93% of obese and 7.1% of non-obese persons.[8]

**Natural history of disease progression**

Fibrosis and the presence of steatohepatitis are the strongest predictors of disease progression. Studies found that those with MASH progressed through one stage of MASLD fibrosis every 7 years, compared to 14 years for those with simple steatosis.[9]

**Table I**

*Revised Nomenclature of MASLD and Related Entities*[2]

| Revised Nomenclature | Definition |
|---|---|
| Steatotic liver disease (SLD) | Umbrella term to describe steatosis, diagnosed histopathologically or by imaging, due to different causes |
| Metabolic dysfunction– associated steatotic liver disease (MASLD) | Steatotic liver disease with the presence of one or more adult or pediatric-specific cardiometabolic risk factors & the exclusion of other causes of hepatic steatosis |
| MASLD and increased alcohol intake (MetALD) or combination etiology | SLD with one or more cardiometabolic risk factors with the coexistence of other conditions like increased alcohol intake (average daily intake of >20–50 and >30–60 g in females and males, respectively) or other causes of steatosis (drugs, Wilson's disease, inborn errors of metabolism, etc.) |

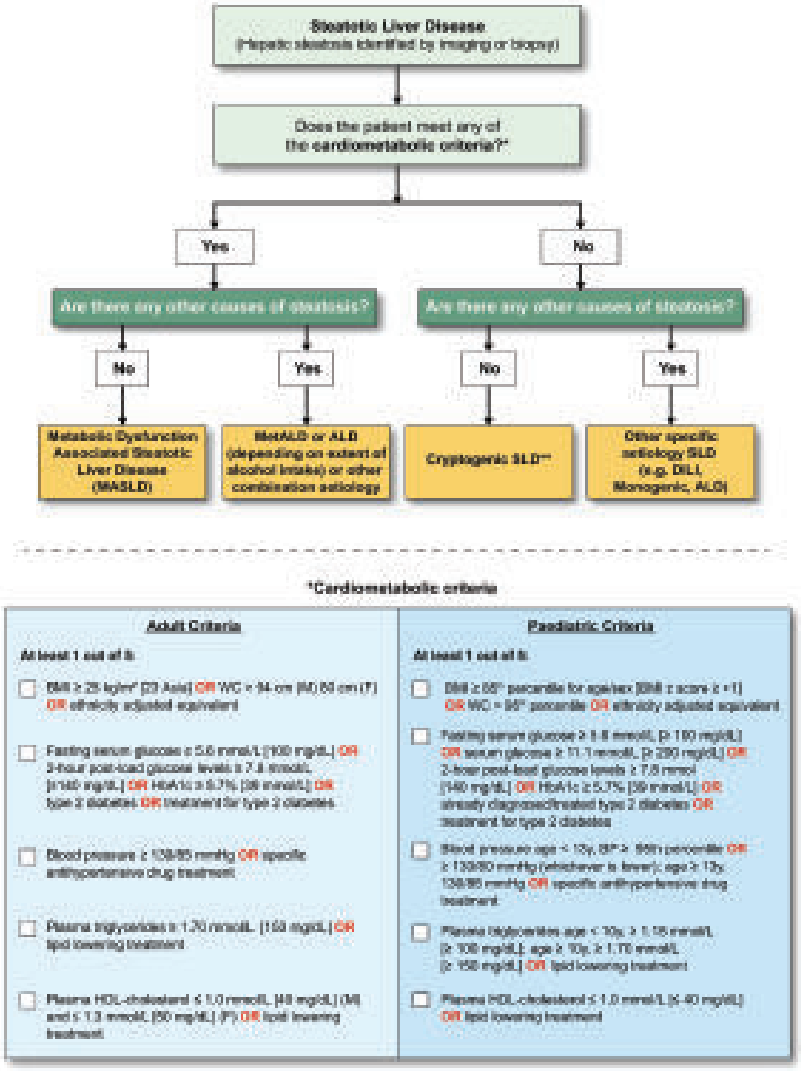


**Figure 1:** *MASLD diagnostic criteria*[2]

**Pathogenesis:**

The pathophysiology of MASLD is complex and multifactorial. The most widely supported "two-hit" theory implicates insulin resistance as the ''first hit'' leading to hepatic steatosis. The "second hit" is inflammation brought on by gut-derived endotoxins, oxidative stress, and mitochondrial dysfunction.

**Insulin resistance**

Primary pathophysiologic abnormality is insulin resistance, leading to an increase in lipolysis, hepatic uptake of free fatty acids (FFA), and accumulation of hepatic triglyceride. Hepatic steatosis, which is characterized by the buildup of fat in the liver, is exacerbated by such excessive triglyceride synthesis.[10]

**Oxidative stress**

Overproduction of reactive oxygen species (ROS) due to elevated fatty acids in the liver causes oxidative stress, which in turn triggers inflammation and hepatocyte destruction. Liver damage is exacerbated by the vicious cycle created by the interaction of oxidative stress and lipid buildup.[11]

**Gut Microbiota Dysbiosis**

Emerging research suggests that alterations in gut microbiota can influence MASLD development by affecting metabolic functions and promoting inflammation.[12]

**MASLD in lean individuals**

Although MASLD is commonly associated with obesity, it can also occur in non-overweight (BMI <25 kg/m$^2$) patients, with the highest prevalence in Asia (19%).[13] Compared with healthy controls, lean subjects with MASLD have increased insulin resistance, metabolic comorbidities and visceral adiposity. Genetic predisposition, sedentary lifestyle and alterations in the gut microbiome may also contribute to this group.[14]

**Diagnostic evaluation**

Diagnosis of MASLD is predicated on the presence of hepatic steatosis along with cardiometabolic risk factors and the exclusion of other liver diseases. The majority of patients are usually asymptomatic; however, some may present with fatigue, right upper abdominal discomfort, hepatomegaly and acanthosis nigricans. Stigmata of chronic liver disease are rarely seen until hepatic decompensation occur.[15] Most often, changes in liver enzymes or a pattern of steatosis in the liver seen during imaging for another reason lead to an incidental diagnosis of MASLD.

Targeted screening for MASLD and advanced fibrosis is recommended in the following high-risk groups:[16,17]

- Obesity and/or features of metabolic syndrome
- Type 2 DM (T2DM), prediabetes
- MASLD with moderate alcohol use
- First-degree relative of a patient with cirrhosis due to MASLD/MASH
- Persistently elevated transaminases over six months

The approach to a patient with suspected/confirmed MASLD should be two-pronged:

- Comprehensive evaluation of associated comorbidities and complications
- Assessment of the risk of fibrosis

**Table II**

*Initial Evaluation in Patients with Suspected/Confirmed MASLD.*

| | |
|---|---|
| History | • Comorbidities: diabetes, hypertension, overweight/obesity, obstructive sleep apnea, cardiovascular disease |
| | • Liver-specific history: evidence of decompensation, portal hypertension |
| | • Medications• Any alcohol history |
| Examination | • Blood pressure measurement |
| | • Features of insulin resistance: acanthosis nigricans |
| | • Features of chronic liver disease: jaundice, ascites, splenomegaly, gynecomastia, palmar erythema, spider angioma, etc. |
| Laboratory | • Liver function tests |
| | • Complete blood count |
| | • Oral glucose tolerance test, HbA1c |
| | • Fasting lipid profile |
| | • Creatinine |
| | • Urine albumin creatinine ratio• Hepatitis-C |
| | • Investigations for other causes of steatohepatitis if clinical suspicion |
| | • Malignancy screening |

**Laboratory findings:**

In MASLD, alanine transaminase (ALT) and aspartate transaminase (AST) level may be either normal or elevated commonly. ALT levels tend to be higher in MASH than in simple steatosis. However, the degree of aminotransferase elevation does not predict the degree of liver inflammation or fibrosis.[18] In addition, alkaline phosphatase (ALP) and glutamyl-transpeptidase (GGT) may be increased by 2 to 3-fold.

In patients with MÁSLD, elevated serum ferritin greater than 1.5 times has been associated with increased risk of ¾tåàtïhåðàtitis, whereas transferrin saturation is elevated in fewer cases.[19]

**Imaging in MASLD**

Ultrasound

Because of its low cost, safety, and accessibility, ultrasound (USG) is most common imaging technique used in clinical practice. Ultrasonography often reveals a bright liver echotexture with blurring of hepatic vasculature because of diffuse fatty infiltration. The sensitivity and specificity of USG are respectively 85% and 94% in detecting moderate to severe steatosis but, the sensitivity is decreased in patients with obesity.[20] However, it has limitations in accurately quantifying hepatic fat content and differentiating between simple steatosis and steatohepatitis.[21]

**CT, MRI**

These imaging modalities can detect steatosis but are less sensitive to detect dynamic changes in liver. Magnetic resonance spectroscopy (MRS) & MRI proton density fat fraction (MRI-PDFF) have higher sensitivity and considered gold standard to quantify hepatic fat, but only used in clinical trials rather than in routine practice.[22]

**Transient elastography**

Vibration-controlled transient elastography (VTCE), known as Fibroscan is a non-invasive method used to assess liver fibrosis by measuring liver stiffness. It is also possible to estimate hepatic steatosis by controlled attenuation parameter measurement at the same time. A liver stiffness cutoff of 6·5–7·9 kPa has approximately 90% sensitivity in excluding stage 3 and 4 fibrosis, whereas patients with cirrhosis typically have liver stiffness more than 12–15 kPa.[23]

**Noninvasive biomarkers**

Noninvasive tools to predict advanced fibrosis are NAFLD fibrosis score (NFS), Fibrosis-4 (FIB-4) index, AST to platelet ratio index (APRI), serum biomarkers like enhanced liver fibrosis (ELF) panel, hepascore etc. However, FIB-4 index (based on platelet count, age, AST, and ALT) is the most validated. Although the accuracy is modest, these scores have good negative predictive values to exclude advanced fibrosis.[21]

**Role of liver biopsy in diagnosis**

Liver biopsy is considered as gold standard for the diagnosis. However, it is an invasive procedure and its utility is currently limited to patients with competing etiologies for hepatic steatosis, discordant results on non-invasive tests, and as an endpoint in clinical trials. Characteristic features of steatohepatitis include lobular inflammation and ballooning of hepatocytes with or without fibrosis. The NASH CRN system is widely used for fibrosis staging.[7]

**Fibrosis risk stratification**

FIB-4 index facilitates primary risk assessment for fibrosis in primary care settings. Significant fibrosis is successfully ruled out by FIB-4 < 1.3, and patients can be monitored on a regular basis in the primary care context. Vibration-controlled transient elastography (VCTE) or an enhanced liver fibrosis (ELF) panel can be used for a secondary risk assessment in patients with an uncertain (1.3–2.67) or elevated (>2.67) FIB-4 index.[16]

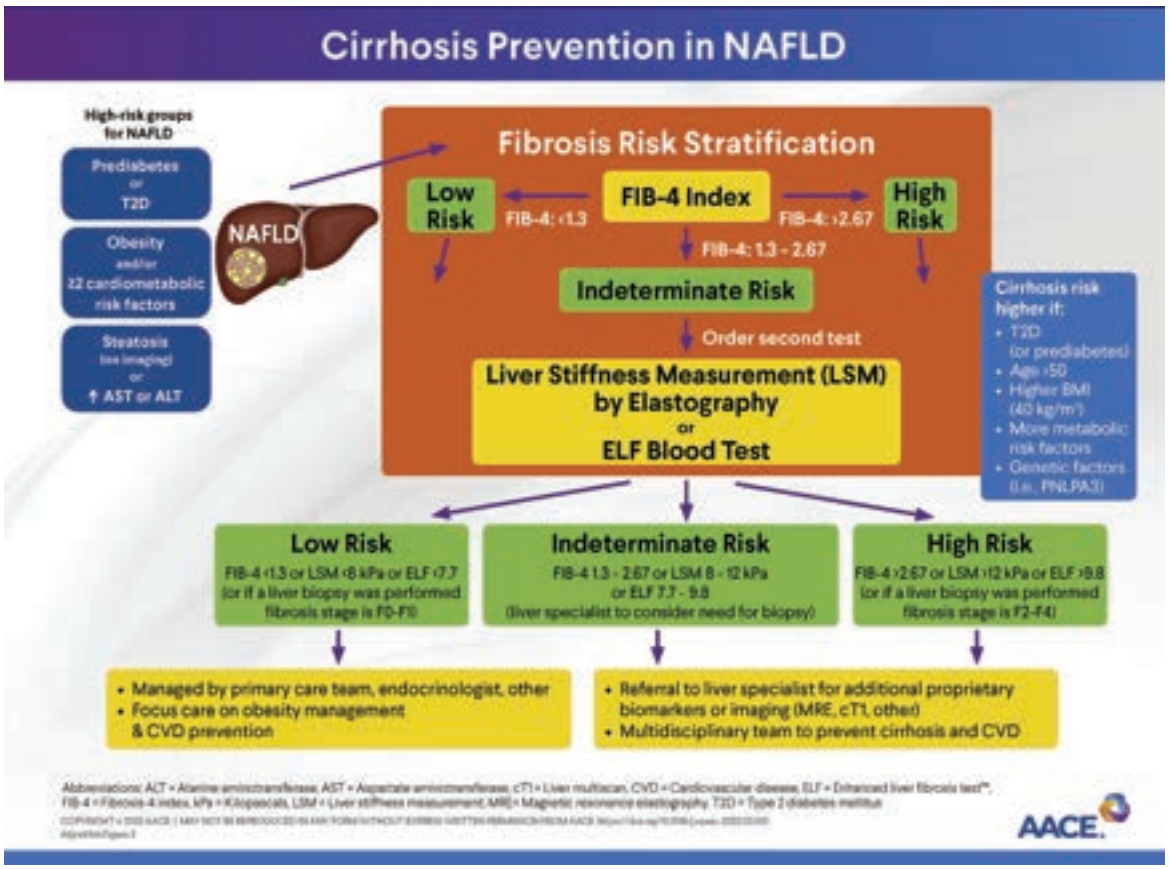


**Figure 2:** Algorithm for fibrosis risk stratification[16]

**Management:**

A multidisciplinary holistic approach is needed to reduce the morbidity and mortality associated with the condition, that includes the following:

- Lifestyle education and intervention
- Liver-directed therapies for MASLD
- Assessment and optimization of cardiometabolic risk factors

**Lifestyle Interventions for MASLD**

Life style modification and weight loss remains the cornerstone of the management of MASLD. There is a dose-response relationship between weight reduction and histological improvement in MASLD. Patients who are overweight or obese and have MASLD should be encouraged to lose at least 7–10% of their body weight. Steatosis can be improved with even mild weight reduction of 3-5%, but MASH and fibrosis can only be improved with weight loss of >10%.[24]

**Dietary Interventions**

Weight loss achieved through caloric deficit of 500-1,000 kcal/day is effective in reducing hepatic steatosis, irrespective of the specific dietary approach. Caloric restriction is the priority with reduction of saturated fat, starch and added sugars. Several recent studies have shown the value of a Mediterranean diet (low in carbohydrates and saturated fat but higher in monosaturated fat) as it effectively reduces hepatic fat content in addition to cardiovascular benefits.[25]

**Exercise**

Exercise, independent of weight loss, has hepatic and cardiometabolic benefit and should be routinely recommended and tailored to the patient's preferences and physical abilities.[16] Studies have shown that 30 to 60 minutes of moderate to high-intensity aerobic exercise performed 2–5 days per week, results in a significant reduction in liver fat content.[26]

**Alcohol**

In patients with obesity and diabetes, synergistic effects of insulin resistance and alcohol increase the risk of fibrosis progression, especially with moderate to heavy alcohol use (>20 g/day in women and >30 g/day in men). Hence, alcohol abstinence should be recommended in these patients, especially with clinically significant fibrosis (≥F2).[17]

**Pharmacotherapy in MASLD**

The therapeutic landscape in MASLD is rapidly evolving and although several agents have undergone clinical trials, there is currently no FDA-approved drug for management of MASLD.

**Anti-diabetic agents in MASLD**

Patients with diabetes comprise a particularly high-risk group, with reported prevalence of MASLD and MASH being as high as 55–70% and 30–40%, respectively. On the other hand, nearly half of MASLD patients are diabetic.[27] Due to the close bidirectional relationship, various antidiabetic agents can serve the dual purpose of addressing hyperglycemia as well as MASLD.

**Thiazolidinediones**

Pioglitazone, a PPARã agonist, improves histology and insulin resistance in MASLD. Studies demonstrated that pioglitazone was better than placebo in achieving MASH resolution as well as fibrosis improvement.[28] Potential side effects include weight gain, osteoporosis and risk for worsening heart failure in those with preexisting cardiac dysfunction.

**GLP-1 receptor agonists (GLP-1RAs)**

GLP-1RAs comprise another class of agents that have changed the landscape of diabetes and obesity. In a small study of patients with NASH, liraglutide improved steatosis and reduced fibrosis progression compared with placebo.[29] Semaglutide was reported to improve MASH resolution to a similar degree in people with or without type 2 diabetes.[30] Tirzepatide, a novel dual agonist at GLP-1 and GIP receptors demonstrates weight loss and reduction in liver fat content of 8.1%, suggesting a possible benefit in MASH.[17]

**SGLT-2 inhibitors (SGLT-2i)**

In addition to the management of hyperglycemia, SGLT-2 inhibitors induce 2%–3% weight loss and have cardiorenal protective benefits. SGLT-2 inhibitors may be considered as adjunctive pharmacotherapy for MASLD as they reduce hepatic steatosis by 10-39%.[31] However, their therapeutic impact on hepatic fibrosis requires further studies.

**Non-diabetic agents in MASLD**

Vitamin E

Vitamin E is a strong antioxidant that has been demonstrated to reduce transaminases, steatosis, and inflammation in non-diabetic patients with MASH at doses of 800 IU/day, while having no effect on fibrosis.[32] Vitamin E treatment leads to a drop in serum ALT to ≤40 U/L and ≥30% of baseline values, resulting in improved histological parameters.[33]

**Saroglitazar (Dual PPAR á/ã agonist)**

Recently, Saroglitazar, a dual potent PPAR-á/ã agonist has been recommended to use in MASH with F1–F3 fibrosis and in MASLD with comorbidities (obesity, T2DM, dyslipidemia).[34]

**Upcoming disease-modifying drugs**

Newer drugs that modify the disease pathogenesis are in the pipeline for phase 3 trials in patients with MASH. Examples include obetacholic acid, lanifibranor, aramchol, resmetirom, aldafermin, pegbelfermin.[7]

**Bariatric Surgery**

In addition to sustained weight loss, bariatric surgery significantly reduces the risk of fibrosis progression in obese patients. Hence, bariatric surgery should be considered as an option to treat MASLD patients with a BMI ≥35 kg/m$^2$ (≥32.5 kg/m$^2$ in the Asian population), especially with coexisting T2DM.[16]

However, new or worsening features of MASLD, like fibrosis was reported in 12% of cases after surgery. Caution has to be exercised in patients with advanced fibrosis and cirrhosis due to risk of hepatic decompensation and mortality.[35]

**Optimization of Management of Comorbidities:**

Metabolic risk factors modification is an essential part of comprehensive management to improve long term outcome**.** Statins are safe for CVD risk reduction across the spectrum of MASLD, except in decompensated cirrhosis. For the management of hypertriglyceridemia, omega-3 fatty acids, icosapent ethyl, or fibrates can be helpful. ACE inhibitors/ARBs are preferred first-line agents to optimize hypertension; but has to be avoided in decompensated cirrhosis.[16]

**Monitoring progress and response to treatment**

- Patients without fibrosis can be monitored every 2 or 3 years, in the absence of worsening of metabolic risk
- Patients with fibrosis should be monitored annually
- Patients with cirrhosis should undergo monitoring at 6-month intervals including screening for hepatocellular carcinoma.[7]

**Mortality**

In individuals with MASLD who do not have severe fibrosis, cardiovascular disease and nonhepatic malignancies are the leading causes of death; whereas liver-related mortality predominates in patients with advanced fibrosis. Therefore, screening for hepatocellular carcinoma (HCC) is recommended for patients with MASH -related cirrhosis.[17]

**Conclusion:**

MASLD is a growing epidemic creating an increasing health burden, but still the awareness remains low among patients and clinicians regarding multidisciplinary approach. There is an increasing need to develop simplified clinical algorithms for early diagnosis and management. Identification and early treatment of comorbid conditions like diabetes, dyslipidemia and cardiovascular diseases can significantly improve the prognosis. Currently lifestyle modifications with weight loss are the only effective treatment for MASLD. However, it can be anticipated that novel pharmacological agents will become available soon and transform the current MASH management into a more comprehensive strategy.

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## *CASE REPORT*

# Inflammatory Myofibroblastic Tumor of Greater Omentum – A Rare Cause of Intra-abdominal Lump

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***Abstract***

***Inflammatory myofibroblastic tumors (IMTs) are uncommon mesenchymal tumors. These are seen more in children & young adults. These tumors can occur in any part of the body, like in lung, mesentery and omentum. Clinical presentation depends on the location of the tumor with associated low-grade fever, growth failure, malaise & weight loss. IMTs may be multicentric, have a high local recurrence rate. Usually benign, malignant transformation is very rare and may metastasize in rare cases. These lesions show wide variability in their histopathologic features like inflammatory infiltration, predominantly of plasmatocytes & lymphocytes and occasionally neutrophils & eosinophils. Owing to the rarity of these lesions, there are no specific imaging findings that distinguish IMTs from other mesenteric masses. Complete surgical excision is the treatment of choice. Local recurrences are high and re-excision is preferred.***

***Keywords: Inflammatory myofibroblastic tumors, Inflammatory pseudotumors, Inflammatory fibrosarcomas, Plasma cell granuloma, Mesenchymal tumors***

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**Introduction:**

Inflammatory myofibroblastic tumors (IMTs), also known as inflammatory pseudotumors, inflammatory fibrosarcomas and plasma cell granuloma, are uncommon mesenchymal tumors composed of

myofibroblastic spindle cells admixed with lymphocytes, plasma cells and eosinophils.[1] These are most common in children & young adults.[2] These tumors can occur in any part of the body, most commonly in the lung, mesentery and omentum. Presentation depends upon the location of the tumor. They may also present with associated low-grade fever, growth failure, malaise &weight loss. Patient may be asymptomatic or may present with a painless abdominal lump, or even with only abdominal pain without any palpable lump.[3] IMTs may be multicentric, usually benign and rarely transformed to malignancy. Pre-operative diagnosis is very difficult due to rarity and unusual presentations. Surgery is the treatment of choice.

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**Case Report:**

A 6-year-old girl came to the Surgery outpatient department of Green Life Medical College Hospital with history of recurrent abdominal pain for 2 months. The pain was felt in lower abdomen, of sudden onset, dull aching, moderate in intensity, non-radiating, had no specific aggravating & relieving factor and occurred at recurrent episodes, each episode lasted for 4-5 days. She complained of low-grade intermittent fever, highest peak recorded was $100^0$ F. She also had history of recurrent constipation and increased frequency of micturition with sense of incomplete emptying of bladder.

On abdomen examination, an intraabdominal mass was palpable in the right side of abdomen extending both in right lumbar region and right iliac fossa. The mass was non-tender, 5x5 cm, well-defined, with smooth surface, firm in consistency, and was mobile in all directions. There

was no organomegaly and para- aortic lymph nodes were not palpable.

Ultrasonography of abdomen revealed the presence of a thick walled, well outlined, hazy fluid containing cystic mass measuring about 6cm×5cm in right lower abdomen but did not comment on organ of origin of the mass. CT Scan of Whole Abdomen with Contrast showed a soft tissue mass in the left iliac fossa, with the possible differentials of mesenteric cyst, lymphadenopathy or exophytic gastrointestinal stromal tumor (GIST) arising from bowel loop.

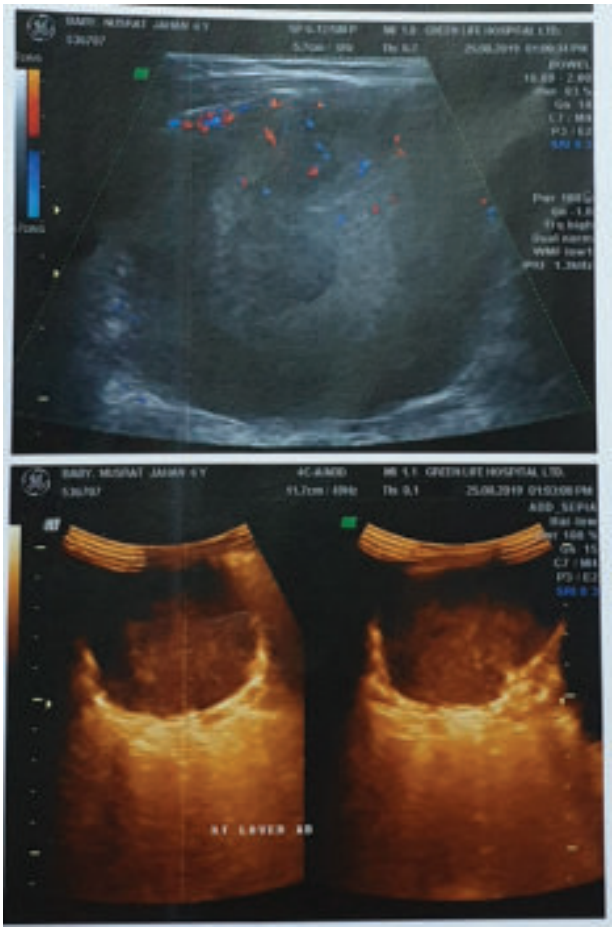

**Fig. 1:** *USG of whole abdomen showing a thick walled, well outlined, hazy fluid containing cystic mass in right lower abdomen*

Exploratory laparotomy was performed under general anesthesia using a midline incision. A solid lump measuring about 6×5cm was found in pelvic cavity attached to greater omentum by a narrow pedicle. It was not adherent to any other surrounding structures. The lump was excised. All abdominal organs were examined and found to be normal.

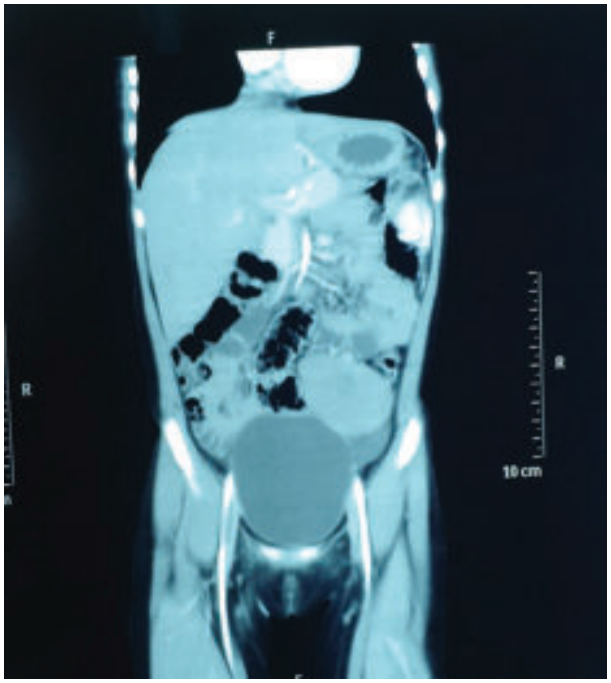


**Fig. 2:** *Contrast-enhanced CT scan of whole abdomen (coronal section) showing soft tissue mass at the left iliac fossa*

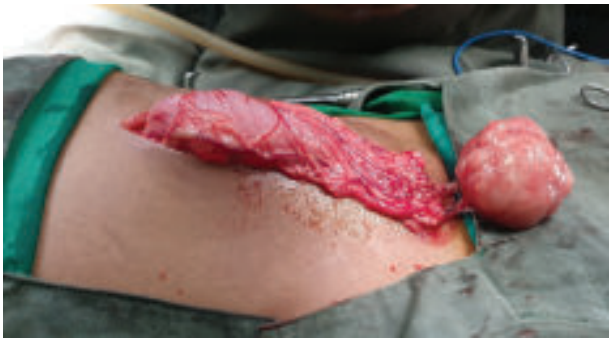

**Fig-3:** *The lump after laparotomy attached to the greater omentum by pedicle*

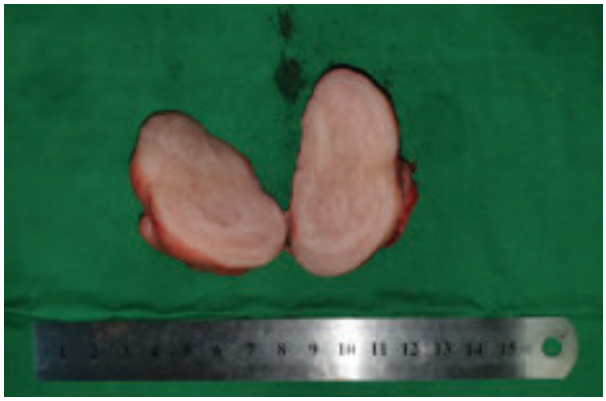

**Fig. 4:** *Cut surface of the tumor showing fleshy and whorled appearance*

Histopathological examination revealed an inflammatory myofibroblastic tumor made of fibroblasts, many lymphoplasmacytic cells and histiocytes in whorled appearance.

The post-operative period was uneventful. Stitches were removed on 9th post-operative day and she was discharged from hospital. She is now on regular followup.

**Discussion:**

Inflammatory myofibroblastic tumors(IMTs)are uncommon mesenchymal tumors composed of myofibroblastic spindle cells admixed with lymphocytes, plasma cells and eosinophils.[1] Previously these were thought to be reactive lesions, but nowadays are considered neoplastic.[1] Though these tumors can occur in any organ, but commonly in the lung, mesentery and omentum. IMTs are common in children & young adults with a mean age of approximately 10 years.[2] The etiology of these tumors is unclear. Presentations depend on the location and size of the tumor. Patient may remain completely asymptomatic or present with a painless abdominal lump, or even with only abdominal pain without any palpable lump.[3] Our patient presented with recurrent abdominal pain and a palpable lower abdominal lump which exerted pressure effect on the urinary bladder & sigmoid colon that lead to features of lower urinary tract symptoms& constipation. Macroscopically these firm tumors show white or yellow colored fleshy appearance on cut section with whorled pattern. The masses may be sessile or polypoid. Microscopically these tumors contain a mixture of inflammatory cells and myofibroblasts, and fibroblasts in fascicles or whorls. Immunostaining is positive for smooth muscle actin (86%), muscle-specific actin (82%), desmin(41%), calponin, cytokeratin (26%), and vimentin, factor XIII A, CD68, CD117 may be present in submesothelial areas of the tumor.[4] Cessna *et al* recommended that immunohistochemistry for anaplastic lymphoma kinase (ALK1) and p80 is useful as an indicator of 2p23 abnormality, but it must be interpreted in the context of histologic and other clinicopathologic data if used as an adjunct to differential diagnosis as anaplastic large-cell lymphoma also expresses the same abnormality.[5] Owing to the rarity of these lesions, there are no specific imaging findings that distinguish IMT from other mesenteric masses such as GISTs, mesenteric fibromatosis, sclerosing mesenteritis, fibrohistiocytic sarcomas, Hodgkin and non-Hodgkin lymphoma, and metastatic carcinoma. Ultrasonography determines the solid nature of the lesion, and contrast-enhanced computed tomography (CT) provides the information regarding the shape, extent of involvement and anatomical relationship to adjacent structures. IMTs may be multicentric with a high local recurrence rate. These are usually benign and malignant transformation is very rare; metastasis is even rarer.[6] Treatment of choice is non-aggressive surgical excision of the tumor. Tothova *et al* and Groenveld *et al* recommended radical excision of the tumor as mainstay of therapy due to high local recurrence rate.[7, 8] Re-excision is the treatment of choice for local recurrence and in several studies the majority of such patients remained disease-free with long-term follow up.[2, 9] Chemotherapy and radiotherapy are reserved for progressive disease after complete excision.

**Conclusion:**

Inflammatory myofibroblastic tumors is a rare tumor. It may present with abdominal pain, mass and pressure effect. Ultrasonography and CT scan are the imaging investigations used to diagnose it. Surgery is the treatment of choice. The patient should be kept follow up to assess recurrence.

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## *COLLEGE NEWS*

# Continuing Medical Education (CME)

***Journal of Green Life Med. Col. 2025; 10(1): 37***

| Date | Topics | Department |
|---|---|---|
| 03.07.2024 | Anaphylaxis; the nightmare | Department of Anaesthesiology |
| 10.07.2024 | Guideline on antibiotic use in common infectious diseases | Department of Medicine |
| 14.08.2024 | Rheumatic fever | Department of Cardiology |
| 21.08.2024 | Title—the structures allow us to breathe | Department of Anatomy |
| 28.08.2024 | There is an exception to every rule (ocular hypertension & normotensive glaucoma) | Department of Ophthalmology |
| 04.09.2024 | The structure allow us to breathe | Department of Anatomy |
| 11.09.2024 | Case based presentation on ectopicgestation: A heart breaking story | Department of Gynae & Obs |
| 18.09.2024 | Mystery behind griping tummy | Department of Surgery |
| 25.09.2024 | Breaking Rabies Boundaries | Department of Community Medicine |
| 09.10.2024 | Prioritise mental health in work place | Department of Psychiatry |
| 16.10.2024 | Management of benign neoplasm of parotid gland | Department of Otolaryngology & HN surgery |
| 23.10.2024 | A 21 year old man presenting with right sided proximal thigh pain | Department of Orthopaedics |
| 30.10.2024 | Understanding speech delay in children | Department of Paediatrics |
| 06.11.2024 | Clinical trial | Department of Pharmacology |
| 13.11.2024 | Diabetes & well being | Department of Endocrinology |
| 20.11.2024 | Carbapenem resistant enterobacterales growing threat to global health | Department of Microbiology |
| 27.11.2024 | Psoriasis | Department of Skin & VD |
| 4.12.2024 | Intravenous fluid therapy in perioperative period | Department of Anesthesiology |
| 11.12.2024 | Damage control resuscitation & damage control surgery in massive obstetric haemorrhage | Department of Gynae & Obs |
| 18.12.2024 | Common brain lesions with headache, visual disturbances and convulsion; their histocytopathologic diagnostic approach | Department of Pathology |

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