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Correspondents
Prof. Dr. Omma Hafsa Any
Professor & Head, Pharmacology & Therapeutics
Army Medical College Jashore
Jashore Cantonment, Jashore, Bangladesh.
Cell : +88 01707-543140
Email: omma.hafsa.anee@gmail.com

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Acknowledgements: Acknowledge only persons who have contributed to the scientific content or provided technical support. Sources of financial support should be mentioned.

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Editorial ***Open Access***

Medical Negligence

Mushtaq Ahmad[1], Farial Naima Rahman[2], Omma Hafsa Any[3]

[1]Professor (Brigadier General) & Principal, Army Medical College Jashore,
[2]Assistant Professor, Department of Forensic Medicine & Toxicology, Army Medical College Jashore,
[3]Professor and Head, Department of Pharmacology & Therapeutics, Army Medical College Jashore.

Medical negligence is an increasing public health concern among healthcare providers worldwide as it affects patient safety. It poses a significant risk of patient injury, disease, disability or death. The WHO has recognized deficiencies in patient safety as a global healthcare issue to be addressed. Negligence is the failure to exercise reasonable care, resulting in harm to another person or their property. It's a legal concept where someone's actions or inactions fall below the standard of care that a reasonably prudent person would exercise in similar circumstances. This failure can lead to legal liability for damages[1].

Medical negligence (also known as medical malpractice, medical errors, tort system) is an increasing public health concern among healthcare providers worldwide. The most comprehensive definition is an act of omission or commission in planning or execution that contributes or could contribute to an unintended result[2,3]. Medical negligence occurs due to the selection of wrong procedure or treatment by physicians or improperly execute the procedure or treatment which harms the patient that the improper treatment causes vital harm to patients and having trouble with a further surgical procedure. The medical practitioners is well aware of what he is using, prescribing, tests and giving prescription under patient socioeconomic status which she/he can afford the medicine and hospital charges[4].

Sometimes in a recognized hospital a good doctormay also do mistake, which may not be intentional mistakes but a medical crime or diligence that destroy /or affect the reputation of doctors[5]. All clinical practitioners and healthcare providers (e.g. physicians, nurses, medical technicians, paramedics, and other healthcare professionals) are responsible for any mistakes that could lead to medical negligence. There are several areas where medical negligence can arise, such as technical errors during surgical procedures, misdiagnosis of the disease, or prescribing the wrong medicine or incorrect dose[6].

The concept of negligence itself can also be broken down into four types of negligence: gross negligence, comparative negligence, contributory negligence, and vicarious negligence or vicarious liability. The 4 C's of medical malpractice-causation, consent, communication, and competence-is essential when evaluating potential medical malpractice claims. Each element plays a crucial role in establishing negligence and determining the validity of a claim.

Five Essential Elements of a Negligence Tort

(1) Duty of Care. Duty of care is a constitutional term that decides if someone is responsible for damages they caused by being careless[7]
(2) Breach of Duty (Standard of case)
(3) Cause in Fact- (a) (Factual Causation), (b) Proximate Cause (Legal Causation)
(4) Damages and Injury

These practices pose a significant risk of patient injury, disease, disability, or death. Subsequently, it may give rise to criminal and financial liabilities on hospitals and healthcare institutions[7,8].

Medical negligence lawsuits are focused on the medical professional's damage, injury or failure to the patient. In general, medical negligence relief is given by means of penalties, i.e. monetary

Correspondence: Brigadier General Professor Mushtaq Ahmad, Principal, Army Medical College Jashore, Bangladesh. Email: mushtaq863@gmail.com
Mobile: 01769555742.

compensation[9,10]. Medical negligence has been recognized for a long time by many researchers from different backgrounds. Several previous studies focused on the economic burden of medical negligence either on clinical practitioners as individuals or healthcare organizations as a management system. However, due to the complicity of this issue, it is not easy to estimate the exact cost of liabilities and compensations on doctors, hospitals, and healthcare organizations[11].

Many previous studies focus on the estimation of annual cost and the financial liabilities on both the public and the private healthcare systems. The cost is not only the direct monetary expense that the doctors must pay but it also includes indirect costs such as physician's time, stress, and loss of reputation[12]. A study by the National Health Service in the United Kingdom estimated that the annual cost is around $1.20 billion[13]. The patient or the claimant has the right to file a lawsuit against clinicians by proving the following: the clinician owes a duty of care, there was a breach of that duty, and that breach caused the injury or damage[14-16].

The Bangladesh Penal Code, 1860 includes provisions for causing death by negligence (Section 304A). Complaints against doctors often involve allegations of rashness or negligence leading to patient harm or death[17].

Section 304A. Whoever causes the death of any person by doing any rash or negligent act not amounting to culpable homicide shall be punished with imprisonment of either description for a term which may extend to 5(five) years, or with fine, or with both.

Section 336 Whoever does any act so rashly or negligently as to endanger human life or the personal safety of others, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to two hundred and fifty taka, or with both.

Section 337: Whoever causes hurt to any person by doing any act so rashly or negligently as to endanger human life, or the personal safety of others shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to five hundred taka, or with both.

Section 338: Whoever causes grievous hurt to any person by doing any act so rashly or negligently as to endanger human life, or the personal safety of others, shall be punished with imprisonment of either description for a term which may extent to two years, or with fine which may extend to 2[five thousand taka], or with both.

In the **Bangladesh Penal Code (BPC), 1860**, Sections 80 and 88 address situations where an act, even if it results in harm, may not be considered an offense due to specific circumstances. Section 80 deals with accidents, stating that an act done without criminal intent or knowledge, in the course of a lawful act, with proper care and caution, is not an offense. Section 88 provides an exception for acts done in good faith for someone's benefit, even if they cause harm, as long as there's no intention to cause death or grievous hurt.

About 16% of 14000 hospitalization cases in Australia resulted in adverse disability due to medical negligence with legal implications. Moreover, doctors and medical professionals face lawsuits due to the cases filed against them due to negligence[18]. A study in Wuhan city in China performed 519 autopsies between 2004 and 2013 to evaluate medical negligence. The study showed that 36.6% of the death cases were due to medical malpractice[7]. Every year, thousands of cases are filed in the courts against healthcare professionals due to tort cases[19]. Despite the high occurrence of these cases, medical negligence is claimed to be under-reported in most healthcare settings[21]. There are many reasons for the limited availability of data related to medical negligence since not all hospitals have a clear policy for reporting every single medical error during routine medical procedures. Moreover, patients suffering from medical negligence may recover from damage and therefore may not be considered a medical negligence case thereafter[21,22].

As a result of criminal and financial liabilities arising due to medical negligence and the increasing demand to improve patient safety and quality care, there is an increased international focus on improving patient outcomes, safety and quality of care that has led stakeholders, policymakers, and healthcare organizations to adopt standardized processes for evaluating healthcare organizations. Hospitals and healthcare organizations are now

adopting standardized processes and an international accreditation system[23]. The accreditation and certification system provide recommended guidelines and international standards to improve healthcare and patient safety in hospitals. The result is certification by an independent external auditor. Despite the national and international strategies for pushing hospitals and healthcare centers to be certified by recognized accreditation bodies, patient safety remains below the acceptable levels. Many studies proved that the effectiveness of such accreditation and certification is limited[24].

Many other researchers argue that there was no convincing evidence on improving output quality and patient safety due to accreditation and certification[25,26]. Nevertheless, it is challenging to provide consistent solutions to eliminate or minimize recurrent events and work toward improving patient safety[27]. It is essential that the governing bodies for the healthcare system should enforce hospitals to establish a litigation system by providing guidelines and steps to resolve the matter either by out of court settlement or a full court trial. This system should include effective policy and procedure to ensure high standards of effectiveness, transparency, and justice for all the involved parties[28].

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Original Article ***Open Access***

Histomorphological Pattern of Different Type of Breast Lesion in a Medical College Hospital in Bangladesh.

Karim S. N[1], Sarkar P[2], Amin A.M.M.A[3], Begum A[4], Parven M[5], Haque S. D[6], Khaliduzzaman F. M.[7], Rahman M M[8]

[1]Dr. Syeda Noorjahan Karim, Associate Professor of Pathology, Gazi Medical College, Khulna, [2]Dr. Purabi Sarker, Associate Professor and Head, Department of Pathology, Ad-din Akij Medical College, Khulna, [3]Dr. Abu Md. Mayeenuddin Al Amin, Associate Professor, Department of Microbiology, Gazi Medical College, Khulna, [4]Dr. Arifa Begum, Associate Professor, Department of Physiology, Gazi Medical College, Khulna, [5]Dr. Mukta Parven, Associate Professor, Department of Biochemistry, Gazi Medical College, Khulna, [6]Dr. Syed Didarul Haque, Associate Professor, Department of Pharmacology, Gazi Medical College, Khulna, [7]Dr. F. M. Khaliduzzaman, Assistant Professor, Department of Pathology, Gazi Medical College, Khulna, [8]Dr. Md. Moshiur Rahman, Associate Professor, Department of Anatomy, Ad-din Akij Medical College, Khulna.

Background: Presence of lump in the breast causes anxiety and apprehension in every woman. This anxiety and fear are associated with increased awareness of breast cancer. It has significantly improved the health seeking behavior of patients with breast lumps. **Aim:** The aim of the study was to observe and analyze the diverse histomorphological features of palpable breast lump. **Methodology:** This cross-sectional study was carried out at the Department of Pathology, Gazi Medical College, Khulna; from October 2021 to September 2022. In this study fifty-eight (58) samples of breast lumps were collected. The specimens were received in different form. processed and stained with hematoxylin and eosin. After staining all the slides were thoroughly examined under light microscope stains to confirm the diagnosis as well as to evaluate histopathologic characteristics. The data was tabulated and statistical analysis was performed. **Results:** Out of 58 cases 44 (75.9%) samples belonged to age 21-50 years and mean age was 34.22±12.09years. The right breast (53.4%) was found affected more than left breast and most of the lesions were in upper and outer quadrant (51.7%). Histologically, most common lesion was fibroadenoma (29.3%), followed by ductal carcinoma (13.8%). A strong positive correlation ((r = 0.511, p = 0.000)) was found between the age and the histological study. A significant positive correlation between the size of the tumor with the histological diagnosis (r = 0.596, p = 0.000) was also revealed in this study. A significant but weak correlation (r = 0.330, p = 0.013) was found between the consistency of the tumor with their histological diagnosis. No significant correlation was found between the quadrant, laterality, mobility and the histological study of the tumor. **Conclusion:** Histopathological study plays very important role in the diagnosis, treatment and prognosis of breast lesions. All breast lesions should be seriously examined. This study highlighted the distinct incidences and pathological characteristics of wide range of breast diseases.

Keyword: Breast lesion, histopathology, fibroadenoma, ductal carcinoma

Introduction:

Breast is a modified sweat gland that exhibits a wide spectrum of pathological lesions, usually presenting as palpable masses ranging from inflammatory, non-inflammatory, neoplastic and non- neoplastic lesions[1,2]. About 200,000 cases of breast disease diagnosed every year worldwide[3]. Breast disease

Corresponding Author: Dr. Syeda Noorjahan Karim, Associate Professor, Department of Pathology, Gazi Medical College, Khulna.
Email: noorjahanska@gmail.com, Contact: +8801676110315
ORCID ID: 0009-0009-9339-8524

patterns and their causes vary between different countries and ethnic groups[4]. Breast cancer is one of the most common causes of cancer related deaths among women globally[5]. Reduction of deaths from breast cancer is currently a top health care priority and an important path of achieving this goal is early detection of disease[6].

Most of the countries have now adopted triple assessment approach in diagnosing breast disease. This comprises clinical, radiological and pathological assessment. It remains an excellent tool in the assessment of palpable breast lump. It's diagnostic accuracy exceeds 99% if all three modalities are concordant[7].

Advances in imaging techniques and increased use of fine needle aspiration cytology have greatly assisted the pre-operative evaluation of breast lesion. However, in a large proportion of cases differentiation between benign and malignant breast lesions still rest on histopathologic examination[8]. Therefore, histopathology plays an important role in the diagnosis of breast lesions. Histopathological patterns of breast lesions are the main criteria to assess the adequacy of treatment modalities and are a necessary component in the diagnosis, treatment and prognosis of breast lesions[9].

Therefore, this study was aimed to analyze the histopathological spectrum of various breast lesions.

Materials and Methods:
This was a cross sectional observational study carried out at the Department of Pathology, Gazi Medical College, Khulna; from November 2021 to October 2022. The sample size was 58. The study population was all the samples of breast lump received in the Department of Pathology of Gazi Medical College during specified time duration.

Inclusion criteria:
1. Patients with palpable breast lump.
2. Patients who gave written informed consent.
3. Patients who had undergone surgery

Exclusion criteria:
1. Patients who received chemotherapy or radiation therapy for breast carcinoma.
2. Patients who didn't give consent
3. Male patients.

All these specimens were sectioned, stained and studied in Department of Pathology, Gazi Medical College, Khulna.

All samples were fixed in 10% formalin and kept for overnight fixation. Next day, the tissues were examined during grossing and were embedded accordingly. Tissue processing was performed manually following standard protocol for paraffin embedding. The paraffin blocks were sectioned with a rotary manual microtome at 5 micrometer thickness. From each paraffin block tissue sections were taken on glass slides. After deparaffinization with xylene the slides were rehydrated with decreasing graded alcohol. Then slides were stained with routine Hematoxylin and Eosin (H&E) stain. Slides of all cases were examined thoroughly to confirm the diagnosis and to evaluate histopathologic characteristics. In case of carcinoma of breast, evaluation of type of tumor, histologic grade of tumor, presence of lympho-vascular invasion, perineural invasion, fat invasion and presence of necrosis were done. Tumors were graded as well, moderate and poorly differentiated carcinoma. Pathologic staging was done according to TNM staging system.

Data Analysis:
After compilation, the data was presented in the form of tables. Statistical analysis was done by using computer based statistical software, SPSS 24.0 version (SPSS Inc, Chicago, IL, USA). Results were shown as table and expressed as frequency & percentage for qualitative data and mean ± SD for quantitative data. A 'p-value <0.05 was considered statistically significant.

Results:
This cross-sectional study was aimed to assess the histopathological spectrum of various breast lesions. In this study age of the patients varied from 13-61. Out of 58 cases 44 (75.9%) samples belonged to age 21-50 years and mean age was 34.22±12.09 years **(Table 01)**. The right breast (53.4%) was found

affected more than left breast. In 1.7% cases both breasts were found involved **(Table 02)**. Most of the lesions were in upper and outer quadrant (51.7%) **(Table 03)**. Histologically, most common lesion was fibroadenoma (29.3%), followed by ductal carcinoma (13.8%). In the present study, only 1 patient diagnosed as lobular carcinoma (1.7%). Most of the patient diagnosed as benign breast lesion are aged between 20-40 years and no malignant case was found below 40 years. **(Table 01)**. A strong positive correlation (r = 0.511, p = 0.000) was found between the age and the histological study **(Fig 1)**. A significant positive correlation between the size of the tumor with the histological diagnosis (r = 0.596, p = 0.000) was revealed in this study **(Fig 2)**. A significant but weak correlation (r = 0.330, p = 0.013) was found between the consistency of the tumor with their histological diagnosis **(Fig 3)**. No significant correlation was found between the quadrant, laterality, mobility and the histological study of the tumor.

Tables

Table 1: Distribution of patients according to histological diagnosis and age group

Histologicalstudy	Agegroup			Total
	1-20 years	21-50 years	51 years or more	
Fibroadenoma (FA)	5	8	0	13
Fibrocystic change (FCC)	0	4	1	5
Fibroadenoma with Fibrocystic change (FA with FCC)	3	5	0	8
Benign lesion compatible with lipoma	0	5	0	5
Inflamed epidermal inclusion cyst	0	1	0	1
Granulomatous Mastitis (GM)	0	5	0	5
Compatible with abscess	0	3	0	3
Inflammatory lesion, suggestive of fat necrosis	0	1	0	1
Ductal Epithelial hyperplasia with focal atypia	0	1	1	2
Intraductal papilloma with fibrocystic change	0	1	0	1
Tubular adenoma	1	0	0	1
Invasive Ductal Carcinoma (IDC)	0	8	3	11
Lactational Adenoma	0	1	0	1
Invasive Lobular carcinoma (ILC)	0	1	0	1
Total	9	44	5	58

Table 2: Distribution of patients according to laterality

	Frequency	Percent
Right	31	53.4
Left	26	44.8
Bilateral	1	1.7
Total	58	100.0

Table 3: Distribution of patients according to site

	Frequency	Percent
Upper & outer	30	51.7
Upper & inner	12	20.7
Lower & outer	3	5.2
Lower & inner	4	6.9
Central	6	10.3
Multiple	3	5.2
Total	58	100.0

Figures

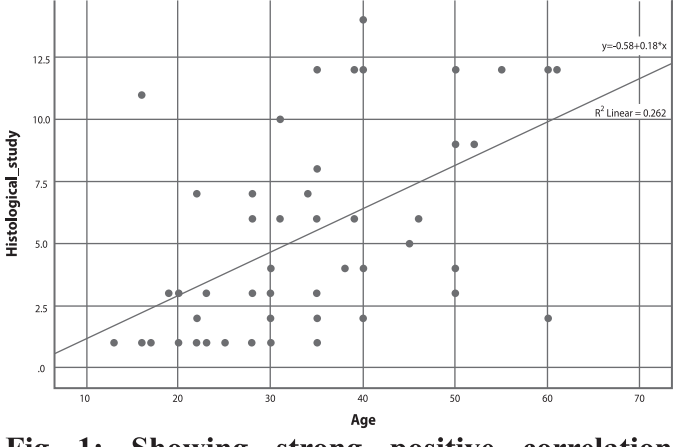

Fig 1: Showing strong positive correlation between age and histological diagnosis.

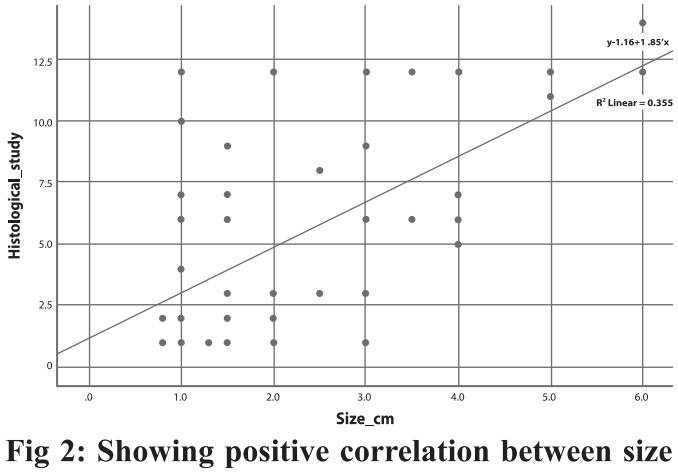

Fig 2: Showing positive correlation between size and histological diagnosis.

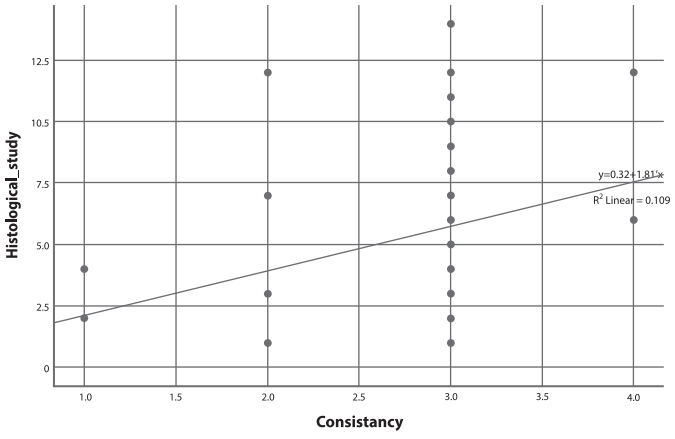

Fig 3: Showing weak but positive correlation between consistency and histological diagnosis

Discussion:

The breast tissue consists of specialized epithelial cells and stroma. The breast is a site of a broad array of pathological alterations. Breast lesions are extremely heterogeneous that consist of several entities with remarkably different characteristic features. Both benign and malignant lesions can occur in the breast. Histopathology plays an important role in the diagnosis of these lesions[9].

In the current study age of the patients varied from 13-61 years. Most of the patients (75.9%) were between 21-50 years with a mean age was 34.22±12.09years. Some other study showed similar type of results. Kumbhakar et al. reported that most of the patients of their study were between 21-40years[10]. Bhargava et al. found most of the patients are in the age group 25-40 years[11]. These age differences may be due to different place of study and different sample size.

In the present study 53.4% patients had right breast lesion and 44.8% patient had left breast lesion. In 1.7% cases both breasts were found involved. Parappurath et al. also reported that right breast (50.6%) was more affected than left[12]. In their study, Chalya et al. also reported right breast (53.8%) was more affected than left one[13]. Sangma et al also showed increased percentage of right breast involvement[14].

In this study most of the patient had lesions in upper and outer quadrant (51.7%) followed by upper inner (20.7%), central (10.3%), lower inner (6.9%), lower outer (5.2%) and multiple quadrant (5.2%). Ramesh et al. showed majority of breast lumps (60 %) were located in the upper outer quadrant followed by lower inner (20%) cases, lower outer quadrant (12%) cases and the least number of cases was in the upper inner quadrant (8%)[15]. In their study, Parappurath et al. also reported that majority of the lesions were in upper and outer quadrant (45%)[12].

Regarding histopathological diagnosis, most common lesion was fibroadenoma (29.3%), followed by ductal carcinoma (13.8%). In the present study, only 1 patient diagnosed as lobular carcinoma (1.7%).The other lesions were FA with FCC (13.8%), Granulomatous mastitis (8.6%), lipoma (8.6%), resolving abscess (5.2%), ductal epithelial hyperplasia with atypia (3.4%), fat necrosis (1.7%), intraductal papilloma (1.7%), lactational adenoma (1.7%), Tubular adenoma (1.7%), Epidermal inclusion cyst (1.7%). A group of authors reported Fibroadenoma (n=136) and fibrocystic changes (n = 38) were the most frequently diagnosed benign breast lesions whereas ductal carcinoma (n = 68) was the most frequently diagnosed malignant breast lesion. Other frequently diagnosed breast lesions included gynecomastia (n=33), galactocele (n = 12), intraductal papilloma (n = 12) and fat necrosis (n=12)[16]. Another group of authors showed Fibroadenoma was the most common benign breast disease, seen in 50% of patients, followed by breast abscess (12%), Mastalgia (11%), fibrocystic disease (8%), duct ectasia (7%), duct papilloma (4.0%), cellulitis (3.0%) and antibioma (2.0%). Phylloides tumor, galactocoele and accessory breast, each, was seen in 1.0% of patients[11]. May be these discrepancies are due to different sample size.

In this study, most of the breast lesion were found within reproductive age group. Patient with breast lump who presented below 40 years of age, usually had benign lesions. Malignancy is more common above 50 years and no malignancy were detected below 40 years. This result is highly significant. It implies that, there might be less chance of occurring breast carcinoma below 40 years. Some authors also showed similar result. Bukhari et al reported most of benign lesion in third and fourth decade and malignancy in fifth and sixth decade[17]. Bhargava et al showed most of the benign lesion were between 13-40 years of age[11].

In the present study, a significant positive correlation was found between the tumor size and the histological study. A significant but weak positive correlation was found between the tumorconsistency and the histological study. No significant correlation was found between the involved quadrant, laterality, mobility and the histological study of the tumor.

Conclusion:
In recent years, breast lesions have gained increased importance and global attention due to the increased mortality and morbidity associated with breast cancer. Histopathological examination plays an important role differentiating between benign and malignant lesions. In the present study the most common benign breast lesion was found fibroadenoma and the most common malignant lesion was invasive ductal carcinoma. The peak incidence of malignant lesion was seen above 40 years of age.

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Authors' Contributions :
Karim S N designed and drafted the study, collected and analyzed the data, interpreted the results, completed literature review and wrote up the draft manuscript. Sarkar P, Amin AMMA, Begum A, Parven M, Haque S D, Khaliduzzaman F M and Rahman MM. were involved in data collection, the manuscript review and editing. All authors read, gave the final critical review of the manuscript and approved it.

Data Availability:
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethical Approval and Consent to Participate:
Ethical approval for the study was obtained from the Institutional Review Board. The written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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Original Article ***Open Access***

Patient Satisfaction in a Tertiary Level Hospital in Bangladesh: A Cross-Sectional Study

Md. Kamrul Hassan[1], Md Inamul Islam[2], Md Nazmul Haque[3], Mushtaq Ahmad[4], AHM Kazi Mostofa Kamal[5], Md Almasul Islam[6]

[1](Major) Classified specialist & Head, Department of Psychiatry, Combined Military Hospital, Jashore and Assistant Professor of Psychiatry, Army Medical College, Jashore, [2](Major) Graded Specialist in Psychiatry, BNS Upasham, Khulna, [3](Brigadier General) Commandant, Combined Military Hospital, Jashore, [4]Professor (Brigadier General) & Principal, Army Medical College Jashore, [5](Brigadier General) Adviser Specialist in Psychiatry, Combined Military Hospital, Dhaka, [6](Colonel) Classified Specialist Ophthalmology & Deputy Commandant, Combined Military Hospital, Jashore.

Abstract

Background: Patient satisfaction serves as a fundamental metric for evaluating healthcare quality and service delivery in hospital settings. **Objective:** This study aimed to assess patient satisfaction levels at Combined Military Hospital (CMH) in Jashore, Bangladesh, a major tertiary care facility serving both military personnel and civilian populations. **Methodology:** Using a cross-sectional study design, we surveyed 100 patients across outpatient and inpatient departments through semi-structured questionnaires. **Results:** The results indicated an overall satisfaction rate of 68%, with particularly positive feedback regarding doctor-patient communication (75% satisfaction) and hospital cleanliness (72% satisfaction). However, significant areas of concern emerged, including prolonged waiting times (45% dissatisfaction) and administrative inefficiencies (38% dissatisfaction). **Conclusion:** These findings suggest that while clinical care standards remain strong, operational improvements in patient flow and administrative processes could substantially enhance the patient experience at this institution.

Keywords: Patient satisfaction, tertiary care, Combined Military Hospital, Bangladesh, healthcare quality.

Introduction:

Patient satisfaction has become an increasingly important indicator of healthcare quality and service delivery in modern medical practice. As emphasized by Cleary and McNeil, satisfied patients demonstrate better treatment adherence and health outcomes while also contributing to a positive institutional reputation[1]. In the context of Bangladesh's healthcare system, tertiary hospitals face unique challenges in maintaining patient satisfaction due to high patient volumes and resource constraints[2]. Patient satisfaction is a multi-dimensional healthcare issue affected by many factors. Healthcare quality affects patient satisfaction and results in positive influences on patient behaviour such as confidence in hospital care[3]. This underscores the importance of assessing diverse service dimensions to improve healthcare delivery, especially in high-volume tertiary settings. CMH Jashore serves as a crucial healthcare provider for both military personnel and civilians in south-western Bangladesh, making the assessment of patient experiences particularly valuable for quality improvement initiatives. This study builds upon previous works by Ware and Hays[4] while focusing specifically on the performance metrics of a military-affiliated tertiary care center in a developing nation context[5].

Corresponding Author: Major Md. Kamrul Hassan,Classified specialist & Head, Department of Psychiatry, Combined Military Hospital, Jashore. Mobile: 01769552948, Email: Khassan1461@gmail.com

Methods and Materials

Study Design and Setting

The investigation employed a cross-sectional study design conducted at Combined Military Hospital (CMH) in Jashore, Bangladesh, between October and December 2024 as a major tertiary care facility serving the Jashoreregion. CMH provided an ideal setting to examine patient satisfaction across various service dimensions[6].

Study Population and Sampling

The study enrolled 100 consecutive patients through convenience sampling from outpatient and inpatient departments. Inclusion criteria comprised adult patients (aged >18 years) receiving care at the facility, willing to participate with informed consent, while exclusion criteria applied to critically ill patients and those unable or unwilling to consent. The sample size was based on similar patient satisfaction studies conducted in comparable healthcare settings[7].

Data Collection Instrument

A semi-structured questionnaire adapted from validated patient satisfaction tools[4], collected data on four domains:

Table 1: Questionnaire Domains and Assessment Criteria

Domain	Assessment Parameters	Response Scale
Waiting Time	OPD waiting duration, consultation waiting time	5-point Likert scale (1 = Very Dissatisfied to 5 = Very Satisfied)
Doctor-Patient Interaction	Communication clarity, empathy and examination thoroughness	5-point Likert scale (1 = Very Dissatisfied to 5 = Very Satisfied)
Facility Cleanliness	Ward cleanliness, toilet hygiene, and general maintenance	5-point Likert scale (1 = Very Dissatisfied to 5 = Very Satisfied)
Administrative Services	Registration efficiency, billing clarity, and staff courtesy	5-point Likert scale (1 = Very Dissatisfied to 5 = Very Satisfied)

Table 1 outlines the four main domains targeted by the questionnaire to measure patient satisfaction comprehensively. Each domain addresses specific facets of the hospital experience that influence how patients perceive the quality of care.

- The **Waiting Time** domain assesses how long patients wait in the outpatient department and the length of time they wait for consultation. It reflects operational efficiency and influences overall patient satisfaction significantly, especially in busy healthcare facilities[8].
- The **Doctor-Patient Interaction** domain evaluates essential aspects of clinical care, such as how clearly doctors communicate, the empathy they show toward patients, and how thoroughly they conduct examinations. This domain captures relational and professional qualities that profoundly affect patients' comfort and trust in their caregivers[6].
- The **Facility Cleanliness** domain measures hygiene standards related to ward cleanliness, toilet hygiene, and general maintenance. Clean and well-maintained facilities are crucial for patient safety, infection control, and the overall impression of care quality[9].
- Finally, the **Administrative Services** domain includes patients' perceptions of registration efficiency, clarity in billing processes, and staff courtesy. These factors affect how smoothly patients navigate the hospital system and their overall experience beyond clinical care[7].

Each domain uses a Likert scale rating from 1 to 5, allowing patients to express varying degrees of satisfaction or dissatisfaction. This approach aligns with widely validated patient satisfaction assessment tools internationally, ensuring a systematic and multi-dimensional evaluation of healthcare service quality[4].

Data Collection Procedure

Trained research assistants administered the questionnaires through face-to-face interviews following patient consultations or hospital discharge. The data collection process maintained strict confidentiality and anonymity protocols in accordance with ethical guidelines.

Statistical Analysis

Collected data underwent comprehensive analysis using SPSS version 26. Descriptive statistics, including means, percentages, and standard deviations, characterized satisfaction levels across domains. Chi-square tests examined associations

between demographic variables and satisfaction scores, with p-values <0.05 considered statistically significant.

Results:

Demographic Characteristics

The study population comprised 55% male and 45% female respondents, with a mean age of 38.2 years (SD±12.4). Educational attainment varied significantly among participants, with 35% having completed secondary education, 28% holding graduate degrees, and 22% reporting primary education only.

Table 2: Demographic Profile of Study Participants (n=100)

Characteristic	Category	Frequency (%)
Gender	Male	55
	Female	45
Age Group	18-30 years	28
	31-45 years	34
	46-60 years	27
	>60 years	11
Education Level	Primary	22
	Secondary	35
	Graduate	28
	Postgraduate	15

Patient Satisfaction Outcomes

Analysis revealed varying satisfaction levels across different hospital service dimensions. The highest satisfaction scores emerged for doctor-patient communication (mean score 4.2/5) and facility cleanliness (mean score 4.1/5). Conversely, waiting times received the lowest ratings (mean score 2.8/5), with 45% of respondents expressing dissatisfaction.

Table 3: Patient Satisfaction Scores by Domain

Service Domain	Mean Score (SD)	Satisfied (%)	Neutral (%)	Dissatisfied (%)
Waiting Time	2.8 (±1.2)	28	27	45
Doctor Communication	4.2 (±0.8)	75	15	10
Cleanliness	4.1 (±0.9)	72	20	8
Administrative Services	3.5 (±1.1)	50	12	38

Discussion

This study provides important insights into patient satisfaction at a military-affiliated tertiary care hospital in Bangladesh, contributing to the broader understanding of healthcare quality in resource-limited settings. Our findings align with global literature demonstrating that doctor-patient communication is one of the strongest predictors of overall patient satisfaction[8,10]. Effective communication fosters trust, encourages adherence to treatment, and significantly enhances patients' perceptions of care quality[11]. The high ratings for clinical interactions at CMH Jashore may also reflect the structured training and disciplined protocols characteristic of military healthcare systems[12].

However, dissatisfaction with waiting times remains a significant concern. The 45% dissatisfaction level found here is consistent with findings from other regional studies in South Asia and reflects systemic inefficiencies often reported in high-volume facilities[7,13]. Excessive waiting time detracts from patient satisfaction and may lead to poorer health outcomes if patients forgo or delay care8. Addressing operational bottlenecks through mechanisms such as digital queue management systems could substantially enhance patient flow and satisfaction[14].

Administrative services showed moderate satisfaction (50%), indicating room for improvement, particularly in registration efficiency, billing transparency, and staff courtesy. This echoes issues highlighted by Ahmed etal. and Ali etal. regarding bureaucratic and resource constraints within Bangladeshi healthcare facilities[2,3]. Otani et al. suggest that hospital culture and administrative practices have a direct impact on patient perceptions, emphasising the need for organisational reforms to enhance service experiences[15].

The high satisfaction with facility cleanliness (72%) may be attributable to the disciplined maintenance standards in military hospitals, which often outperform public counterparts in this domain[9]. Physical environment factors, including cleanliness, accessibility, and safety, are critical to patient

comfort and confidence, as supported by Smith et al[16].

Additionally, the age-related differences in satisfaction scores, with younger patients reporting lower satisfaction across domains, align with research indicating that demographic factors such as age and education influence expectations and perceptions of care[7,16]. This suggests that healthcare providers should consider tailored approaches that address varying patient needs and expectations.

Building on foundational work by Ware and Hays and Cleary and McNeil, this study reinforces that patient satisfaction is a multi-dimensional construct influenced by clinical care, operational effectiveness, and interpersonal interactions[1,4]. Future quality improvement initiatives should adopt a comprehensive approach combining staff training, process re-engineering, and enhanced communication strategies to sustainably improve patient experiences in tertiary care hospitals.

Conclusion

This comprehensive assessment of patient satisfaction reveals several strengths in clinical service delivery alongside operational challenges. While doctor-patient communication and facility cleanliness meet high standards, prolonged waiting times and administrative inefficiencies diminish the overall patient experience. These findings suggest targeted interventions such as digital queue management systems, staff training programs, and process re-engineering could substantially enhance service quality. Future research should explore longitudinal satisfaction trends and evaluate the impact of specific quality improvement initiatives.

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Authors' Contributions:

Hassan MK designed and drafted the study, collected and analyzed the data, interpreted the results, completed literature review and wrote up the draft manuscript. Islam MI, Haque MN, Ahmad M, Kamal AHMM and Islam were involved in data collection, the manuscript review and editing. All authors read, gave the final critical review of the manuscript and approved it.

Data Availability:

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

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Original Article ***Open Access***

Socio Demographic Profile and Smoking Habit of Population in Selected Unions of Dhamrai Upazilla, Dhaka.

Farial Naima Rahman[1], Mushtaq Ahmad[2], Mohammad Ali[3], Tumpa Siddique[4]

[1]Assistant Professor, Department of Forensic Medicine & Toxicology, Army Medical College Jashore, [2]Professor (Brigadier General) & Principal, Army Medical College Jashore, [3]Professor (Brigadier General) & Former Head, Department of Community Medicine & Public Health, Armed Forces Medical College Dhaka, [4]Lecturer, Department of Community Medicine& Public Health, Armed Forces Medical College Dhaka.

Abstract

Background: Smoking is known to be a prominent public health problem, which can lead to significant morbidity and mortality but could totally be abolished by preventive measures. Young adults mostly become the victims of this lethal habit when they gain a certain degree of socializing independence and relatively more chances of mingling among friend circles. **Objective:** To assess socio demographic profile and smoking habit among populationin a selective rural setting. **Methodology:** The cross-sectional study was conducted over 4 months (November 2023 to February 2024) among 272 residents of Dhamrai, Sombagh and Sutiparaunion under DhamraiUpazilla in Dhaka district. Participants were selected by convenient sampling technique; data were collected by face-to-face interviewing with a semi-structured pretested questionnaire to assess socio-demographic characteristics, knowledge, attitude and exposure to smoking. Data were analyzed by SPSS software. **Results:** Out of 272 respondents 92.28% were male, maximum 97(35.66%) belonged to age group 26-35 years, followed by 15-25 years 87(31.98%). Most of the smokers 245(90.07%) were Muslim and maximum had their educational qualification upto secondary level 69(25.37%) followed by 62(22.79%) higher secondary level and 49(18.01%) illiterate. Regarding occupation 112(41.17%) student, 43(15.85%) day labour, 39(14.33%) were business man. Considering financial status 126(46.32%) belonged to lower middle class and most 177(65.07%) of the respondents were married. Maximum respondents 238(87.50%) knew that smoking causes harmful disease like cancer, 220(80.88%) admit that smoking is financial burden to family, maximum 226(83.09%) had cough, 124(45.59%) suffered from respiratory tract infection, 95(34.93%) had chest problem, maximum smokers 127(46.69%) started smoking due to influence of friends, 78(28.68%) from influence of family members. Most of the smokers 109(40.07%) smoke in public places/ market, 72(26.47%) in restaurant or tea stall, and majority of the smokers 166(61.02%) smoke cigarette, 68(25%) prefer biri, 21(7.72%) smoke in Hukka and 17(6.25%) chew raw tobacco. **Conclusion:** Awareness should be raised through national wide educational program to reduce the habit of smoking.

Keywords: Socio demographic profile, habit, smoking.

Introduction:

Smoking is known to be a prominent public health problem, which can lead to significant morbidity and mortality but could totally be abolished by preventive measures. The range of morbidity and mortality involves almost all the major organs of the human body[1]. Estimated death toll from smoking only is around millions per year and if the trend of smoking continues on the same pace, it is likely to cross eight million deaths by 2030[2]. Bangladesh is one of the most populous countries in the 'world.'

Corresponding Author: Farial Naima Rahman, Assistant Professor, Department of Forensic Medicine & Toxicology, Army Medical College Jashore. Mobile: 01715287927. Email: niparahman1977@yahoo.com

About 35.3% (37.8 million adult) of Bangladesh's total population, are tobacco users. According to the Global Adult Tobacco Survey (GATS), the prevalence of smoking increased with decreasing socioeconomic status in Bangladesh[3-4]. Tobacco use is one of the leading risk factors for several non-communicable diseases. More than 5 million deaths world-wide can be attributed to direct tobacco use[5]. There is a great chance for a non-smoker to be away from this dangerous addiction if they are provided a smoking free environment in their teaching institutions[6].

Objective:

This study was performed to assess socio demographic profile and smoking habit among populationin a selective rural setting of Bangladesh.

Materials and Method:

The descriptive cross-sectional study was conducted over 4 months (November 2023 to February 2024) among 272 residents of Dhamrai, Sombagh and Sutipara union under Dhamrai Upazilla in Dhaka district. Participants were selected by convenient sampling technique; data were collected by face-to-face interviewing with a semi-structured pre tested questionnaire to assess socio-demographic characteristics, knowledge, attitude and exposure to smoking. Written informed consent was taken from the participants and unwilling persons were discarded. Data were analyzed by SPSS software.

Result:

Table-1 showed among the 272 respondents most 251(92.28%) were male and 21(7.72%) female. Maximum 97(35.66%) belonged to age group 26-35 years, followed by 15-25 years 87(31.98%). Most of the smokers245(90.07%) were Muslim and maximum had their educational qualification uptosecondary level 69(25.37%) followed by 62(22.79%), higher secondary 55(20.00%) primary and 49(18.01%) illiterate. Regarding occupation 112(41.17%) student, 43(15.81%) day labour, 39(14.33%) were business man. Considering financial status 126(46.32%) belonged to lower middle class and 129(47.43%) lower class. Most 177(65.07%) of the respondents were married.

Table-1

Distribution of smokers as per demographic characteristics. (n= 272)

Demographic characters	(n= 272)	Total	Male	Female
Gender		272(100%)	251(92.28%)	21(7.72%)
Age group	15-25 years	87(31.98%)	82(30.14%)	5(1.84%)
	26-35 years	97(35.66%)	89(32.72%)	8(2.94%)
	36- 45 years	47(17.28%)	43(15.81%)	4(1.47%)
	46--55 years	26(9.56%)	23(8.46%)	3(1.10%)
	More than 55 years	15(5.51%)	14(5.15%)	1(0.36%)
Religion	Muslim	245(90.07%)	226(83.09%)	19(6.98%)
	Hindu	23(8.45%)	21(7.72%)	2(0.74%)
	Buddhist	3(1.10%)	3(1.10%)	0(0%)
	Christian	1(0.36%)	1(0.36%)	0(0%)
Education completed	Illiterate	49(18.01%)	41(15.07%)	8(2.29%)
	Primary	55(20.22%)	49(18.01%)	6(2.20%)
	Secondary	69(25.37%)	65(23.90%)	4(1.47%)
	Higher secondary	62(22.79%)	59(21.69%)	3(1.10%)
	Graduate	37(13.60%)	37(13.60%)	0(0%)
Occupation	Student	112(41.17%)	111(40.80%)	1(0.36%)
	Service holder	32(11.76%)	30(11.02%)	2(0.73%)
	Business man	39(14.33%)	39(14.33%)	0(0%)
	Driver	17(6.25%)	17(6.25%)	0(0%)
	Technician	15(5.51%)	15(5.51%)	0(0%)
	Day labour	43(15.81%)	39(14.38%)	4(1.47%)
	House wife	14(5.14%)	0(0%)	14(5.14%)
Financial status	Lower class	129(47.43%)	115(42.28%)	14(5.14%)
	Lower middle class	126(46.32%)	122(44.85%)	4(1.47%)
	Upper middle class	14(5.14%)	11(4.04%)	3(1.10%)
	Upper class	3(1.10%)	3(1.10%)	0(0%)
Marital status	Married	177(65.07%)	15(5.51%)	20(7.35%)
	Unmarried	95(34.93%)	94(34.56%)	1(0.36%)

Table-2 showed among the 272 respondents 238(87.50%) knew that smoking causes harmful disease like cancer, 220(80.88%) admit that smoking is financial burden to family, 181(66.54%) are aware of that Government has ban on smoking in public place and 140(51.47%) know life span reduces due to smoking.

Table-2

Distribution of smokers as per knowledge about

effect of smoking(n= 272)

Knowledge regarding effect of smoking	Total (n= 272)	Male 251(92.28%)	Female 21(7.72%)
Causes harmful disease like cancer	238(87.50%)	224(8.23%)	14(5.15%)
Passive smoking also dangerous	39(14.34%)	37(13.60%)	2(0.74%)
Life span reduces due to smoking	140(51.47%)	129(47.43%)	11(4.04%)
Government ban on smoking in public place	181(66.54%)	178(65.44%)	3(1.10%)
Financial burden to family	220(80.88%)	201(73.90%)	19(6.98%)
Attempt to quit smoking	74(27.21%)	69(25.37%)	5(1.84%)

Table-3 showed among the 272 respondents maximum 226(83.09%) had cough, 124(45.59%) suffered from respiratory tract infection, 95(34.93%) had chest problem, 87(31.98%) had sore throat, 89(32.72%) had peptic ulcer and 106(38.97%) had various other problems.

Table-3
Distribution of smokers as per health problem of participants related to smoking (n=272)

Health problem of participants related to smoking NB: single smoker suffer from multiple types of health problem	Total (n= 272)	Male 251(92.28%)	Female 21(7.72%)
Cough	226(83.09%)	211(77.57%)	15(5.51%)
chest pain	95(34.93%)	88(32.35%)	7(2.57%)
Sore throat	87(31.98%)	76(27.94%)	11(4.04%)
Breathing problem	81(29.78%)	69(25.37%)	12(4.41%)
Respiratory tract infection	124(45.59%)	115(42.28%)	9(3.31%)
Peptic ulcer	89(32.72%)	83(30.53%)	6(2.21%)
Hypertension	61(22.43%)	57(20.96%)	4(1.47%)
Other problem	106(38.97%)	98(36.03%)	8(2.94%)

Figure-1 showed maximum smokers 127(46.69%) started smoking due to influence of friends, 78(28.68%) from influence of family members, 43(15.81%) out of curiosity, 15(5.51%) due to influence of social media and 9(3.31%) from influence of western culture.

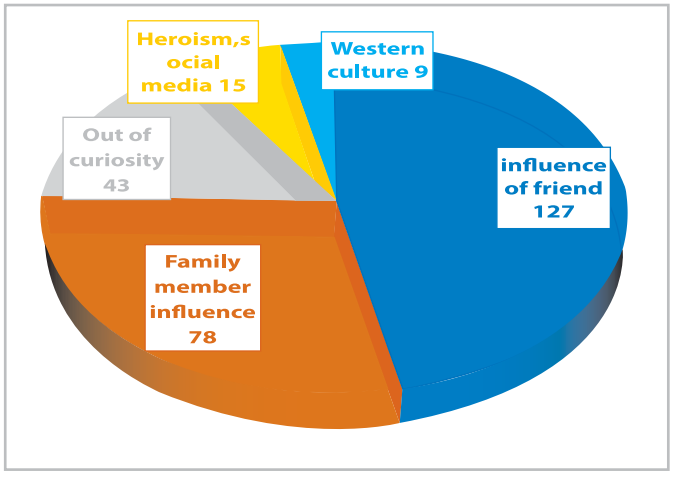

Figure-1 : Distribution of smokers considering provoking factor for smoking
(n=272)

Figure-2 showed maximum smokers 109(40.07%) smoke in public places/ market, 72(26.47%) in restaurant or tea stall, 33(12.13%) in dormitory, 20(7.35%) inside home, 17(6.25%) in working place, 12(4.41%) in public transport and 9(3.31%) in educational institutes.

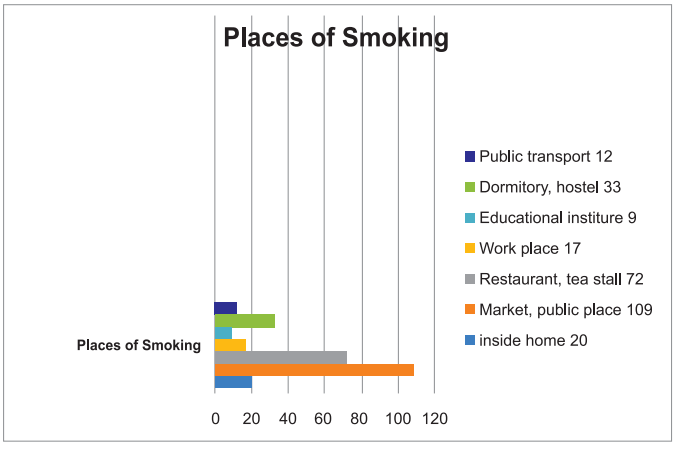

Figure-2 : Distribution of smokers considering places chosen for smoking (n=272)

Figure-3 showed maximum smokers 166(61.02%) smoke cigarette, 68(25%) prefer biri, 21(7.72%) smoke in Hukka and 17(6.25%) chew raw tobacco.

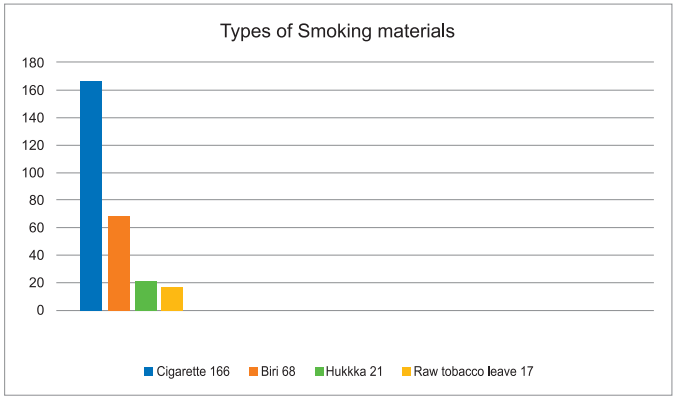

Figure-3 : Distribution of smokers considering type of smoking materials
(n=272)

Discussion:

Tobacco use is one of the most preventable causes of premature death in the world, contributing to 6 million deaths every year[7]. Smoking and second-hand smoke (SHS) are collectively serious and growing public health concerns globally, with a

large number of tobacco-associated preventable deaths occurring in lower-income countries[8]. The number of tobacco smokers is increasing rapidly because of the availability of cheap tobacco products, the lack of strong tobacco control regulations and the weak enforcement of existing regulations. Bangladesh is one of the top ten countries in the world, with a high current smoking prevalence of 35.3%[9]. Future projections suggest that tobacco smoking will kill more than 8 million people each year worldwide by the year 2030 with 80% of these premature deaths occurring in low and middle-income countries[10]. All non-smokers are potentially in danger of exposure to SHS because of the smokers . Exposure to SHS is now unequivocally proven to be as harmful as active smoking, causing death, disease and disability. Every year, exposure to SHS causes over 880,000 premature deaths worldwide[11].

This study took place at Dhamraiupazila which is located about 40 kilometers northwest of the capital city of Dhaka. It is bounded by the upazilas of Mirzapur and Kaliakair on the north, Singair on the south, Savar in the east, and Manikganj Sadar, Saturia and Nagarpur on the west. The total area of the upazila is 307.41 km^2andtotal population is4,12,418.

Among the 272 respondents most were male 251(92.28%) and 21(7.72%) female. Studies done previously both home and abroad also found male smokers are predominantly higher than female[12-15].

In this study maximum smokers 97(35.66%) belonged to age group 26-35 years, followed by 15-25 years 87(31.98%). Smoking is considered the symbol of adulthood and a “friend” during stress and loneliness to many adolescent people. It is well established that most adults start tobacco use in late childhood or adolescence. It has been estimated that nearly a third of the world’s population, those over the age of 15 years, smokes cigarettes[16] and smoking prevalence is on the rise, especially in developing countries[17]. This age group coincides with previous studies done both home and abroad[18-22].

This study found maximum smokers had their educational qualification upto secondary level 69(25.37%) followed by 62(22.79%) higher secondary, 55(20.00%) primary and 49(18.01%) illiterate. Regarding occupation were 112(41.17%) student, 43(15.81%) day labour, 39(14.33%) were business man. Among them 166(61.02%) smoke cigarette, 68(25%) prefer biri, 21(7.72%) smoke in Hukka and 17(6.25%) chew raw tobacco. Biri, Hukka and raw tobacco are preferred by the smokers of low socio economic condition. However no cases of E cigarette or Shisha had been found in this study, probably those were used in city areas by smokers. The results are familiar with results of previous studies[23-27].

Among the 272 respondents of this study 238(87.50%) knew that smoking causes harmful disease like cancer, 140(51.47%) knew life span reduces due to smoking, maximum 226(83.09%) smokers had cough, 124(45.59%) suffered from respiratory tract infection, 95(34.93%) had chest problem, 87(31.98%) had sore throat, 89(32.72%) had peptic ulcer and 106(38.97%) had various other problems. According to a nationwide survey conducted in Bangladesh, the prevalence of SHS was 43%[28].The Global Burden of Disease Study estimates that in 2019, tobacco was responsible for around 157,862 fatalities in Bangladesh, which is approximately 19% of all deaths[29]. According to World Health Organization (WHO), each year in Bangladesh, 1.2 million people suffer from diseases that are associated with tobacco use[30]. A study conducted in Bangladesh revealed that 61,000 children were suffering from diseases due to exposure to SHS in 2018[31]. A ten-year prospective study that included twenty thousand adult participants found that smoking was responsible for 25% of deaths among males and 7.6% of deaths among females[32]. These pieces of evidence demonstrate that Bangladesh has a huge number of deaths and illnesses related to tobacco use, necessitating national attention to this massive issue. When it comes to protecting the general public from SHS, the emphasis has been placed on the enforcement of appropriate legislation throughout the world. A Cochrane Review of 50 studies from developed countries shows that enforcing laws can reduce exposure to SHS, especially in workplaces and public places[33].

This study found maximum smokers 127(46.69%) started smoking due to influence of friends, 78(28.68%) from influence of family members, 43(15.81%) out of curiosity, 15(5.51%) due to influence of social media and 9(3.31%) from influence of western culture. The chances of starting smoking are also very high among individuals who idealize their elders at home like father or elder brother. Smoking is also taken as a sign of maturity and independence[34]. A Korean study revealed the similar relationship of the role of elder in the family; they reported that smoking was relatively more common in families with low socioeconomic status[35]. Similarly, social circle and a friend are the main source of inspiration for starting smoking when the boys enter in colleges or boarding houses, and other temptation included motivation from media and showing off maturity among class fellows[36].

It has been found in this study that maximum smokers 109(40.07%) smoke in public places/ market, 72(26.47%) in restaurant or tea stall, 33(12.13%) in dormitory, 20(7.35%) inside home, 17(6.25%) in working place, 12(4.41%) in public transport and 9(3.31%) in educational institutes. Although 181(66.54%) were aware of that Government has ban on smoking in public place. Bangladesh is distinguished as the first signatory of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC), which was ratified on May 10, 2004. In Bangladesh, the Smoking and Tobacco Products Usage (Control) Act was acted in 2005 and amended in 2013. Bangladesh tobacco control act requires the prohibition of smoking in public places and owners of public places to display 'no smoking' sign. In the context of developing countries, Bangladesh's experiences in enforcing public health laws have been dismal. However, effective implementation of the legislation necessitates ongoing monitoring to ensure that legal provisions are being followed and that decisions can be used for midcourse correction[37]. Several studies have been conducted in Bangladesh to assess the prevalence and patterns of tobacco use but no studies measured the observance of multiple compliance indicators and smoking in public places[37-41].

Smokers' behavior is influenced in part by their understanding of smoke-free legislation. There has been evidence of the relationship between the effective implementation of legislation regarding smoking restrictions in public places and the reduction of smoking behavior[42-44]. Chapman et al. estimated the contribution of smoke-free workplaces to the declines in cigarette consumption in Australia and the USA. They reported that smoke-free workplaces are responsible for an annual reduction of 602 million cigarettes[45]. A study conducted in Spain by Jimenez-Ruiz found that the prevalence of exposure to environmental tobacco smoke decreased from 49.5% in 2005 to 37.9% in 2007 (a 22% reduction) after the implementation of smoke-free laws in the country[46]. According to Wakefield, a study conducted in the United States found that smoking restrictions and smoking bans in public places may help to reduce teenage smoking[47].

Conclusion:

Smoking is undisputedly a significant risk factor in the development of many chronic illnesses in humans and thus is a hurdle in living a healthy and happy life. The adverse effects smoking has on the proper functioning of the human body should seldom be neglected. People from low socio-economic condition are more likely to use tobacco and are vulnerable to developing Non-Communicable Diseases (NCDs.) Efforts should be focused on providing health education through personal communication, films, posters, newspaper articles, folk dramas, radio & television programs regarding awareness of secondhand smoking. Future research should investigate how this exposure can be reduced, smoking initiation prevented and smoking cessation facilitated. Therefore, more public health attention is needed to prioritize education advising people in terms of health hazards due to secondhand smoke which can motivate people to avoid exposure to SHS which will improve the population's health status in Bangladesh.

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Conflict of interest:

No conflict of interest.

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Authors' Contributions:
Rahman FN, Ahmad M designed and drafted the study, collected and analyzed the data, interpreted the results, completed literature review and wrote up the draft manuscript. Ali M and Siddique T were involved in data collection, the manuscript review and editing. All authors read, gave the final critical review of the manuscript and approved it.

Data Availability:
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethical Approval and Consent to Participate:
Ethical approval for the study was obtained from the Institutional Review Board. The written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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Extended Cholecystectomy: Evaluation of Prognostic Factors in Early Gallbladder Cancer

Islam MM[1], Hossain SMS[2], Hasan MM[3], Kabir SB[4]

[1]Lieutanant Colonel Md Mustasinul Islam, Classified Specialist in Surgery, BNS Upasham, Khulna, [2]Brigadier General SM Shakhwat Hossain, Classified Specialist in Surgery and Advisor Specialist in HBS and Pancreatic Surgery, CMH Dhaka, [3]Brigadier General Md Mahboob Hasan, Classified Specialist in Surgery and Advisor Specialist in HBS and Pancreatic Surgery, CMH Dhaka, [4]Dr. Saba Binta Kabir, Assistant Professor, Pathology, Enam Medical College, Dhaka.

Abstract

Background: Surgery is the only curative treatment for gallbladder malignancy. Prognosis plays a vital role in clinical decision making and management of the disease. The aim of the study is to evaluate the incidence of different prognostic factors in early carcinoma gallbladder. **Methods:** This observational study was carried out in The Department of Hepatobiliary Surgery of Combined Military Hospital (CMH) Dhakaover a period from December 2018 to November 2019 by prior taking clearance from ethical committee. A total number of 30 patients were purposively sampled and undergone extended cholecystectomy forearly gallbladder cancer and studied prospectively. **Results:** In current study out of 30 patients, highest incidence is recorded at 5th (8) and 6th (10) decades with female predominance (Female:Male=1.73:1). Preoperative tumor marker CA-19-9 and CEA levels were raised in 21 (70%) and 13 (43.33%) cases respectively (Both CA-19-9 and CEA level were raised in 4 (13.33%) cases). Extended cholecystectomy with curative resection was performed in all 30 (100%) patients. Among them 5 (16.67%) were undergone cholecystectomy with wedge resection of liver and 25 (83.33%) patients were undergone cholecystectomy with hepatic bisegmentectomy (IVb&V). Laparoscopically 6 (20%) cases and open surgically 24 (80%) cases were intervened. In resected specimen, histopathologically pT1 were found in 23 (76.67%), pT2 in 07 (23.33%), pN0 in 30(100%) cases. According to TNM staging, stage I were found in 23 (76.77%), among those 2 were stage Ia (6.67%) and 21 were stage Ib (70%) and stage ll were found in 7 (23.33%) patients. The primary tumor was adenocarcinoma in all cases (100%). Histopathological grading showed, 15 patients (50%) with moderately differentiated tumors, 13 (43.33%) with well differentiated tumorsand 2 (6.67%) with poorly differentiated tumors. **Conclusions:** Expected outcome of the treatment for gallbladder carcinoma can be measured by assessing its prognostic factors. Early detection in an early stage is the prime measure for curative resection. Identification of the key prognostic factors is essential for guiding surgical management and providing outcome prediction.

Key words: Early gallbladder carcinoma, Prognostic factor

Introduction:

Gallbladder (GB) malignancy is rare, accounting for 3% of all GI malignanciesbut amongst the biliary tract malignancies, it is the most common, world wide representing 80%-95% of biliary system cancers[1,2]. The rank is 6th amongst GI system malignancies[3]. Extended cholecystectomy is one of the curative surgical options for early gallbladder cancer (EGBC).

Variable prognostic factors are related with

Corresponding Author: Lieutenant Colonel Md Mustasinul Islam, Classified Specialist in Surgery, BNS Upasham, Khulna, Cell: +8801678071495, E-mail: mustasin394@gmail.com

gallbladder cancer (GBC) and treatment outcomedepends on those factors. GBC is most frequently found in elderly age which is accountable for poor prognosis. Factors related to survival are extent of tumor invasion, lymph node status, TNM stage, vascular invasion, gross or histological appearance of the tumor and surgical curability. An early diagnosis is a critical factor for survival of the patient.

Staging:

Staging of cancer is done in terms of its extent, severity and prognosis. It groups cancer patients such that generalization can be made about prognosis and the choice of treatment. Staging system of GBC is based on American Joint Committee on Cancer (AJCC), Union for International Cancer Control (UICC) Tumor, Node, and Metastasis (TNM) classification, the eighth edition of which is currently being followed (Table I)[4].

Early gallbladder cancer (EGBC):

It is defined as carcinoma limited to the mucosa (T1a) or muscularispropria (T1b) with no lymph metastasis (N0). It is a stage I disease. Clinical diagnosis of EGBC is almost impossible as it either asymptomaticor has nonspecificsymptoms that are indistinguishable from gallstone disease and on examination no clinical abnormality is detected.

Surgical management of EGBC:

The treatment of tumors confined to mucosa (Tis) or lamina propria (T_{1a}) is simple cholecystectomy, which offers a surgical cure[5]. Thus simple cholecystectomy with a tumor free margin at the cystic duct is curative in T1a lesions. GBC which invade the muscularis layer (T_{1b-2}) have the propensity to invade liver tissue. Patients with T_2 lesion have upto 33% micrometastases in the adjacent liver parenchyma[6]. For this reason simple cholecystectomy is not adequate for all EGBC but the earliest stage (T_{1a}), cholecystectomy including wedge resection of segment IVb and V of the liver with portal lymphadenectomy[7]. (Figure 1)

Table I: AJCC, 8th edition GBC Staging

Tx		**Primary tumor (T)**	
T0		Primary tumor cannot be evaluated	
Tis		No evidence of cancer was found	
T1		Carcinoma in situ	
	T1a	Tumor has invaded the lamina propria	
	T1b	Tumor has invaded the muscular layer	
T2	T2a	Tumor has invaded the perimuscular connective tissue on the peritoneal side	
	T2b	Tumor has invaded the perimuscular connective tissue on the side of the liver but has not spread to liver	
T3		Tumor extends beyond the gallbladder and/or has invade the liver and/or 1 other adjacent organ or structure, such as stomach, duodenum (part of small bowel), colon, or pancreas	
		Regional lymph nodes (N)	
Nx		Regional lymph nodes cannot be evaluated	
N0		No regional lymph node metastasis	
N1		Regional lymph node metastasis	
		Distant metastasis (M)	
Mx		Distant metastasis cannot be evaluated	
M0		No distant metastasis	
M1		Distant metastasis	
		Staging group	
Stage 0		Tis N0	M0
Stage I		T1 N0	M0
Stage IIA		T2a N0	M0
Stage IIB		T2b N0	M0
Stage IIIA		T3 N0	M0
Stage IIIB		T1,2,3N1	M0
Stage IV		Any TAny N	M1

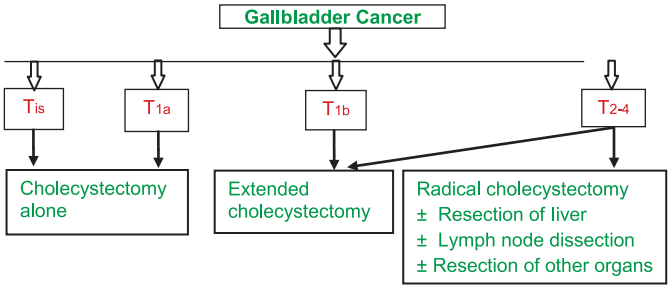


Figure 1: Management of preoperatively or intraoperatively diagnosed and staged GBC

Extended cholecystectomy includes removal of the GB with a 2 cm non-anatomical wedge of the liver and lymphadenectomy.

This study was performed in a tertiary care hospital

to assess the incidence of variable prognostic factors in the patients of GBC who were diagnosed earlier and undergone a curative resection.

Methodology:

This observational study was carried out in The Department of Hepatobiliary Surgery of Combined Military Hospital (CMH) Dhakaover a period of December 2018 to November 2019 after obtaining clearance from ethical committee. A total number of 30 patients were purposively sampled and underwent extended cholecystectomy for EGBC and studied prospectively. Patients with advanced staged GBC were excluded in the study.

A detailed history taking was performed from the patient, physical findings were noted meticulously and relevant investigation were done for the diagnosis and staging of the disease. Finally, diagnosis was confirmed by histopathological examination. Clinical and pathological data were collected, including age, gender, tumor marker (CEA and CA 19-9), stage of malignancy, method and procedure of surgery, histopathological type and grading.

All patients were followed up post operatively during their stay in the hospital and as outpatient regularly.

All data were collected systemetically and formatted in predesigned data collection sheet. All collected data were placed into computer and analysed by Statistical Package for Social Science (SPSS) version 24.0. Data analyzation was performed by descriptive statistics (frequency and percentage). Collected data were presented by tables, graph and diagram.

Results:

In this series, patients of different age groups are included, ranging from 31-85 years of age. The highest incidence is recorded in this study of their 5th and 6th decades of life, 8 (26.67%) and 10 (33.33%) respectively. GBC is predominantly a disease of elderly females. The female to male ratio of our patient is 19:11 (1.73:1) (Table II).

Preoperative CA-19-9 and CEA tumor marker was done and which were raised in 21 (70%) and 13 (43.33%) cases respectively (Both CA-19-9 and CEA level were raised in 4 (13.33%) cases) (Table III).

Early stage disease is suitable for any curative procedure. Curative resection was performed in all 30 (100%) patients. Among them 5 patients (16.67%) were underwent cholecystectomy with wedge resection of liver and 25 patients (83.33%) were underwent cholecystectomy with hepatic bisegmentectomy (IVb&V) (Table IV). Extended cholecystectomy was done in all 30 patients (100%), laparoscopically[4] patients (13.33%) and open surgical procedure in 26 patients (86.67%) (Figure 2).

Histopathological examination was performed amongst all resected specimens. pT1were found in 23 cases (76.67%) and pT2 in 07 cases (23.33%). pN0 were in all 30 patients (100%) of EGBC. According to TNM staging, stage I were found in 23 cases (76.67%), amongthose 2 were stage Ia (6.67%) and 21 were stage Ib (70%) and stage ll were found in 7 cases (23.33%). The primary tumor was found adenocarcinoma in all cases (100%) (Table V).

Out of all patients, Histopathological grading showed, 15 patients (50%) with moderately differentiated tumors, 13 (43.33%) with well differentiated tumors and 2 (6.67%) with poorly differentiated tumors. (Figure 3)

Table II: Incidence of different age and sex group (n=30)

Age (years)	Number of Patient (n)			Percentage (%)
	Male	Female	Total	
31- 40	1	2	2	10
41-50	1	3	4	13.33
51-60	3	5	8	26.67
61-70	4	6	10	33.33
71 & above	2	3	5	16.67
All ages	**11**	**19**	**30**	

The higher incidence was in two age groups that is 5th and 6th decade F:M = 1.73:1

Table III: Laboratory Investigations (CEA and CA19-9) (n=30)

Investigation	Number of patient (n)	Percentage (%)	Comment
Elevated serum CA-19-9	**21**	**70**	Normal upto 37 U/L
Elevated serum CEA	**13**	**43.33**	Normal upto 10 U/L

Both CA-19-9 and CEA was raised in 4 cases (13.33%)

Table IV: Details of curative resections (n=30)

Procedure	Number of case	Percentage (%)
Cholecystectomy + wedge resection of liver ± Lymphatic clearance	5 (R0Resection)	16.67%
Cholecystectomy + Hepatic bisegmentectomy (IVb& V) ± Lymphatic clearance	25 (R0Resection)	83.33%

R0Resection was achieved in 100% cases

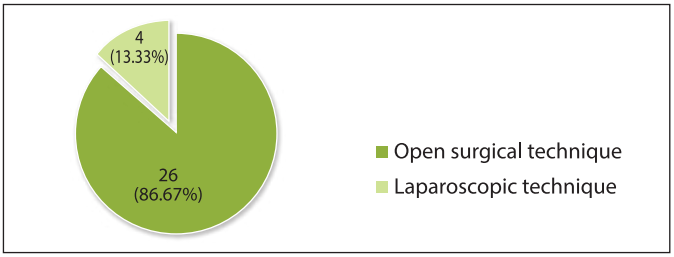
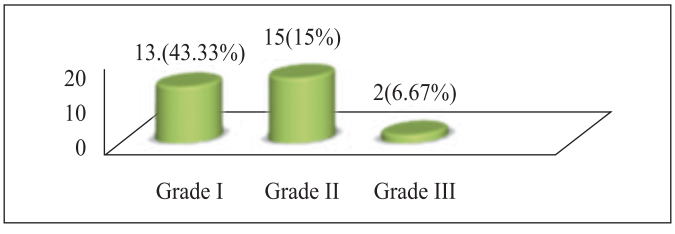


Figure 2: Approaches of extended cholecystectomy (n=30)

Table V: Hisopathological findings (n=30)

Staging group	T Stages	Number of patient(n)	Percentage (%)	N Stages	Percentage (%)	Tissue diagnosis
Stage I	pT1a	2	6.67%	N0	100%	Adeno carcinoma (100%)
	pT1b	21	70%	N0		
Stage II	pT2	7	23.33%	N0		

Adenocarcinoma- 100%, Stage I- 76.67%, Stage II- 23.33%



Discussion:

GBC is a relatively common malignancy with poor prognosis. Globally amongst about 165,000 all cancer death GB accounted for 1.7% annually[8,9]. The proportion of mortality to incidence was higher than other malignancy. By the advent of GBC staging an improvement in overall 5-year survival rate was observed. Overall mortality and cancer-specific mortality were reported as 87% and 75.4% respectively[10].

In Indian subcontinent, study revealed that prominent peak of GBC occurred in the 5th decade of life with mean age of presentation of 58.2 years[11]. Most reports suggested that women were at higher risk and therefore GBC was more prevalent in females[12]. Male:Female ratio for GBC was found 1:2.93 in Indian subcontinent[11]. The highest incidence in our study was recorded in the 5th and 6th decades of life and the female to male ratio was1.73:1. These findings were consistent with other published studies.

CA 19-9 and CEA are the most sensitive tumor markers for GBC. The incidence of raising CEA level found 27% and CA 19-9 found 58% cases[13]. Preoperative raised level of these marker is a bad prognostic factor. 5-year survival rate was 37%, 2% and 0% respectively for normal level of both markers, raised level of either marker and raised level of both the marker[13]. Our assessment showed that raising of CEA level in 43.33%, CA 19-9 level in 70% and both marker were raised in 23.33% cases.

Cholecystectomy along with at least non anatomical resection of segment IV and V of liver in contact with the GB for T2 disease was acceptable[14]. Mean recurrence free survival was 58.2 months after cholecystectomy plus hepatic bisegmentectomy (IVb and V) and 42.3 months after cholecystectomy plus non anatomical wedge resection of liver for T2 and T3 Cancer[15]. We performed 16.7% cases by wedge resection and 83.33% by hepatic bisegmentectomy (IVb and V).

Earlier curative laparoscopic surgery was contraindicated in GBC suspected patients[16]. Recent studies also advocated minimally invasive laparoscopic surgery for GBC.[17-22] However, currently both conventional open and modern laparoscopic approach for extended cholecystectomy is recommended. For EGBC the rate of complication in open approached extended cholecystectomy was 31.5%, whereas in laparoscopic procedure was 16.6% and median number of lymphnode was 12 for both approaches[23]. Extended cholecystectomy by both conventional open approach (86.67%) and laparoscopic approach (13.33%) were done in the current study.

The 5-years survival rate of patients with Stage-la (90-96%), Stage-lb(58-80%), Stage-ll (15-40%), Stage-III (5-6%), Stage-IV (1-6%)[24,25]. According to TNM staging survivability varies. Survival rate for more than 5-years in patients with pT_1 plus pT_2 was 82%, pT_3 plus pT_4 15%, pN_0 79%, pN_1 58%, pN_2

36%, pM_0 48%, pM_1 0%[18]. The incidence of EGBC (Tis- 11.7%, T1- 30.1% and T_2- 58.2%).[18] In our study group pT_{1a}- 6.67%, pT_{1b}- 70% and pT_2plus N0- 23.33%.

If stratified by tumor grading, well differentiated tumors had long survival (5.93 ± 0.27 years) where as incidence was low (15.3%), then moderately differentiated (3.72 ± 0.15 years) and incidence was (38.2%) and finally poorly differentiated tumor had poor survival (1.66 ± 0.07 years) and incidence was high (42.5%)[10].

Our study group revealed that the incidence of Grade I disease was 43.33%, Grade II is 50% and Grade III was found in 6.67% cases.On histopathological variant,well differentiated adenocarcinoma were associated with better survival. 5-years survival of patient of adenocarcinoma was accounting 71%[26]. We found 100% adenocarcinoma in our study group. Prognosis also depends on surgical curability. After achieving tumor free resection margin (R0 resection) 5-years survival was 72%[27]. We could achieve R0 resection in 100% cases.

Conclusion:

Patients with GBC in our country, usually present at a late stage. Early detection contributes to a higher survival rate. The prognosis of GBC was thus poor, mainly because of delayed presentation. Advanced investigations, early detection and curative treatment modalities are done to achieve R0 clearance. Our purpose was to early detection of tumor, thus making surgical intervention possible and ultimately resulting in a good prognosis. Assessment of prognostic factors further helped to predict the outcome of planned management.

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None.

Conflict of Interest:

No conflict of Interest.

Financial Disclosure:

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Authors' Contributions:

Islam MM designed and drafted the study, collected and analyzed the data, interpreted the results, completed literature review and wrote up the draft manuscript. Hossain SMS, Hasan MM and Kabir SB were involved in data collection, the manuscript reviewand editing. All authors read, gave the final critical review of the manuscript and approved it.

Data Availability:

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethical Approval and Consent to Participate:

Ethical approval for the study was obtained from the Institutional Review Board. The written informed consent was obtained from study participants. All methods were performed in accordance with relevant guidelines and regulations.

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Original Article ***Open Access***

Socio Economic and Risk Factors of Child Drowning in Rural Area- A Retrospective Study at a Peripheral District Hospital

Mushtaq Ahmad[1], Farial Naima Rahman[2], Fahd Bin Zia[3]

[1]Professor (Brigadier General) & Principal, Army Medical College Jashore, [2]Assistant Professor, Department of Forensic Medicine Toxicology, Army Medical College Jashore, [3]Anesthetist, 250 Bedded District Sadar Hospital Bhola.

Abstract

Background: Drowning is a significant public health concern and the third leading cause of unintentional death worldwide. It is also one of the leading causes of death among children in Bangladesh. **Objective:** To assess socio economic and risk factors of child drowning in a selective rural area of Bangladesh. **Methodology:** This retrospective study was performed at 250 Bedded District Sadar Hospital Bhola during the period of October 2023 to November 2024. All the convenient cases who fulfilled the required inclusion criteria and whose parents/ attendants gave the informed consent were taken for case study. This study included children of 1 year-12 year(s) who attended the emergency department after unintentional or accidental drowning. All data were collected in individual pre-determined case record form containing different code number. The collected data were compiled and re-examined to exclude inappropriate entry as well as to exclude errors in data collection procedure and analyzed with the help of SPSS program, version 28. Ethical clearance was taken from ethical review committee of Institution. **Results:** Out of 70 cases interviewed, maximum drowning victims were male 56(80%), Commonest site of drowning were pond 45(64.29%) followed by canal 4(5.71%) and river 8(11.43%). Most of the child victims belonged to age group 1-4 years 48(68.57%), followed by 4- 8 years 13(18.57%). Maximum 54(77.14%) children did not know how to swim. Most cases 43(61.43%) of drowning happened between 6:00 am to 12:00 am. The distance of drowning site were within 50 meters 41(58.57%), of home followed by 50- 100 meters 21(30%). Socio demographic characteristics of victim's mother showed maximum mother had education up to primary level 35(50%), maximum 36((51.43%) were from lower economic class, most of them belonged to the age group 25-30 years 29(41.43%), most of the mothers 36(51.43%) were house wife/home makers, maximum mothers 36(51.43%) were at home during drowning incident and maximum 25(35.71%) were busy at house hold activities during incident time. **Conclusion:** The study points out the associated factors of child drowning accidents in Bangladesh, which will aid in developing preventive policies. Drowning prevention program for Bangladesh should be enhanced for community awareness of fresh water rescue and resuscitation practices.

Keywords: Drowning, Children, Rural Bangladesh.

Introduction:

Drowning is a significant public health concern and the third leading cause of unintentional death worldwide among children 5 to 14 years of age[1] In the United States, drowning is the second leading cause of injury-related death among children 1 to 4 years of age, with a death rate of 3 per 100,000,[2] and in some countries, such as Thailand, the death rate among 2-year-old children is 107 per 100,000[3]. In many countries in Africa and in Central America, the incidence of drowning is 10 to 20 times as high as the incidence in the United States.

Death from drowning have not been adequately studied and addressed in some low-income countries like Bangladesh[4]. Hardly a day goes by in Bangladesh

Corresponding Author: Brigadier General Mushtaq Ahmad, Professor & Principal, Army Medical College Jashore, Mobile: 01711140546. Email: mushtaq863@gmail.com

in which the media do not report a child's death by drowning. But according to experts, this is just the tip of an iceberg, with the actual number of the case fatalities several times greater than the reality[5]. The 2024 survey in Bangladesh highlighted that for every 100,000 people, about 60 die from injury-related causes. The three main causes are: road accidents (15 per cent), suicide (12.42 per cent), and drowning (11 per cent). Each year, approximately 18,665 people die from drowning in Bangladesh, according to the study. Of them, 14,269 are children, meaning more than 75 per cent of drowning victims are underage. Children aged 1 to 4 are the most at risk, with a drowning mortality rate of 77.92 per 100,000, compared to the national average of 11.6.The study also revealed that 70 per cent of drowning deaths occur in ponds near homes. Other locations include: rivers (12 per cent), canals, wetlands and haors (6 per cent), buckets (4 per cent), ditches (4 per cent), and wells and the sea[6].

Previously drowning has been defined as death secondary to asphyxia while immersed in a liquid usually water within 24 hours of submersion. At the 2002 world congress of drowning, held in Amsterdam, a group of experts suggested a new consensus definition for drowning to decrease the confusion. The new definition states that "Drowning is a process resulting in primary respiratory impairment from submersion in a liquid medium, outcome may include delayed morbidity"[7,8].

Objective:

To assess socio economic and risk factors of child drowning in a selected rural area of Bangladesh.

Materials and Method:

This retrospective study was performed at 250 Bedded District Sadar Hospital Bhola during the period of October 2023 to November 2024.

The study was carried out using a qualitative phenomenological method. To get a complete picture of the prevalence and associated factors of child drowning fatalities in Bangladesh, two data collection methods, such as In-depth Interviews (IDI) and Focus group discussions (FGD) have been adopted. Given the descriptive nature of the investigation, a qualitative approach seemed appropriate. Study participants can provide extra information to researchers by maintaining notes throughout interview sessions. Analyzing participants views using qualitative research methods is possible, resulting in new knowledge and insights regarding the subject. Through our in-depth examination of this current issue, we aimed to establish guidelines for the reporting of qualitative studies. As per as qualitative research design, we have followed Standards for Reporting Qualitative Research (SRQR) guidance[9].

All the convenient cases who fulfilled the inclusion criteria and whose attendant gave the informed consent were taken for case study. This study included children, 1 year - 12 year(s) who attended the emergency Department after unintentional or accidental drowning. A total 70 cases were selected as research sample.

The variables of victims were age, sex, swimming ability. The variables related to parents of victim were maternal age, maternal education, maternal profession of the victim, activity and presence of mother during drowning. The variables related to drowning were location, time of drowning, site of drowning, distance of drowning site from home.

The aim and objectives of the study along with its procedure and benefits were explained to the parents of the children in detail in easily understandable language and requested for written consent. All data were collected in individual pre-determined case record form containing different code number. The collected data were compiled and re-examined to exclude inappropriate entry as well as to exclude errors in data collection procedure. The compiled data were then analyzed with the help of SPSS program, version 28. Ethical clearance was taken from ethical review committee of the In stitution.

Results:

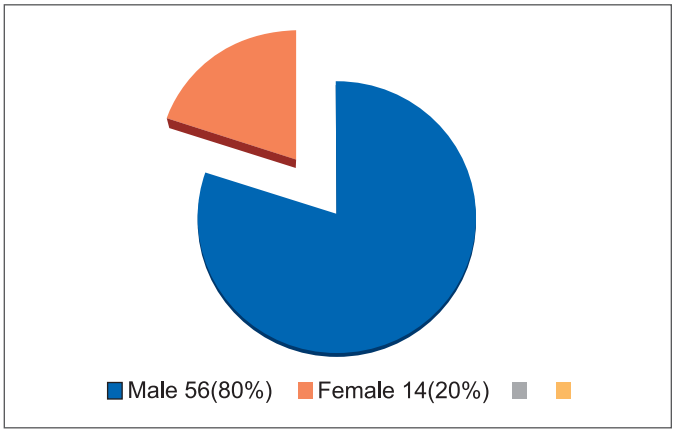

Figure-1:Distribution of gender.

Considering gender male 56(80%) drowning cases were more than female 14(20%). (Fig-1)

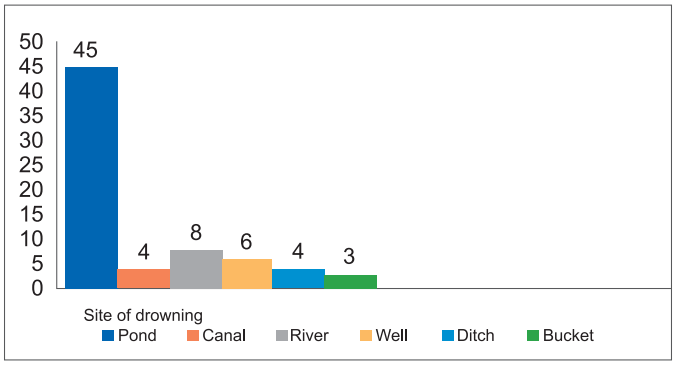

Figure -2: Site of drowning.

Figure-2 shows site of drowning; Pond 45(64.29%), Canal 4(5.71%), River 8(11.43%), Well 6(8.57%), Ditch 4(5.71%), Bucket 3(4.28%).

Most cases of drowning occurred at pond situated beside the habitats (Figure-2), followed by Pond 45(64.29%), Canal 4(5.71%), River 8(11.43%), Well used to fetch water 6(8.57%), Ditch 4(5.71%). Some unusual drowning case were found due to bucket 3(4.28%) in the houses.

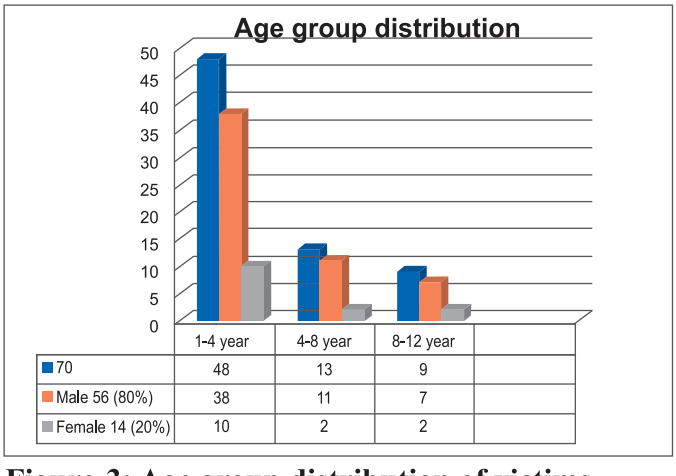

Figure-3: Age group distribution of victims.

Figure-3 shows age group distribution of victims. Maximum belonged to age group 1-4 years 48(68.57%), followed by 4- 8 years 13(18.57%) and 8- 12 years 9(12.86%).

54(77.14%) children did not know how to swim. Most cases 43(61.43%) of drowning happened between 6:00 am to 12:00 am, which is the working hour of attendants or guardian and the baby remain unattended. 25(35.71%) drowned between 12:00 am to 06:00 pm and 2(2.86%) between 06:00 pm to 12:00 pm. Maximum distance of drowning site were within 50 meters 41(58.57%), followed by 50- 100 meters 21(30%) and 8(11.43%) within 100- 500 meters.

Table-1

Socio demographic characteristics of victim's mother. (n= 70)

Education level of mother	Primary	35(50%)
	Secondary	22(31.43%)
	Graduate	2(2.86%)
	Illiterate	11(15.71%)
Socio economic status of mother	Lower class	36((51.43%)
	Lower middle class	29(41.43%)
	Upper middle class	4(5.71%)
	Upper class	1(1.43%)
Maternal age	15 - 20 years	7(10%)
	20 – 25 years	17(24.28%)
	25- 30 years	29(41.43%)
	30-35 years	12(17.14%)
	More than 35 years	5(7.14%)
Maternal profession	House wife/ home maker	36(51.43%)
	Local Business	3(4.28%)
	Job	6(8.57%)
	Daily worker	25(35.71%)
Presence of guardian at home during drowning time	Yes	36(51.43%)
	No	34(48.57%)
Mother's activity during drowning	House hold activities	25(35.71%)
	Sleeping	4(5.71%)
	Gossiping	7(10%)
	Remained outside home	34(48.57%)

Table-1 shows socio demographic characteristics of victim's mother. Maximum mother had education up to primary level 35(50%), followed by secondary level 22(31.43%).

Socio economic status of mother showed maximum 36((51.43%) from lower economic class and 29(41.43%) from lower middle class, 4(5.71%) from Upper middle class and only 1(1.43%) from upper class.

Most of the victim's mother belonged to the age group 25- 30 years 29(41.43%), followed by 17(24.28%) 20 – 25 years, 12(17.14%) 30-35 years, 7(10%) 15 - 20 years and 5(7.14%) More than 35 years.

Regarding maternal profession, most of the mothers 36(51.43%) were house wife/ home makers, 25(35.71%) daily workers, 6(8.57%) were involved in job and 3(4.28%) had local business.

During drowning incident maximum mothers 36(51.43%) were at home and 34(48.57%) were outside home. Mothers 25(35.71%) were busy at house hold activities, 7(10%) were gossiping and 4(5.71%) were sleeping.

Discussion

Drowning is a major but often neglected public health problem. It is a leading cause of childhood mortality in rural Bangladesh[10]. Results of studies in different countries showed that drowning is one of the leading cause of mortality among children[11,12, 13]. A recent survey performed by Society for Media and Suitable Human Communication Techniques in support of Global Health Advocacy Incubator documented 1402 deaths from 875 drowning incidents, where 83% (n=1164) of victims were children in the last one and half years (January 2020–June 2021). More than two thirds (69%) were below 9 years[14].

In this study, maximum drowning victims were male 56(80%), and most of the child victims belonged to age group 1-4 years 48(68.57%), followed by 4- 8 years 13(18.57%). Previous study around the world showed key risk factors for drowning were male sex, age less than 4 years, low income, poor education, rural residency, aquatic exposure, risky behavior and lack of supervision[15-18]. A study in Bangladesh found that drowning is the fifth leading cause of death among children 1-17 year(s) of age[17]. The annual near drowning rates in children aged 1-4 year(s) are 136.9 per 100,000 in rural areas and 18.9 per 100,000 in urban areas[19]. Study of Nahar K (2022) also found the highest (76%) rate of drowning was in children of 1-4 years of age[20]. Another study found twenty six percent of all death in children between the ages of 1-4 year (s) was due to drowning[21]. This proportion seems to be very high and deserve attention from researcher and policy maker. Despite this overwhelming figure, drowning is still not given the focus to combat this national tragedy.

The highest rates of fatal and non-fatal drowning were observed in children 1-4 years of age followed by 5–9 years old children. These findings are similar to findings from a previously conducted national survey, Bangladesh Health and Injury Survey (BHIS) 2005, and reflect the trend that rural children aged 1–4 years are the worst affected by drowning in Bangladesh, and that this trend has not changed over the past decade. Similar findings have also been reported in other East-Asian countries such as Thailand, Vietnam, and China, and countries in the Western Pacific Region[3,22,23,24]. In most of the countries around the world, drowning ranks among the top three cause of death from unintentional injury, with the rates highest among children under five years of age[25]. Our outcomes also have similarity with previous studies. In New Zealand, 76% of unintentional drowning involved males[26]. The highest number of underwater deaths occurred among males in Louisiana with 84 %[27].

An assessment of Peden and McGee[28] exposed that males had a higher death rate due to drowning compared to females for all age groups. Lindholm and Steensberg[29] stated that, in Denmark, males were involved in 72.5 % of underwater deaths. The underwater deaths involving males in Iran was 87 % and the ratio of male–female mortality rate was 6.5:1. The outcome of Ma et al. showed that boys were at greater danger of drowning than girls in China[30]. In the United States, the percentage of mortality was meaningfully superior among males than among females. Overall, males are more likely to drown than females.

In this study, most drowning events occurred in ponds and ditches, almost all located within 20 meter from the residences of victims, and most frequently during the annual monsoon season, similar to findings reported in prior studies[3,32,33]. Given the tropical climate in Bangladesh, monsoon rainfalls may lead to floods, and increased water levels in rivers, canals, ponds, and ditches, which puts children and other individuals at higher risk of drowning. Virtually all (95%) drowning events occurred in the daylight hours. This pattern of seasonality and time of drowning are in accordance with other studies[3,33]. The overall global rate for drowning among children is 7.2 deaths per 100,000 population, with significant regional variations[34].

Commonest site of drowning were Pond 45(64.29%) followed by Canal 4(5.71%) and River 8(11.43%). Due to geographical feature of this country villages are usually surrounded and intersected by canals and rivers and there are numerous ponds near houses. Most of the villages are inundated for several months in the monsoon. Some research reveals a

clear seasonal pattern of drowning. The peak of the drowning death usually takes place in the monsoon months that is April to September. Previous studies also found majority of near drowning among children occurs in rural areas typically in rivers, ponds, ditches, buckets in bathrooms and in urban area drowning occur in buckets, toilets, sinks and other common household objects containing water[8]. Most children like to have fun in water bodied like in ponds, ditches, lakes or simply in the road following a rainstorm, also in a bucket or tub water, though it can be a dangerous medium. A small child can be drowned in a few centimeters of water at the bottom of a bucket, bathtub, or in a rice field. Drowning is an injury that displays epidemiological patterns that change according to age group, body of water and activity[21]. Young children also die when they fall head first into this water container and not become able to extricate themselves[35].

Maximum 54(77.14%) children did not know how to swim. Previous studies also found that drowning were related to non-swimmers[36,37,38,39]. Most cases 43(61.43%) of drowning happened between 6:00am to 12:00 am. The time of drowning is another important point of consideration for preventive measure. In this study it has been observed that almost all (80%) of the drowning occurred in daylight hours and 46% drowning occurred before noon when mother and other care taker remain busy with their household work. This suggests that children are not properly supervised during this time. This finding is consistent with the study done in BHIS (97%) and also with the study done by M Kapil Ahmed (61%) in Matlab[21,19]. Most drownings were reported to occur between noon and 1:00p.m. Low socioeconomic status is more likely to lead to drowned fatalities, indicated by low family expenditure[40].

The distance of drowning site were within 50 meters 41(58.57%), of home followed by 50- 100 meters 21(30%). In rural Bangladesh pond, ditches and sometimes river are located very close to house which is routinely used for household work throughout the year. Living near water body was found to be a cause of drowning. In this study it is found that 44% drowning site is within 10 m and 36% drowning site is within 20 meter that is (44+36) 80% cases drowning site is veryclose to house (Within 20 meter). This study is found very close to the study done by BHIS (The Bangladesh Health and injury survey) in Dhaka[19,20].

Socio demographic characteristics of victim's mother showed maximum mother had education up to primary level 35(50%), maximum 36(51.43%) were from lower economic class[21,41-45]. most of them belonged to the age group 25- 30 years 29(41.43%), most of the mothers 36(51.43%) were house wife/ home makers, maximum mothers 36(51.43%) were at home during drowning incident and maximum 25(35.71%) were busy at house hold activities Unprotected water bodies were recognized as a reason for the high drowning rate and poverty is as a primary cause of child drowning in India[13,40]. The increased risk of drowning among children under five years of age has been associated with lack of adequate adult supervision, combined with environmental risks, and behavioral factors such as increased curiosity among toddlers, lack of ample dexterity and co-ordination, and limited cognitive awareness of their surroundings[31,46].

In 2021, the United Nations General Assembly declared July 25 as World Drowning Prevention Day to acknowledge drowning as a leading cause of death around the world [47].

Drowning prevention programmes should include active prevention, such as establishing child care at home, especially for children under five years old; increase knowledge and awareness about childhood drowning, especially among rural parents; aquatic protection supervision by close relative; aquatic security teaching; drowning education for children in every school; and fixing of cautionary symbols in dangerous areas in Bangladesh[48]. Compared to the 2016 survey, drowning deaths have declined slightly, but Bangladesh still has the second-highest rate in South Asia. Under the Ministry of Women and Children Affairs, Bangladesh Shishu Academy is implementing a program to prevent child drowning. It includes daycare centers for children aged 1-5 and swimming lessons for children aged 6–10. This program is active in 45 upazilas across 16 districts. In 2023, it trained 115,000 children, with

over 240,000 expected to be trained this year. Although daycare centers are a step forward, they fall short of the actual need and lack community engagement.

In Kerala's Anganwadi model in India, 30 mothers in a locality take turns to supervise children aged 8 months to 5 years, from 10:00am to 3:00pm. This not only provides child supervision but also builds emotional bonds between caregivers and children. It as a strong example of civic participation that could inspire similar community-based approaches in Bangladesh. Data of recent studies showed that the nonfatal drowning rate decreases considerably with increased parental education, especially maternal education. Child care has been enhanced by better mother education and socioeconomic level[21,49,50].

Limitations: This study was performed in a single Peripheral District Hospital, which does not represent the overall picture of Bangladesh. Further studies needed to be carried out to get the updated data and planning of preventive measures.

Conclusion

Death due to drowning is principally avoidable and can be decreased by raising awareness about the dangers of drowning. This highlights the need for well-designed research to study the clinical and sociodemographic characteristics which can identify the causes and the origins of drowning injuries and to evaluate the preventive measures. Current study may help the policy maker to further identify the problem and take appropriate measures for saving valuable lives of children from drowning in Bangladesh.

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Conflict of interest:
No conflict of interest.
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Authors' Contributions :

Rahman FN, Ahmad M and Zia FB designed and drafted the study, collected and analyzed the data, interpreted the results, completed literature review and wrote up the draft manuscript All the authors were involved in manuscript review, editing and gave the final critical review of the manuscript and approved it.

Data Availability:

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. The written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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Comparative Analysis of the Complete Anatomy App and Virtual Dissection Table in Undergraduate Anatomy Education

Sharna Moin[1], Mushtaq Ahmad[2], A.H.M. Mostafa Kamal[3], Fatema Tuz Munira[4], Zobayer Mahmud Khan[5], Sadia Chowdhury[6], Farial Naima Rahman[7], Prohelika Paul[8], Tithi Rani Biswas[9], Tanvir Faysal[10], Fahim Faisal[11]

[1]Associate Professor & Head, Department of Anatomy, Army Medical College Jashore, Jashore Cantonment, [2]Professor (Brigadier General) & Principal, Army Medical College Jashore, Jashore Cantonment, [3]Professor & Head, Department of Anatomy, Dhaka Medical College, Dhaka, [4]Associate Professor (Lieutenant Colonel) & Head, Department of Physiology, Army Medical College Jashore, Jashore Cantonment, [5]Associate Professor, Department of Anatomy, Dhaka Medical College, Dhaka, [6]Associate Professor & Head, Department of Biochemistry, Army Medical College Jashore, Jashore Cantonment, [7]Assistant Professor, Department of Forensic Medicine, Army Medical College Jashore, Jashore Cantonment, [8]Assistant Professor, Department of Anatomy, Jashore Medical College, Jashore, [9]Assistant Professor, Department of Anatomy, Army Medical College Jashore, Jashore Cantonment, [10]Lecturer, Department of Anatomy, Dhaka Medical College, Dhaka, [11]Lecturer, Department of Anatomy, Army Medical College Jashore, Jashore Cantonment

Abstract

Background: Digital anatomy tools are increasingly used in medical teaching. The Complete Anatomy App and the Virtual Dissection Table are two widely recognized platforms, each with distinct features, different capabilities and limitations. Observing the wide adoption of the Complete Anatomy app among the students and the limited mobility and high cost of Virtual Dissection Table elsewhere raised academic curiosity to compare their educational effectiveness. **Objectives:** To compare the usability, accessibility, educational impact, institutional feasibility, and cost-effectiveness of the Complete Anatomy App and the Virtual Dissection Table in undergraduate anatomy education, with the aim of identifying which features are superior in each platform and determining the more practical option for use in resource-limited academic settings. **Methods:** A comparative cross-sectional analytical study was conducted using structured questionnaires filled out by undergraduate medical students. Quantitative data were analyzed using t-tests and Chi-square tests, and qualitative responses were thematically analyzed. **Results:** A total of 200 undergraduate medical students participated, divided equally between two groups: 100 who used the Complete Anatomy App (Group A) and 100 who used the Virtual Dissection Table (Group B). Group A achieved significantly higher mean scores for ease of use (4.3 ± 0.7 vs 3.1 ± 0.9; $p < 0.001$) and overall satisfaction (4.4 ± 0.6 vs 3.6 ± 0.8; $p < 0.001$). Regular use beyond classroom hours was reported by 92% of app users, compared with none in the table group. The app also outperformed in exam preparedness (84% vs 62%; $p < 0.001$) and histology integration (81% vs 23%; $p < 0.001$). In contrast, the Virtual Dissection Table was superior in spatial realism (4.5 ± 0.6 vs 3.9 ± 0.8; $p = 0.002$) and radiological correlation (84% vs 71%; $p = 0.03$). Cost analysis revealed that the app was far more economical, costing approximately USD 25 per student per year, compared with USD 800–1000 per student per year for the table. **Conclusion:** The Complete Anatomy App was more usable, accessible, and cost-effective, while the Virtual Dissection Table provided better spatial and radiological realism. The app suits resource-limited settings, and combining both tools can enhance overall learning outcomes.

Keywords: Anatomy education, Complete Anatomy App, Virtual Dissection Table, digital tools, undergraduate learning

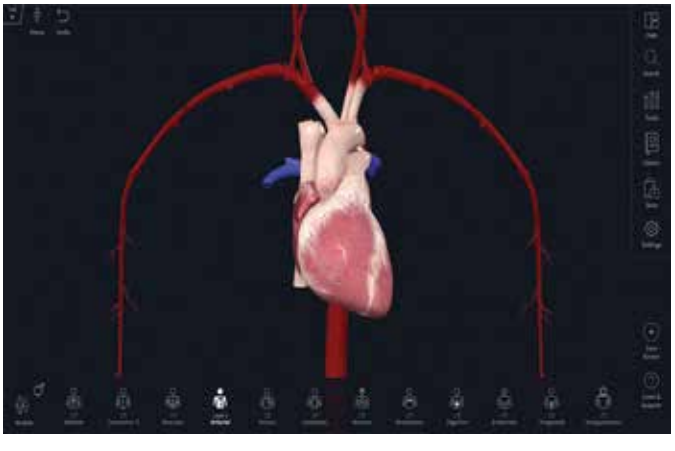
Introduction:

Digital innovations are transforming anatomy education globally. Two widely recognized tools, the Complete Anatomy app and the Virtual Dissection Table, are increasingly integrated into undergraduate anatomy studies to enhance 3D understanding of human structures and improve interactivity in

Corresponding Author: Dr. Sharna Moin, Associate Professor & Head, Department of Anatomy, Army Medical College Jashore, Jashore Cantonment; Email: moinsharna@gmail.com; Contact: +8801722739784

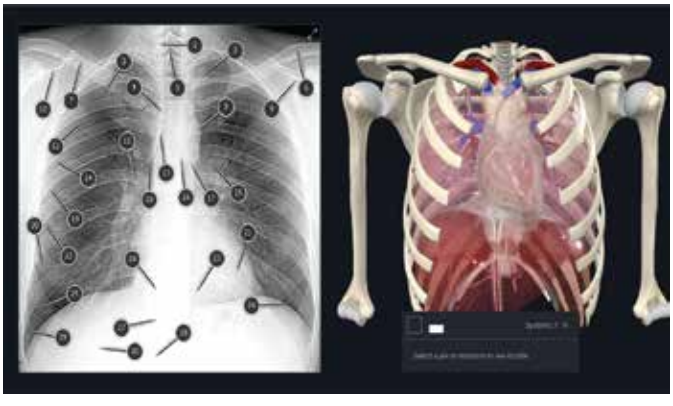
learning environments[1-3]. These tools differ significantly in terms of cost, portability, classroom scalability, and student engagement features[4-5].

The Complete Anatomy app, developed by 3D4 Medical and first released in 2015, has since evolved into a comprehensive cloud-based platform for anatomical learning. It offers over 17,000 high-resolution 3D anatomical structures (Photograph 1), interactive layer dissection, augmented reality (AR) compatibility (Photograph 2), radiological correlations (Photograph 3), histological sections (Photograph 4), clinical videos, and functional simulations such as muscle movement and joint mechanics[6-8]. It also includes preloaded lectures, quizzes, real-time collaborative tools, and educator features that support content creation, lecture recording, annotations, and student assessments. Institutions can subscribe to educator licenses, which allow shared content and lectures across students via cloud-based access. The app is compatible with smart television, laptop, desktop, mobile phones, tablets and can be projected on any large screen, making it highly portable and scalable for large classrooms and remote education. Students can access content anytime and anywhere, even at home. However, challenges include device dependency, the need for internet access, occasional subscription costs, and the learning curve for educators unfamiliar with digital platforms[9-10].



Photograph 1: Complete Anatomy App showing the arterial system of the heart.

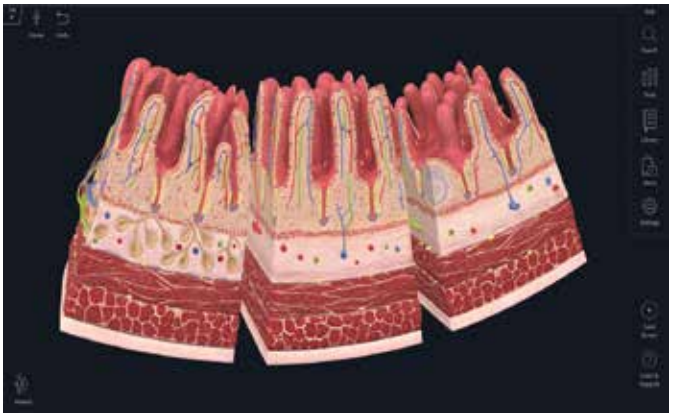
Photograph 2: Augmented Reality (AR) session in Army Medical College Jashore using the Complete Anatomy App.



(a)

(b)

Photograph 3: Radiology module of Complete Anatomy App demonstrating correlation of (a) X-ray and (b) CT images with corresponding 3D anatomical visualization.



Photograph 4: : Histology model of small intestine displayed in the Complete Anatomy App.

The Virtual Dissection Table (Photograph 5), launched in 2011 by Anatomage Inc., is a life-sized virtual dissection table that enables full-body 3D exploration using high-resolution CT and MRI datasets[11]. It supports virtual slicing, clinical case analysis, radiographic comparisons, and provides realistic digital cadaver experiences[12]. Its strengths lie in its tactile teaching interface, enhanced spatial visualization, and effective use in group teaching[13-14].

However, the non-portable nature of the hardware, high procurement and maintenance costs, and space constraints often confine its use to dedicated simulation or dissection rooms[15]. Each session can accommodate maximum 15 students, limiting its accessibility in large classrooms[16]. In Bangladesh, the Virtual Dissection Table has been introduced in few institutions mainly for institutional branding or demonstrative purposes, rather than widespread regular teaching[17]. As a result, its use remains limited among the broader student population.

Although numerous studies have evaluated either the Complete Anatomy app or the Virtual Dissection Table individually, there is no published research globally or in Bangladesh that directly compares the Complete Anatomy app and the Virtual Dissection Table side by side. This study seeks to fill that gap by systematically analyzing both platforms through student feedback, with the goal of guiding academic institutions in developing countries about which platform may serve their curriculum and infrastructure best.

Photograph 5: Medical students at Dhaka Medical College observing anatomical structures during a virtual dissection session using the Virtual Dissection Table, facilitating visualization of 3D anatomy and radiological correlations.

Materials and Methods

This comparative cross-sectional analytical study was conducted over a period of three months in the Department of Anatomy at Army Medical College Jashore (AMCJ) from July 2025 to September 2025. Data were collected from Army Medical College Jashore, which uses the Complete Anatomy App, and Dhaka Medical College, where the Virtual Dissection Table is routinely used in anatomy teaching. A total of 200 undergraduate medical students from first year and second year at both institutions were enrolled using convenient sampling. Institutional permissions were obtained prior to data collection. Informed consent was obtained electronically from all participants through Google Form prior to initiation of the study. Participants were divided into two intervention groups based on their institutional exposure:

Group A (n = 100): Students who used the Complete Anatomy App

Group B (n = 100): Students who engaged with the Virtual Dissection Table

All participants completed a structured and pre-validated Google Form questionnaire developed by the researchers. The questionnaire consisted of both Likert-scale and multiple-choice questions. Cost-related data were collected independently from verified sources (official websites, academic procurement references) and not through the questionnaire.

Ethical clearance was obtained from the Institutional Ethical Review Board (IERB) of Army Medical College Jashore prior to study.

Data entry and statistical analysis were done using IBM SPSS version 26.0. Simple statistics like frequency, percentage, average (mean), and standard deviation were used to describe the responses. Independent sample t-tests were used for numerical data & Chi-square tests were used for categorical data. A p-value of less than 0.05 was considered statistically significant.

Results:

A total of 200 undergraduate medical students participated in this study, divided equally into two groups: 100 students from Army Medical College Jashore who used the Complete Anatomy App and 100 students from Dhaka Medical College who engaged with the Virtual Dissection Table. In Group A, 29% were female and 71% were male, while in Group B, 42% were male and 58% were female (Table 1). The mean age of all participants was 19.8 ± 1.2 years.

Table 1: Distribution of participants as per demographic characteristics (n = 200)

Demographic characters	Male	Female	Total
Group A (Complete Anatomy App, AMCJ)	29 (29%)	71 (71%)	100 (100%)
Group B (Virtual Dissection Table, DMC)	42 (42%)	58 (58%)	100 (100%)
Total	71 (35.5%)	129 (64.5%)	200 (100%)

The Complete Anatomy App group consistently rated the platform higher in terms of ease of use (mean 4.3 ± 0.7 vs. 3.1 ± 0.9, $p < 0.001$) and overall satisfaction (4.4 ± 0.6 vs. 3.6 ± 0.8, $p < 0.001$) (Figure 1). Students emphasized the convenience of accessing the app on smartphones, tablets, or laptops at any time, including at home, with 92% reporting regular use beyond classroom hours. In contrast, Virtual Dissection Table users reported restricted availability, with 78% stating they could only use it during scheduled laboratory sessions. Moreover, each session with the table could only accommodate 10–15 students at a time, limiting exposure for large groups, whereas the app allowed entire classes to learn simultaneously, either in person or remotely (Table 2). When visual realism was considered, however, Virtual Dissection Table outperformed the app, receiving higher scores for spatial clarity and lifelike anatomical visualization (mean 4.5 ± 0.6 vs. 3.9 ± 0.8, $p = 0.002$) (Figure 1).

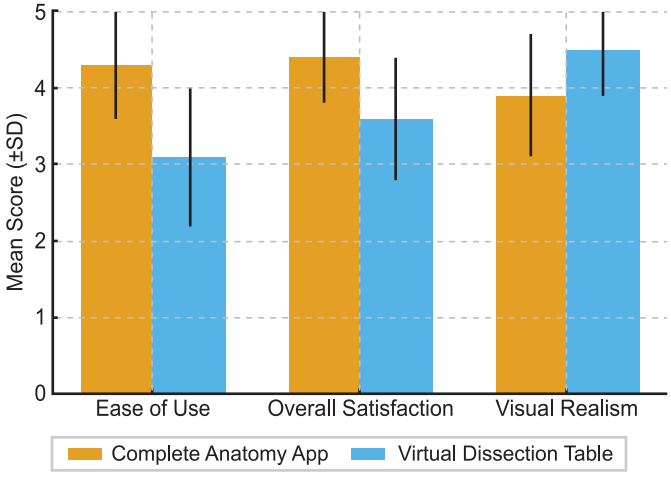


Figure 1: Comparison of mean scores between Complete Anatomy App and Virtual Dissection Table

Table 2: Usage pattern and accessibility of the two platforms

Variable	Complete Anatomy App (%)	Virtual Dissection Table (%)
Regular use beyond classroom hours	92%	Not possible
Restricted to scheduled lab sessions	Not restricted	78%
Allowed large groups/class-wide use	Yes	No (only 5–10 students/session)

When specific educational features were compared, notable differences emerged. Augmented reality, a distinctive feature of the Complete Anatomy App, was reported as useful by 76% of students in Group A, particularly for projecting anatomical structures into classroom or home settings, whereas Group B students had no AR-based option available. Radiological imaging and clinical correlations were judged superior in the Virtual Dissection Table group, with 84% agreeing that its direct CT/MRI datasets enhanced their clinical orientation compared to 71% of app users who relied on simplified radiology modules ($p = 0.03$). Conversely, histology model integration was a major strength of the app, with 81% of Group A students highlighting its usefulness for correlating microscopic and gross structures, while only 23% of Group B reported comparable exposure through the table interface ($p < 0.001$) (Table 3).

Table 3: Comparison of specific educational features between Complete Anatomy App and Virtual Dissection Table

Educational Feature	Complete Anatomy App (%)	Virtual Dissection Table (%)	*p* value
Augmented Reality usefulness	76%	Not available	–
Radiology orientation (CT/MRI datasets vs simplified modules)	71%	84%	0.03
Histology model integration	81%	23%	< 0.001

In terms of overall educational effectiveness, 87% of Complete Anatomy App users reported that the app improved their understanding of anatomy compared to 72% of Virtual Dissection Table users ($p = 0.01$). Exam preparedness also showed a notable difference, with 84% of Group A students expressing increased confidence versus 62% in Group B ($p < 0.001$). For clinical correlation, however, the Virtual Dissection Table was rated more highly, with 81% of users agreeing that it enhanced clinical and radiological understanding compared to 69% of the app users ($p = 0.04$) (Figure 2).

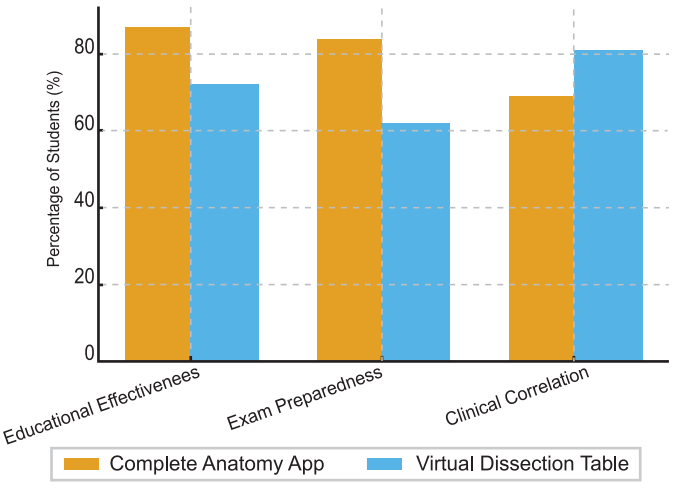


Figure 2: Comparison of Educational Outcomes

The cost analysis revealed striking differences. The institutional educator license for the Complete Anatomy App (covering 100 students) was approximately USD 2,500 annually with minimal maintenance costs, translating to about USD 25 per student per year[16]. By contrast, the Virtual Dissection Table required an initial investment of USD 80,000–100,000 with recurring annual maintenance of USD 5,000-7,000, resulting in a per-student cost of approximately USD 800-1,000 per year18-20 (Table 4). This made the app far more cost-effective and scalable, particularly in resource-limited institutions.

Table 4: Cost comparison between Complete Anatomy App and Virtual Dissection Table

Cost Component	Complete Anatomy App	Virtual Dissection Table
Initial Investment	Not applicable	USD 80,000–100,000
Annual License/ Maintenance	USD 2,500 (covers 100 students)	USD 5,000–7,000
Per-student Annual Cost	USD 25	USD 800–1,000
Cost-effectiveness	High (scalable, low maintenance)	Low (expensive, resource-intensive)

Overall, the Complete Anatomy App outperformed the Virtual Dissection Table in four out of five domains: ease of use, accessibility, exam

preparedness, and cost-effectiveness. The Virtual Dissection Table remained superior only in spatial realism and clinical radiological correlation. Statistical analysis confirmed significant differences between groups in most parameters, with p values < 0.05 for ease of use, satisfaction, exam preparedness, and clinical correlation. These findings suggest that while the Virtual Dissection Table provides a powerful demonstration tool for small groups, the Complete Anatomy App offers greater practicality, accessibility, and sustainability for large-scale undergraduate anatomy education in developing countries.

Discussion:

This study compared two widely recognized digital anatomy platforms-Complete Anatomy App and Virtual Dissection Table-and showed that each tool provided distinct advantages in undergraduate anatomy education. The app was rated higher for usability, accessibility, and exam preparedness, whereas the table received superior scores for spatial realism and radiological integration. These findings are consistent with earlier reviews indicating that digital anatomy tools vary in their effectiveness depending on the intended learning outcomes rather than one tool being universally superior[21-23].

Students in this study rated the Complete Anatomy App more highly, reflecting its portability, multi-device accessibility, and remote connectivity via cloud. Similar to previous research, mobile and tablet-based anatomy applications were shown to increase student engagement and inerest[24,25]. Augmented reality features were also valued, and earlier evidence demonstrated that AR can enhance interactive learning by projecting anatomical structures into real-world environments[24].

The Virtual Dissection Table was consistently rated higher for lifelike visualization, confirming prior findings that large-scale virtual dissection improves spatial understanding of anatomy[26]. Its use of CT and MRI datasets also supports radiology and surgical teaching, but the limitations of accessibility, group size, and high cost reported in this study are in agreement with earlier literature[27].

Feature-specific analysis highlighted that the Complete Anatomy App integrated histology and functional simulations, whereas the Virtual Dissection Table emphasized gross anatomy and radiology. This suggests that the two platforms are complementary rather than interchangeable, each contributing unique strengths to anatomy education. Cost-effectiveness was a critical determinant. The app was affordable and scalable, while the table required substantial investment and maintenance. This supports recommendations that digital tools must be evaluated not only for pedagogical benefit but also for sustainability in resource-limited institutions[28].

The novelty of this research lies in being the first direct side-by-side comparison of the Complete Anatomy App and Virtual Dissection Table in Bangladesh. While prior studies evaluated each tool separately, none systematically compared them through student-centered outcomes. This provides valuable evidence for curriculum planners in developing countries, where balancing limited resources with effective teaching method is essential.

Conclusion:

This study showed that the Complete Anatomy App was superior in usability, accessibility, exam preparedness, and cost-effectiveness, whereas the Virtual Dissection Table excelled in spatial realism and radiological integration. For resource-limited institutions, the app appears more practical, while the table remains valuable for advanced group teaching. An integrated approach could optimize learning outcomes.

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Ethical Clearance:
Ethical clearance was obtained from the Institutional Ethical Review Board (IERB) of Army Medical College Jashore prior to study. All methods were performed in accordance with the relevant guidelines and regulations.

Conflict of Interest:
The author declares no conflict of interest.

Funding:
No funding was received for this study.

Authors' Contributions:
Moin S led the study concept and design, developed the questionnaire, collected AMCJ data, performed statistical analysis, interpreted results, prepared all figures & tables, drafted the manuscript, and finalized the paper for submission. Ahmad M provided academic guidance, supervision throughout the study, and critical review of the manuscript drafts. Kamal AHM granted institutional permission and facilitated access for data collection at Dhaka Medical College. Khan ZM supported coordination and data collection from Dhaka Medical College students. Faysal T assisted in demonstration and operational understanding of the Virtual Dissection Table and contributed to technical support regarding its workflow. Munira FT, Chowdhury S, Rahman FN, Paul P, Biswas TR, and Faisal F contributed through academic feedback, manuscript reviewing, and supportive administrative/logistical roles during the study.

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