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Editorial

Original Articles

Editorial

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Honesty in Medical Education

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Medical education refers to the process of training individuals to become healthcare professionals. It encompasses basic medical education, specialist training, and continuing education to ensure clinical competence throughout a professional's career. It has a strong foundation in the social sciences and plays a crucial role in shaping the healthcare profession in addition medical education is a dynamic process that commences at the start of basic medical education (Medical School) and continues until a health care professional retires from active practice. Its goal is to prepare health care professionals to apply the latest scientific knowledge to promote health, prevent and cure human disease and mitigate symptoms.

The assumption of trust between students and institutions of medical education is anachronistic. With current technologies and countless available resources, teachers are no longer gatekeepers to the vast world of medical knowledge. This new access to information, along with an institution's lack of transparency and tendency to obscure poor student academic results, erodes trust from a student. This can then cause student anxiety as well as the adoption of hidden curriculums to offset perceived risk.[1–6] The emergence of this hidden curriculum can be directly linked to students being unsure of how to succeed in the medical profession while, on the other hand, transparency leads to students having stronger outcomes.[4-5]

Firstly trust is an essential component between students and teachers and can be gained through honest communication, contributing to healthy, respectful and fulfilling relationships.[7] Without a fundamental degree of trust within relationships, including those in medical education, the relationship will falter.[1,8–10]

Secondly, honesty is the foundation of healthy relationships.[7] The need for honesty, here rather than perhaps in all personal relationships, stems from the institutional desire to protect itself and its image, along with the difference in power dynamics between a medical school and its medical students. The moral and relational weight of responsibility rests on the institution to provide open information to students.

It has been observed that, senior faculty have an outdated view of how professional, interpersonal trust is established in the digital era. Classically, when a medical student was admitted into an institution, the faculty and textbooks residing there were the sole experts available. The student's fate was tied to the local knowledge and pedagogy as there was no counter narrative, and the experience of medical school was encapsulated within that singular institution. It is therefore logical that senior faculty would assume that trust in an institution would be endemic to the experience, as that was their lived reality of medical training.

In contrast, most current students are digitally adept at seeking out information and conducting their own research to advance their career aspirations. Furthermore, they have an overabundance of outside data points to compare their institution's curriculum against social media posts, corporate products for education and board preparation, medical education podcasts and instant communication with peers at other institutions to name a few. Therefore, the marketplace of ideas related to how one should navigate their medical school journey has been drastically increased, often with contradictory academic approaches being suggested. The plurality of choices sets up a tension between the student and institution, as questions arise for the student regarding the justification for the "local" pedagogy compared to the other options, especially in cases where a student is struggling with the curriculum.

There are two major faults that run under the foundation of such an assumption.

Firstly, psychologically students need to have the core belief that their medical school will properly train them for their future career goals. They require full faith that by putting in the extraordinary effort asked of them, the outcome will be desirable. Fostering a solid trust that maintains healthy relationships the kind we would like to see between students and institutions is not guaranteed, and it is the medical institution which seems to take for granted that they should be trusted while avoiding difficult conversations. Medical programs seem to take a Bayesian approach of relying on general outcomes as proof of their efficacy.

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However, the current generation of medical students come from a time where truth has a degree of malleability and therefore trust in long-standing institutions has to be earned. Furthermore, students feel the effects of the curriculum with or without the institution's honesty. They experience the growth in their knowledge and can compare that with progress on outside question banks. They also observe their fellow students and the reaction they have to the curriculum. Therefore, even without commenting, the reality of the data (Good or bad) is felt by students as they progress through their education.

Secondly, ethically students are independent agents. As separate entities from medical education institutions, they should have full access to the information available to make personal decisions. The choices a student makes while in medical school can have drastic impacts on their career prospects. They deserve to fully understand their level of academic readiness, which is likely to unfold and be perceptible, as they progress at their institution. As a field, we cannot on one hand argue for informed consent for patients, in which individuals receiving care should be prioritized as the cornerstone of all health decisions, but then fail to extend that agency of choice to our students who will comprise the next generation of physicians.

In conclusion unless there is further modification, the new integrated curricula are at risk of produce medical graduates deficient in the characteristics that have set physicians apart from other healthcare professionals, namely high-level clinical expertise based on a deep grounding in biomedical science and understanding of the pathologic basis of disease. The challenges for education of the best possible physicians are great but the benefits to medicine and society are enormous.

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Original Article

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Exploring Oral Hygiene Practice and Common Dental Problems among Primary School Students in Chattogram City, Bangladesh

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Abstract

Background: *Oral diseases continue to be a major public health concern globally, with a growing number of school-aged children affected by various oral health issues. In this context, the present study was conducted to assess oral hygiene practices and common dental problems among selected school-going children in Chattogram City.*

Materials and methods: *This descriptive cross-sectional study was conducted in November 2024 at Chattogram Cantonment Public College, Chattogram. A total of 312 students participated in the study. Data were collected through face-to-face interviews, followed by oral health check-ups using semi-structured questionnaires and checklists. Participants were selected using a convenient non-probability sampling method. The data were analyzed using SPSS version 27 and presented in tables and graphical formats.*

Results: *In this study, the majority of students (42.9%) were 11 years old, with a mean age of 11.07 ± 0.85 years. About 68% brushed their teeth in the nightafter takingmeal, whereas a significant number over 25% did not brush at night. Dental caries were present in 60.6% of the students, but only 10.9% had teeth that had been filled. Calculus was observed in approximately 43% of the students, and around 20% had gum bleeding. Additionally, about 15% of the students reported experiencing dental pain, while 31.1% suffered from tooth sensitivity.*

Conclusions: *This study reveals that many students experience various dental problems resulting from inadequate oral hygiene practices. Therefore, maintaining proper oral hygiene and seeking appropriate treatment is necessary.*

Key words

Dental problems; Oral hygiene; Practice; Primary school students.

Introduction

Oral health is a fundamental part of general health and has a lifelong impact on a person's quality of life. For children, maintaining good oral hygiene is crucial, as it affects their ability to eat, speak, learn and develop socially. Despite the importance of oral health, it remains an overlooked area in many low- and middle-income countries, including Bangladesh. Poor oral hygiene practices, inadequate awareness, limited access to dental services and socio-economic disparities are major contributing factors to the high burden of oral diseases among Bangladeshi school children.[1,2]

Studies in different regions of Bangladesh have shown alarming findings regarding the oral health status of school-aged children. In Dhaka, research has shown that a significant number of primary school children suffer from dental caries and periodontal problems, primarily due to irregular toothbrushing habits and a lack of parental involvement.[3] A similar study in Sylhet found a high prevalence of gingivitis and visible plaque, indicating poor oral hygiene behavior.[4] Furthermore, many children are unaware of the correct brushing techniques, the use of fluoride toothpaste, and the importance of regular dental visits.[5]

Chattogram, the second-largest city in Bangladesh, presents a diverse urban population with wide variations in income, education, and access to healthcare. While some school children may have access to private dental care, others, especially those from lower-income families, often lack basic oral health education and treatment. Research has shown that urban school children, despite living in cities, may still suffer from poor oral health due to limited preventive programs and unequal distribution of dental services.[6] Addressing these issues requires a detailed understanding of their current oral hygiene practices and their common dental problems.

Hence, this study aims to assess the oral hygiene habits and common oral problems of primary school children in a specific area, to promote optimal oral health that supports both their current well-being and their long-term health and quality of life.

Materials and methods

This descriptive cross-sectional study was conducted in November 2024 at Chattogram Cantonment Public College, Chattogram. It included primary school students

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aged 9 to 13 years. Data were collected through face-to-face interviews with the students, followed by a brief oral health check-up. A pre-tested semi-structured questionnaire and a checklist were used for data collection. A convenient non-probability sampling method was employed. Before the conduction of this study, written permission was obtained from the school authorities and the purpose of the study was clearly explained. The students were also informed about the objectives of the study and the data collection process. Participation was voluntary and students were free to withdraw at any time if they wished.
For the oral check-up, we used simple tools such as dental mirrors, caries probes, tweezers, and torches. Students from class one, class two, class three and those who did not wish to participate were excluded from the study. Data were finally collected from 312 students. The questionnaire was initially prepared in English and then translated into Bangla to ensure better understanding by the students. The checklist was used to collect data on oral health problems.

The data collection tool was divided into four sections. The first section gathered information about the students' socio-demographic background. The second section focused on their oral hygiene habits. The third section included findings from their oral health check-up, and the final section looked at their treatment needs. After data collection, the information was reviewed to ensure it was consistent, relevant, and of good quality. The data were then organized, coded, cleaned, sorted, and edited. Finally, the analysis was carried out using Microsoft Excel and IBM-SPSS version 26. The analysis process followed a plan based on the study's objectives and key variables. The results were shown in tables and graphs to present the categorical data clearly.

Results

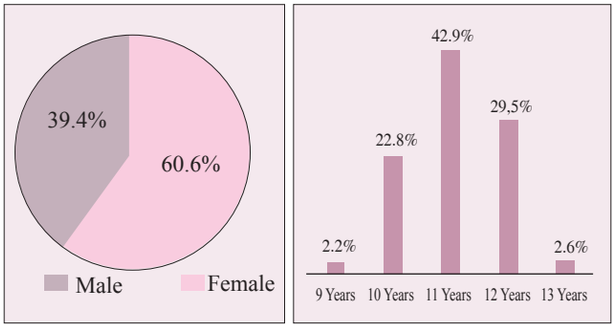

Figure I Distribution of students according to gender and age (n=312)

Figure I shows that among 312 participants, the majority of the students (60.6%) are male.All students are between the ages of 9 and 13 years, with the highest percentage (42.9%) being 11 years old and the lowest percentage (2.2%) being 9 years old.

Table I Distribution of siblings and religion of the students (n=312)

Siblings	Frequency	Percentage (%)
1 to 2	225	72.1
3 to 4	83	26.6
More than 4	4	1.3
Total	312	100.0

According to Table I, most students have 1 to 2 siblings (72.1%).

Table II Distribution of Oral Hygiene Practice of the students (n=312)

Brushing frequency	Frequency	Percentage (%)
1 time	119	38.1
2 times or more	192	61.5
Not at all	1	.3
Total	312	100.0
Brushing time at night	Frequency	Percentage (%)
After meal	210	67.3
Before meal	19	6.1
Not at all	83	26.6
Total	312	100.0
Interdental cleaning aids	Frequency	Percentage (%)
Dental floss	49	15.7
Interdental brush	14	4.5
Nothing	199	63.8
Thread	6	1.9
Toothpick	44	14.1
Total	312	100.0
Reason for changing the toothbrush	Frequency	Percentage (%)
Based on the duration of use	120	38.5
Change of color of bristles	35	11.2
Flaring of bristles	154	49.4
Injury to the gums	3	1.0
Total	312	100.0

Table II indicates that A significant portion (61.5%) brushes their teeth two times or more per day. Most students brush their teeth after meals at night (67.3%) and before meals. Additionally, most of the students (63.8%) do not use any material for interdental cleaning, while a small portion (15.7%) use dental floss.About 50% reported changing their toothbrush due to flaring of the bristles.

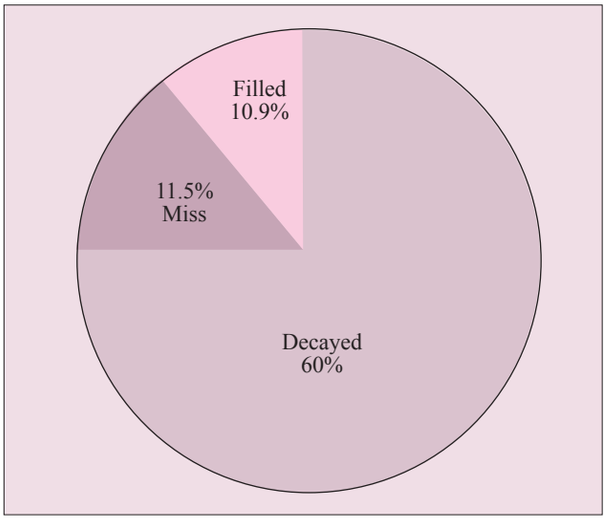

Figure 2 Distribution of students according to decayed, missed and filled teeth status (n=312)

Figure 2 shows that, according to the decayed, missing and filled teeth (DMFT) status of the 312 students, more than 60% have decayed teeth, 11.5% have missing teeth, and 10.9% have filled teeth due to dental caries.

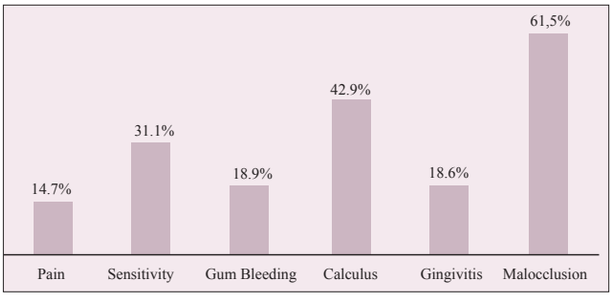

Figure 3 Distribution of students according to oral and dental problems (n=312)

Figure 3 shows that, among the 312 students, the majority have malocclusion (61.5%), about 14.7% suffer from dental pain, 31.1% have tooth sensitivity, 18.9% experience bleeding gums, 17.8% have gingivitis, and more than 40% have calculus on their teeth.

Discussion

This study was conducted among 312 primary school children in Chattogram City to evaluate their oral hygiene practices and dental problems. Among the participants, 60.6% were male and 39.4% were female. The students were between 9 and 13 years of age, with a mean age of 11.07 ± 0.85 years. Most students had 1 to 2 siblings (72.1%), while about 27% had 3 to 4 siblings. Out of the 312 students in this present study, 61.5% of students reported brushing two or more times daily. A cross sectional study conducted with rural primary-school children in Mathbaria, aged 5–12 years, found that only 17% brushed twice daily and 80.7% brushed once daily.[7] This notable difference suggests that the children in our study, conducted in an urban setting, exhibit significantly better oral hygiene practices compared to those in the rural population studied.

In terms of brushing time, night-time brushing habits showed that 67.3% brushed after dinner, while 26.6% did not brush at night. This lack of night-time brushing is clinically important, as it can contribute to plaque accumulation and dental caries.The study in Mathbaria, Pirojpur reported that 88.7% of students brushed in the morning before meals.[7] Both study findings indicate wrong oral hygiene practices in rural and urban areas.

In our current study of 312 students, 87.5% used both a toothbrush and toothpaste, while 12.5% used a toothbrush without toothpaste.In a comparative cross sectional study of 593 Bangladeshi school children (152 rural, 441 urban) 98.77% of urban school children and 88.2% of rural children used a toothbrush. About 99.04% of urban children and 74.3% of rural children used toothpaste along with the toothbrush. The proportion of children using both toothbrush and toothpaste in our study (87.5%) is lower than the urban subgroup in the comparative study, where almost all children (~99%) used toothpaste with a toothbrush.[8]

In this study, a majority of students (63.8%) did not use any interdental cleaning aids. Among those who did, 15.7% used dental floss, 14.1% used toothpicks, 4.5% used interdental brushes, and 1.9% used thread. Another cross-sectional study reported lower floss use (4.9%) and higher toothpick use (33.8%) indicating an overall limited use of interdental aids across studies.[8]

The reported symptoms included tooth sensitivity in 31.1% of students, gum bleeding in 18.9% and dental pain in 14.7%. Additionally, these findings are significantly less severe than the rural study by Sarwar et al., which reported 66.8% gingival bleeding and 69.6% caries prevalence.[7]

Dental caries experience among the students was relatively higher. A total of 60.6% had decayed teeth, 11.5% had missing teeth, and 10.9% had filled teeth due to caries. A study conducted in Sylhet city where 39.9% had tooth decay and 9.6% had fillings.[9] Another study conducted in Bangladesh showed that the overall dental caries prevalence was 57.5%.[10] This contrast suggests a greater burden of untreated caries and possibly delayed or inadequate dental care among the students in the present study, highlighting the need for improved oral health awareness and access to preventive and restorative services in this population.

In this study, the majority had malocclusion (61.5%), about 15% suffered from dental pain, more than 30% had tooth sensitivity, around 20% experienced bleeding gums, 17.8% had gingivitis, and a significant portion (40%) had calculus on their teeth. A study conducted in Udaipur, Rajasthan, reported a malocclusion rate of 36.42% and a gingivitis

prevalence of 84.37%.[11] Compared to our findings, the Indian study showed a much higher prevalence of gingivitis and a lower prevalence of malocclusion.

Conclusion

This study highlights a moderately satisfactory level of oral hygiene practices among primary school children in Chattogram city. However, significant gaps in oral health remain, including high rates of malocclusion, dental caries, and other related conditions.

Recommendation

It is recommended to implement regular school-based oral health awareness programs and routine dental screenings. Encouraging proper oral hygiene practices should be a priority.

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Disclosure

The author declared no competing interests.

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Original Article

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A Study on Musculoskeletal Disorders and Its Associated Factors among the Paients Attending Rehabilitation Services in a Selected Hospital in Dhaka City

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Md. Billal Hossain[4] Shirin Malek[5]

Abstract

Background: *Musculoskeletal conditions are the leading cause of disability worldwide, musculoskeletal burden of disease is increasing because of rapid ageing of populations, especially in developing countries. Study was conducted to assess the musculoskeletal pain and its associated factors among the patients attending rehabilitation services in a selected hospital in Dhaka city.*

Materials and methods: *A pretested, semi-structured questionnaire was used to collect the data and the sample size was 343.*

Results: *Study revealed that 5.80%, 24.70%, 44.10%, and 25.40% of the respondents belonged to their age group were ≤40 years, 41-50 years, 51-60 years, and ≥61 years respectively with mean age 44.54±13.85years. It was observed that 11.40%, 3.00%, 0.40%, 2.30%, 58.70%, 15.60%, 4.40%, 4.20% of the respondent's had complained neck pain, shoulder pain, upper limb pain, upper back pain, lower back pain, knee pain, leg & ankle pain and others respectively. This study revealed that degenerative diseases were 24.80%, intervertebral disc diseases were 35.60%, muscle spasm 36.20% and undiagnosed musculoskeletal disorders were 3.40%. In accordance with minimizing pain and disability 49.60% of the respondent received medications, 1.00% received surgery and 49.30% received several Physiotherapy interventions for rehabilitation. There were statistically significant associations between severity of pain with body mass index (p=0.002<0.05), daily working hours (p=0.023<0.05) and bending posture (p=0.002<0.003).*

Conclusion: *This study identified risk factors for musculoskeletal pain were working patterns, mal posture, daily working hours. However, for controlling pain and disability, medication, surgery and Physiotherapy interventions were given by the health care service providers.*

Key words

Degenerative diseases; Musculoskeletal disorders; Rehabilitation.

Introduction

Musculoskeletal Disorders (MSD) are dysfunctions or injuries that affect the musculoskeletal structures including muscles, bones, joints, tendons, nerves and ligaments. MSD, defined as diseases which affect the locomotor system including muscles, bones, joints, tendons and ligaments, have a growing impact worldwide. The burden of Musculoskeletal (MSK) diseases has increased significantly between 2000 and 2015, with MSK diseases being the second cause of years lived with disability worldwide. The burden of MSK diseases increased significantly between 2000 and 2015 and is high in Europe and it is strongly correlated with countries' gross domestic product per capita.[1] Musculoskeletal Pain Symptoms (MPS) are one of the most important consequences of musculoskeletal disorders MPS prevalence was significantly higher in females and statistically different among majors. MPS were significantly associated with increased clinical training load, mental stress symptoms, and smartphone average use timeanother study they found body MPS in neck, lower back and shoulder 12-month were the most prevalent (67.1% and 61.4%, 58.8% respectively.[2]

MPS are quite common, headache and back pain being most common symptoms. These symptoms are associated with prolonged use of computer and internet and often left unreported and unrelated.[3] MSK problems are a significant global health problem that have been rapidly increasing issue for the adult population. The International Labor Office reported that MSD has led to increased health problems in the working population. It is caused by physical factors such as repetitive movements, working in stressful situations, awkward situations, extreme positions or static positions. Psychosocial factors and depression are significant predictors of MSD among teachers.[4] Anxiety, concurrent low back pain and senior years of studies were significantly associated with the presence of neck pain. Taller students and prolonged smart phone usage appeared to be associated with the presence of neck pain.[5]

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Being physically active associated with lower risk of having musculoskeletal pain, while smoking habits and healthy eating were associated with higher pain when adjusting for age and gender.[6] Study found association between text messaging on mobile phones and musculoskeletal disorders.[7] Another study found that the high prevalence of neck pain and remarkable association with widowed/separated people who have low income and low educational level, who perform their occupational activities in sitting and leaning positions, and who reported having two or more diseases.[8] Office workers who were older, female, more experienced and work for longer hours, displayed higher risks for WMSDs.[9] The aim of this study was to investigate the musculoskeletal pain and its associated factors among adult populations attending rehabilitation services in a selected hospital in Dhaka city, Bangladesh.

Materials and methods

A descriptive type of cross-sectional study was conducted to assess the musculoskeletal pain and its associated factors among the patients attending rehabilitation services in a selected hospital with a sample size 343. The study was conducted inthe Bangladesh Spine and Orthopedic Hospital (BSOH) in the Dhaka city. A pre-tested, semi-structured questionnaire was used to collect the data on the basis of objectives and variables. A randomized sampling technique was used and data were collected through face-to-face interview. The study period was twelve months from January 2024 to December 2024. After collection of data, it was checked and rechecked with competently. The data analysis was carried out by using the Statistical Package for Social Sciences (SPSS 22 version). After analyzed the data all the findings were interpreted accordingly. Univariate, bivariate and multivariate analysis were done and diagram were prepared by the use of SPSS and Microsoft Office Excel.

Results

Table I Distribution of respondents by socio-demographic variables (n=343)

Table I shows that 5.80%, 24.70%, 44.10% and 25.40% of the respondents belonged to their age group were ≤40 years, 41-50 years, 51-60 years, and ≥61 years respectively with mean age 44.54±13.856.

Variables	Number (n)	Percentage (%)
Age (In years)		
≤40	20	5.80
41-50	85	24.70
51-60	151	44.10
≥61	87	25.40
Total	343	100.00
Mean ± SD	44.54±13.856	
Sex		
Male	207	60.30
Female	136	39.70
Total	343	100.00
Marital status		
Married	317	92.40
Unmarried	26	7.60
Total	343	100.00
Educational level		
Primary	81	23.60
Secondary	31	9.00
Higher Secondary	43	12.50
Graduate	147	42.90
Post Graduate & above	41	12.00
Total	343	100.00
Occupation		
Student	21	6.10
Housewife	106	30.90
Worker	5	1.50
Service Holder	152	44.30
Business	23	6.70
Retried	13	3.80
Dependent	23	6.70
Total	343	100.00

It was found that 60.3% of the respondents were male and 39.70 % were females, 92.40% were married and 7.60% were unmarried respectively. It was revealed that 23.60%, 9.00%, 12.50%, 42.90%, 12.00% of the respondent's education level were primary, secondary, higher secondary, post graduate and above respectively. Study also showed that 6.10%, 30.90%, 1.50%, 44.30%, 6.70%, 3.80%, 6.70% of the respondent's occupation were student, housewife, worker, service holder, business, retired, dependent respectively.

Table II Distribution of the respondents by associated factors of musculoskeletal pain (n=343)

Body mass index		
BMI	Frequency	Percentage (%)
Underweight (<18.5)	41	12.00
Normal weight (18.5-24.9)	195	56.90
Overweight (25-29.9)	91	26.50
Obese (>29.9)	16	4.70
Total	343	100.00
Mean ± SD	23.1649 ± 4.14	
Daily working hours		
Dailyworking hours	Frequency	Percentage (%)
≤8	68	19.80
9-12	165	48.10
≥13	104	30.30
Total	343	100.00
Mean ± SD	8.87± 2.75	
Working patterns		
Working pattern	Frequency	Percentage (%)
Sitting	157	45.70
Standing,	68	19.70
Bending	88	25.80
Weightlifting	30	8.80
Total	343	100.00

Table II shows that 12.00%, 56.90%, 26.50% and 4.70% of the respondents were underweight, normal weight, overweight and obese respectively with their mean age was 23.1649 ± 4.14. Table II reveals that 19.80%, 48.10% and 30.30% of the participants' daily working hours were 1.00 hours, 2.00hours and 3.00 hours respectively with their mean working hours of 8.87 ± 2.754. Table also II finds that 45.70%, 19.70%, 25.80 % and 8.80 % of the respondents' working patterns were sitting, standing, bending and weightlifting respectively.

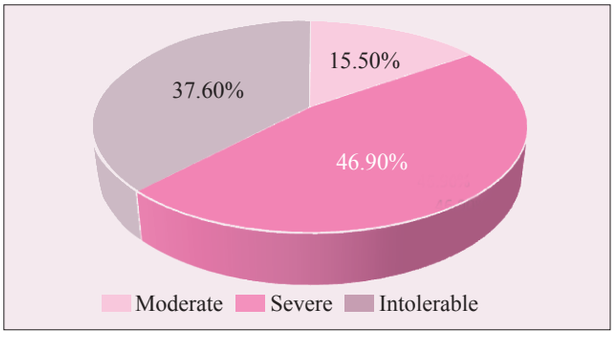

Figure 1 Distribution of the respondents by severity of pain

Figure 1 shows that 15.50%, 46.90%, and 37.60 % of the respondent's pain severity were moderate, severe and intolerable respectively.

Table III Distribution of respondents by pain-related information (n=343)

Variables	Number (n)	Percentage (%)
Area of Pain		
Neck pain	60	11.40
Shoulder pain	16	3.00
Upper limb pain	2	0.40
Upper back pain	12	2.30
Lower back pain	308	58.70
Knee pain	82	15.60
Leg & ankle pain	23	4.40
Others	22	4.20
Total	343	100.00
Nature of Pain		
Intermittent	274	79.9
Continuous	69	20.1
Total	343	100.00
Characteristics of Pain		
Tingling	27	4.10
Numbness	229	34.60
Burning	75	11.30
Radiating	279	42.20
Others	51	7.70
Total	343	100.00

Table III reveals 11.40%, 3.00%, 0.40%, 2.30%, 58.70%, 15.60%, 4.40%, 4.20% of the respondent's had complained neck pain, shoulder pain, upper limb pain, upper back pain, lower back pain, knee pain, leg and ankle pain and others respectively. It wasfound that 79.90% of the respondents' nature of pain were intermittent and 20.10 % were continuous. It is also observed that 4.10%, 34.60%, 11.30%, 42.20% and 7.70% of the respondents' characteristics of pain were tingling, numbness, burning, radiating and others.

Table IV Distribution of respondents by diagnosis and treatment and rehabilitation services related information (n=343)

Variables	Number (n)	Percent (%)
Diagnosis		
Muscle spasm	293	36.20
Degenerative diseases of the cervical spine	45	5.60
Degenerative diseases of lumber spine	32	4.00
Intervertebral Disc diseases	288	35.60
Osteoarthritis	90	11.10
Osteoporosis	33	4.10
Gout	1	0.10
Others	27	3.30
Total	343	100.00
Treatment		
Medicine	342	49.60
Surgery	7	1.00
Physiotherapy	340	49.30
Total	343	100.00
Rehabilitation Services		
Traction	36	2.30
Manual exercise	332	21.50
Manipulation	245	15.80
SWD	332	21.50
UST	324	21.00
IRR	23	1.50
Electrical stimulation	250	16.20
Wax bath	3	0.20
Total	343	100.00

It is found from table IV that 36.20%, 5.60%, 4.00%, 35.60%, 11.10%, 4.10%, 0.10% and 3.30% respondents' diagnoses were muscle spasm, degenerative diseases of the cervical spine, degenerative diseases of lumber spine, intervertebral disc diseases, osteoarthritis, osteoporosis, gout and others were respectively. It is revealed that 49.60%, 1.00% and 49.30% of respondent's treatment types were medication, surgery and Physiotherapy respectively. Table IV also illustrates that 2.30%, 21.50%,

15.80%, 21.50%, 21.00%, 1.50%, 16.20% and 0.20% of respondents' rehabilitation services were traction, manual exercise, manipulation, SWD, UST, IRR, electrical stimulation and wax bath were respectively.

Table V Association between pain severity with BMI, working hours and working pattern

Working Hours	Severity of Pain			Total	χ^2	p-value
	Moderate	Severe	Intolerable			
≤8	14(4.20)	39(11.60)	15(4.50)	68(20.20)	24.60	0.002
9-12	17(5.10)	73(21.70)	75(22.30)	165(49.00)		
≥13	18(5.30)	47(13.90)	39(11.60)	104(30.90)		
Total	49(14.60)	159(47.20)	129(38.40)	337(100.00)		
Bending Position	Severity of Pain			Total	χ^2	p-value
	Moderate	Severe	Intolerable			
Yes	18(5.30)	93(27.10)	76(22.20)	187(54.50)	11.37	0.023
No	35(10.20)	68(19.80)	53(15.40)	156(45.50)		
Total	53(15.50)	161(46.90)	129(37.60)	343(100.00)		
BMI	Severity of Pain			Total	χ^2	p-value
	Moderate	Severe	Intolerable			
<18.50-24.99	27(7.80)	104(30.30)	105(30.70)	236(68.90)	30.00	0.003
25-29.99	21(6.10)	49(14.30)	21(6.10)	91(26.50)		
≥30	5(1.50)	8(2.30)	3(0.90)	16(4.70)		
Total	53(15.50)	161(46.90)	129(37.60)	343(100.00)		

Results were published as number (%) χ^2 test was performed and $p<0.05$ was level of significance.

The table V shows that there were statistically significant association between pain severity with body mass index ($p=0.002<0.05$) daily working hours ($p=0.023<0.05$) bending posture ($p=0.002<0.003$).

Discussion

Average age of the respondents was 44.54±13.856, whereas most of the participants of this study age between 51-60 years. Study findings of comparison study carried out Sungai Petani Kedah, Malaysia, most of the respondents' age between 30-39 years.[10] Our study observed that 60.3% of the respondents were maleand rest of them were females. It is also found that majority of the respondents (88.10%) had complained musculoskeletal pain with BMI ≥18.5 and their mean age of 23.1649 ± 4.14.Another study found that respondents' BMI were 28.59±4.62.[11] Another study found significant cross-sectional associations between total body fat mass and widespread pain (SMD 0.49, 95% CI 0.37–0.61, p< 0.001).[12]

This study also observed that bending posture is associated with musculoskeletal pain. Another study found that Exposure to back twisted or bend, squatting or lying on knees and to carrying or lifting were associated with musculoskeletal pain in the back, whereas exposure to back twisted or bend, arms above shoulder and repeated arm movement were associated with pain in the shoulder. Exposure to back twisted or bend, repeated arm movement, squatting or lying on knees and to carrying or lifting were associated with musculoskeletal pain in the hip.[13] It is also revealed that 80.2% of the participants had complained musculoskeletal pain for working longer periods with a mean working hours of 8.87 ± 2.754. Another study they found long working hours were significantly related to work-related musculoskeletal symptoms in Korean wage workers.[14]

Our study also revealed that 58.70%, 15.60%, 11.40%, 4.40%, 4.20% 3.00%, 0.40%, 2.30%, of the respondent's had complained lower back pain, knee pain, neck pain, leg and ankle pain, others anatomical regions, shoulder pain, upper limb pain, upper back pain and respectively. Another study they found body sites with a higher prevalence of pain were: knee (63.5%), lumbar region (46.8%) hip (29%) and ankle (23%).[15] Another study they found body the upper limb was the most frequently affected body region among manufacturing sector workers: shoulder (24.8%) elbow and/or forearm (15.5%) wrist and/or hand (19.0%).[16] Another study they found body the most commonly affected body regions were the lower back, shoulders and knees.[17] It wasfound that 79.90% of the respondents' nature of pain were intermittent and 20.10 % were continuous. It is also observed that 4.10%, 34.60%, 11.30%, 42.20% and 7.70% of the respondents' characteristics of pain were tingling, numbness, burning, radiating and others.

Conclusion

This study foundthat working patterns, daily workloads, obesity and work-related environmental factors were influencing for musculoskeletal pain. However, this musculoskeletal pain is controlled by several conservative treatments including Physiotherapy interventions as well assurgery.

Recommendation

- The study findings will aware patients on postural correction, assist individual in muscle building at home on neck, back and knee.
- The study will recommend researchers for future research on association between environmental factors and MSK pain.

Disclosure

The authors declared no conflict of interest.

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Multidrug Resistance in Urinary and Wound Pathogens: A Microbiological Study in South-West Bangladesh

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Abstract

Background: *The emergence of Multidrug-Resistant (MDR) pathogens is a growing concern, particularly in the context of urinary and wound infections, which are common clinical conditions. This study aimed to assess the prevalence of MDR in bacterial isolates from urinary and wound infections in South-West Bangladesh.*

Materials and methods: *A cross-sectional microbiological study was conducted from October 2024 to December 2024, involving 62 clinical samples (51 midstream urine and 11 wound swabs) from patients attending Ibn Sina hospital and Nurul Islam Diabetes centre in Jashore. Samples were processed using standard microbiological techniques for bacterial isolation, identification, and antimicrobial susceptibility testing by the Kirby-Bauer disk diffusion method. Resistance to at least one agent in three or more antimicrobial categories was defined as Multidrug Resistance (MDR). Descriptive statistical analysis was performed to determine the distribution of bacterial species and their MDR profiles.*

Results: *Among urinary isolates, Escherichia coli was the predominant pathogen (58.8%), followed by Klebsiella pneumoniae (15.7%) and Pseudomonas aeruginosa (9.8%). In wound swabs, P. aeruginosa was the most frequent pathogen (36.4%), followed by K. pneumoniae and Staphylococcus aureus (18.2% each). MDR was most commonly observed in E. coli (80.0%) and K. pneumoniae (75.0%) among urinary isolates. Similarly, high MDR rates were noted in P. aeruginosa (75.0%) and K. pneumoniae (100%) in wound isolates. A high rate of resistance was observed against first-line antibiotics such as ampicillin, ceftriaxone, and cotrimoxazole, whereas relatively lower resistance was noted against amikacin, piperacillin-tazobactam, and carbapenems.*

Conclusion: *The findings underscore a significant prevalence of MDR pathogens in both urinary and wound infections in South-West Bangladesh, particularly among E. coli and P. aeruginosa. This highlights the urgent need for enhanced infection control measures, appropriate antibiotic stewardship, and the development of alternative therapeutic strategies to combat MDR infections in the region. Further surveillance is essential to monitor trends in antimicrobial resistance and guide clinical practice.*

Key words

Antimicrobial Resistance (AMR); *Escherichia coli; Klebsiella pneumoniae;* Multidrug Resistance (MDR); Urinary Tract Infection (UTI); Wound infection.

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Introduction

Urinary Tract Infections (UTIs) are the second most common type of bacterial infection globally and represent a leading cause of hospital-acquired infections, accounting for approximately 35% of all nosocomial cases. An estimated 250 million UTIs occur worldwide annually, with clinical presentations ranging from asymptomatic bacteriuria to severe urosepsis. The primary causative agents of UTIs are bacteria, with *Escherichia coli* being the most frequently isolated organism in uncomplicated cases. However, in complicated infections, there is a notable shift toward more resistant pathogens such as *Klebsiella, Proteus, Serratia, Enterobacter* and *Pseudomonas species.*[1,2]

Gram-positive uropathogens like *Staphylococcus saprophyticus, Enterococcus faecalis, Streptococcus agalactiae, Streptococcus pyogenes* and *Staphylococcus aureus* are also commonly encountered and often exhibit resistance to multiple antibiotic classes. The treatment of UTIs typically involves a wide range of antimicrobial agents, with drug selection influenced by the infection's severity and recurrence status.[3,4] However, the increasing prevalence of Multidrug-Resistant (MDR) strains has significantly complicated treatment strategies. High levels of antimicrobial resistance among uropathogens are

closely linked to antibiotic overuse and empirical prescribing practices.[5,6] Given the regional variability in pathogen distribution and susceptibility, local epidemiological data are essential for informing effective treatment regimens.[7-9] Similarly, wound infections pose a major clinical concern, particularly in resource-limited settings like Bangladesh. Wounds provide a favorable environment-warm, moist and nutrient-rich-for bacterial colonization and subsequent infection.[6,7] Infected wounds are often characterized by high microbial loads, prolonged inflammation and weakened host immune responses.[8] Pathogens commonly associated with wound infections include *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Streptococcus pyogenes, Proteus species* and *Enterococcus species*.[9] In low-income regions, wound infections contribute significantly to preventable illness and death.[10,11] The bacterial profile and resistance patterns in these infections often differ between hospitals and regions, reinforcing the need for localized surveillance.[12] While resistance may occur naturally, its rapid escalation is largely driven by inappropriate antibiotic use in both human and veterinary medicine. Resistance mechanisms frequently target essential microbial processes such as cell wall synthesis, DNA replication, protein production, and membrane function.[13-15] Furthermore, in Bangladesh and many other developing countries, the absence of strict regulations enables over-the-counter access to antibiotics without prescriptions, leading to widespread misuse and accelerating the spread of MDR organisms.[16,17]

Although some studies have assessed Antimicrobial Resistance (AMR) in isolated specimen types, comprehensive evaluations combining both urinary and wound infections are limited, especially in the rural and semi-urban regions of Bangladesh. Therefore, the present study aims to investigate the prevalence of multidrug resistance among bacterial pathogens isolated from urinary and wound samples in South-West Bangladesh, thereby contributing valuable data to guide local infection control strategies and antibiotic stewardship.

Materials and methods

This cross-sectional microbiological study was conducted in South-West Bangladesh over a defined period from October 2024 to December 2024, aiming to assess multidrug resistance among bacterial isolates from urinary and wound infections. A total of 62 clinical samples, comprising 51 midstream urine specimens and 11 wound swab specimens, were collected from patients attending Ibn Sina Hospital and Nurul Islam Diabetes Centre in Jashore. Urine samples were collected using the midstream clean-catch technique in sterile, wide-mouthed containers after proper instructions to minimize contamination. Wound swabs were obtained under aseptic conditions using sterile cotton-tipped applicators, carefully rotating over the base of the wound to ensure an adequate sample of viable pathogens. Upon collection, all specimens were immediately transported to the microbiology laboratory and processed within two hours to maintain specimen integrity. Each urine sample was inoculated with a calibrated loop onto Cystine-Lactose-Electrolyte-Deficient (CLED) agar and MacConkey agar to selectively promote the growth of uropathogens and differentiate lactose fermenters. Blood agar and Chocolate agar were used for wound swab samples to facilitate the recovery of both fastidious and non-fastidious organisms. Inoculated media were incubated aerobically at 37°C for 18 to 24 hours. Plates were examined for bacterial growth, and colony morphology was recorded. Bacterial isolates were subjected to Gram staining and subsequently identified through a series of standard biochemical tests, including catalase, coagulase, oxidase, indole, citrate utilization, urease activity, Triple Sugar Iron (TSI) reaction, and motility assessments. In cases requiring further confirmation, commercially available identification systems, such as API 20E (bioMérieux, France), were employed for gram-negative organisms. Antimicrobial susceptibility testing of all significant isolates was performed using the Kirby-Bauer disk diffusion method on Mueller-Hinton agar, following the guidelines set by the Clinical and Laboratory Standards Institute (CLSI, 2023). Antibiotics tested included ampicillin, amoxicillin-clavulanic acid, ceftriaxone, cefotaxime, ceftazidime, ciprofloxacin, levofloxacin, gentamicin, amikacin, nitrofurantoin (For urinary isolates) piperacillin-tazobactam, imipenem and meropenem. Interpretation of susceptibility was based on zone diameter breakpoints specified by CLSI. Multidrug resistance was defined as resistance to at least one agent in three or more different antimicrobial categories. The use of standard reference strains ensured quality control for culture, identification, and susceptibility testing procedures, specifically Escherichia coli ATCC 25922 and Staphylococcus aureus ATCC 25923, which were processed simultaneously with clinical isolates. All microbiological and susceptibility data were entered and curated using Microsoft Excel 2019 and analyzed using IBM SPSS Statistics version 25. Descriptive statistics, including frequencies and percentages, were calculated to determine the distribution of bacterial species and their multidrug resistance profiles among urinary and wound isolates.

Results

Table I Distribution of bacterial isolates from urine and wound swab samples (n = 62)

Pathogen	Urine Isolates (n=51)	Percentage (%)	Wound Isolates (n=11)	Percentage (n=11)
Escherichia coli	30	58.8%	2	18.2%
Klebsiella pneumoniae	8	15.7%	2	18.2%
Pseudomonas aeruginosa	5	9.8%	4	36.4%
Staphylococcus aureus	4	7.8%	2	18.2%
Proteus mirabilis	3	5.9%	1	9.0%
Enterococcus faecalis	1	2.0%	0	0.0%
Total	51	100%	11	100%

Table I shows the distribution of bacterial isolates recovered from urine and wound swab samples. Escherichia coli was the predominant pathogen among urinary isolates (58.8%), while Pseudomonas aeruginosa was the most frequently isolated organism from wound swabs (36.4%).

Table II Multidrug Resistance patterns among bacterial isolates

Pathogen	MDR in Urine Isolates (n=51)	Percentage (%)	MDR in Wound Isolates (n=11)	Percentage (%)
Escherichia coli	24	80.0%	1	50.0%
Klebsiella pneumoniae	6	75.0%	2	100%
Pseudomonas aeruginosa	3	60.0%	3	75.0%
Staphylococcus aureus	2	50.0%	1	50.0%
Proteus mirabilis	2	66.7%	1	100%
Enterococcus faecalis	0	0.0%	0	0.0%

Table II highlights the Multidrug Resistance (MDR) rates among the bacterial isolates. MDR was predominantly noted among gram-negative organisms, particularly *E. coli* and *K. pneumoniae.* High MDR rates were also evident among *Pseudomonas aeruginosa* and *Proteus mirabilis* in both urine and wound swab samples.

Table III Antibiotic Resistance profiles of bacterial isolates

Antibiotic	*E. coli* (n=32)	*K. pneumoniae* (n=10)	*P. aeruginosa* (n=9)	*S. aureus* (n=6)	*P. mirabilis* (n=4)
Ampicillin	28 (87.5%)	9 (90.0%)	-	4 (66.7%)	3 (75.0%)
Amoxicillin-Clavulanic Acid	22 (68.8%)	7 (70.0%)	-	2 (33.3%)	2 (50.0%)
Ceftriaxone	24 (75.0%)	8 (80.0%)	7 (77.8%)	3 (50.0%)	3 (75.0%)
Cefixime	23 (71.9%)	7 (70.0%)	6 (66.7%)	2 (33.3%)	2 (50.0%)
Ciprofloxacin	23 (71.9%)	6 (60.0%)	5 (55.6%)	2 (33.3%)	2 (50.0%)
Levofloxacin	21 (65.6%)	6 (60.0%)	5 (55.6%)	2 (33.3%)	2 (50.0%)
Doxycycline	18 (56.3%)	5 (50.0%)	4 (44.4%)	1 (16.7%)	2 (50.0%)
Cotrimoxazole (TMP-SMX)	25 (78.1%)	8 (80.0%)	6 (66.7%)	3 (50.0%)	3 (75.0%)
Gentamicin	12 (37.5%)	4 (40.0%)	4 (44.4%)	1 (16.7%)	1 (25.0%)
Amikacin	5 (15.6%)	2 (20.0%)	2 (22.2%)	0 (0.0%)	0 (0.0%)
Nitrofurantoin (Urine only)	7 (21.9%)	3 (30.0%)	-	-	1 (25.0%)
Piperacillin-Tazobactam	6 (18.8%)	3 (30.0%)	3 (33.3%)	-	1 (25.0%)
Imipenem	3 (9.4%)	2 (20.0%)	2 (22.2%)	0 (0.0%)	0 (0.0%)
Meropenem	2 (6.3%)	1 (10.0%)	1 (11.1%)	0 (0.0%)	0 (0.0%)

Table III details the antibiotic resistance profiles among the major isolated pathogens. High resistance was observed against first-line antibiotics such as ampicillin, ceftriaxone, cefixime and cotrimoxazole. Fluoroquinolones (Ciprofloxacin, levofloxacin) also demonstrated notable resistance rates. Resistance to doxycycline was moderate across all isolates. On the other hand, low resistance was noted to amikacin, piperacillin-tazobactam, and carbapenems (Imipenem and meropenem) suggesting their continued efficacy for treatment against multidrug-resistant pathogens.

Discussion

This study provides important insights into the microbiological landscape and Multidrug Resistance (MDR) patterns among urinary and wound pathogens in South-West Bangladesh. The findings reflect a concerning trend of high MDR prevalence among commonly isolated bacteria, echoing global concerns about rising Antimicrobial Resistance (AMR) particularly in low and middle-income countries like Bangladesh. Among the urinary isolates, Escherichia coli was the predominant pathogen, accounting for 58.8% of cases, a finding consistent with numerous previous studies where *E. coli* remains the leading cause of Urinary Tract Infections (UTIs) globally.[1-3] The high isolation rate of Pseudomonas aeruginosa (36.4%) from wound infections also aligns with its recognized role as a significant opportunistic pathogen in skin and soft tissue infections, particularly in hospital settings. The presence of *Klebsiella pneumoniae, Staphylococcus aureus* and *Proteus mirabilis* further emphasizes the diversity of pathogens implicated in these infections. The overall MDR rates observed in this study were alarmingly high, particularly among *E. coli* (80% in urinary isolates) and *K. pneumoniae* (75% in urinary isolates and 100% in wound isolates). Similarly, P. aeruginosa showed substantial MDR (60% in urine and 75% in wound swabs). These results are in line with reports from other regional studies in South Asia that have documented escalating resistance among gram-negative organisms to multiple antibiotic classes.[12] Resistance to first-line antibiotics, including ampicillin, ceftriaxone and cotrimoxazole, was particularly notable across all major isolates. For instance, *E. coli* demonstrated 87.5% resistance to ampicillin and 75.0% to ceftriaxone, highlighting the reduced efficacy of commonly used empirical therapies. The considerable resistance observed against fluoroquinolones such as ciprofloxacin and levofloxacin is particularly concerning given their frequent use in outpatient and hospital settings for UTIs and wound infections. This phenomenon may be attributed to widespread misuse, over-the-counter availability, and inappropriate prescribing practices, as well as limited antimicrobial stewardship initiatives in the region.[5,6] On a positive note, relatively lower resistance rates to amikacin, piperacillin-tazobactam and carbapenems (Imipenem and meropenem) were observed across most isolates. This suggests that these agents still retain significant therapeutic value against MDR pathogens. However, the emerging resistance to carbapenems, albeit low (6.3% to 22.2% depending on the pathogen) is worrisome, as it may herald the onset of Carbapenem-Resistant Enterobacterales (CRE)

an urgent public health threat.[18,19] The resistance pattern in *Staphylococcus aureus* was also notable, with 50% of isolates exhibiting MDR. Although resistance rates were comparatively lower for gentamicin and doxycycline, the presence of significant resistance to beta-lactams and fluoroquinolones suggests the possible circulation of Methicillin-Resistant *Staphylococcus aureus* (MRSA) strains, confirmatory testing (e.g. Cefoxitin disk test or mecA gene detection) was not performed in this study. The lack of multidrug resistance among the Enterococcus faecalis isolates is an interesting finding; however, due to the low number of isolates, broad conclusions cannot be drawn regarding resistance trends among enterococci in this population.[20]

The high prevalence of MDR pathogens identified in this study has important clinical and public health implications. Infections caused by MDR organisms are associated with prolonged hospital stays, increased healthcare costs, and higher morbidity and mortality rates.[21] These findings underscore the urgent need for regular local surveillance of antimicrobial resistance, implementation of stringent infection control measures and promotion of rational antibiotic use through robust antimicrobial stewardship programs.[22]

Limitations

Several limitations of this study should be acknowledged. The relatively small sample size and two-center design may limit the generalization of the findings to the broader population of South-West Bangladesh. Furthermore, molecular studies to identify resistance mechanisms (e.g. Extended-spectrum beta-lactamase production and carbapenemase genes) were not conducted, which could have provided deeper insights into the genetic basis of observed resistance patterns. Nevertheless, this study provides essential baseline data that can inform local empiric antibiotic prescribing policies and highlights the urgent need for coordinated efforts to combat the rising tide of multidrug-resistant infections in the region.

Conclusions

This study highlights the alarming prevalence of Multidrug-Resistant (MDR) bacterial pathogens in both urinary and wound infections in South-West Bangladesh. *Escherichia coli, Klebsiella pneumoniae* and *Staphylococcus aureus* were among the most frequently isolated organisms, with a significant proportion demonstrating resistance to commonly used antibiotics. The findings underscore the critical importance of continuous surveillance of antimicrobial resistance patterns at the local level. The implementation of strict antibiotic stewardship programs, infection control protocols and public awareness campaigns is essential to mitigate the spread of MDR pathogens. Moreover, region-specific antibiotic prescribing guidelines based on updated sensitivity profiles are necessary to ensure effective clinical management and preserve the efficacy of existing antibiotics.

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Disclosure

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Original Article

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Dynamics of White Blood Cell and Platelet Counts during 35 Days of Blood Storage: A Hematological Analysis

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Abstract

Background: *Blood storage is a critical aspect of transfusion medicine, but prolonged storage can lead to alterations in hematological parameters, particularly White Blood Cell (WBC) and platelet counts. Understanding these changes is essential for ensuring the efficacy and safety of stored blood. This study aimed to analyze the dynamics of WBC and platelet counts in stored blood over a 35-day period.*

Materials and methods: *A longitudinal prospective study was conducted at the Department of Transfusion Medicine, Bangladesh Medical University (BMU) Dhaka, from January 2023 to January 2024. Forty-two whole blood samples from healthy donors were collected and stored at 2-6°C in CPDA-1 anticoagulant-containing blood bags. Complete Blood Count (CBC) analyses were performed on days 0, 7, 14, 21, 28 and 35 using an automated hematology analyzer. Statistical analyses were conducted using SPSS version 22.0, with a significance level set at p<0.05.*

Results: *The mean WBC count showed a significant decline from 5.76±1.45 ($x10^9$/L) on day 0 to 3.84±1.05 ($x10^9$/L) on day 35 (p<0.05). Similarly, the mean platelet count decreased significantly from 216.69±70.09 ($x10^9$/L) on day 0 to 95.93±42.02 ($x10^9$/L) on day 35 (p<0.05). These reductions suggest potential loss of viability of WBCs and platelets over the storage period.*

Conclusion: *WBC and platelet counts exhibit a significant decline during 35 days of blood storage, which may impact transfusion efficacy. Further studies are required to assess the viability and functionality of stored cells and explore potential interventions to mitigate storage-related deterioration.*

Key words

Blood storage; hematological analysis; Platelet count; Transfusion medicine; White blood cells.

Introduction

Since the beginning of human history blood has been recognized as a vital force, the essence of life. Now transfusion of blood not only supports the life of critically ill patients but also aims for use as a remedy for various degenerative conditions. The main principles of transfusion lie in safe and effective blood supply, and adequate oxygen delivery as well as to reduce the complications of anemia, thrombocytopenia, and also other medical disorders. The cellular components of whole blood are red blood cells, platelets and white blood cells.[1] Plasma is the non-cellular component of whole blood composed of water, sugars, fats, proteins, and salt. After the collection of whole blood, it is stored at a specific temperature for a certain period. Proper storage and preservation of blood is essential to ensure a readily available safe blood supply for Transfusion Medicine. Blood collection and storage systems licensed by the Food and Drug Administration (FDA) allow red cells to be stored for up to 42 days, while the median duration of storage of transfused red cell units in the United States is 15 days.[2] Blood is stored in CPDA-1 anticoagulant solution containing blood bag at 2-6°C for 5 weeks (35 days). It was developed in 1968 and shown to permit whole blood storage for 5 weeks (35 days). CPDA-1 anticoagulant solution is composed of Citrate (Chelates ionized calcium that prevents coagulation) Phosphate (acts as a buffer hence maintains the pH of the blood), Dextrose (A source of energy for the red cells) Adenine (increases the post-transfusion survival of red cells to 35 days

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because of enhanced ATP production). During storage, blood experiences a sequence of hematological changes that minimize the life span and purpose, and the most affected product is whole blood.[3] The deterioration in blood and cellular constituents happens almost immediately after it is removed from the donor and recipients in need of transfusions rely on the blood and blood components safety and potency.[4] To minimize the dangers linked with blood transfusion, advanced anticoagulants, additive solutions, red blood cell membrane stabilizers, preservatives and bags were manufactured.[5] Even with these developments, several changes in blood stored for transfusion have been encountered and referred to as red blood cell storage lesions, which can affect the efficacy of blood transfusion.[6] Preserved blood cells undergo progressive structural and functional changes that may reduce red cell function and vitality after transfusion.[2] The changes in hematological parameters namely HGB, HCT, MCV, MCH, MCHC, RBC count, WBC count and Platelet count. This study was conducted to understand the hematological changes of blood, taking place in stored blood to make future blood transfusions at a level of safety.

Materials and methods

This longitudinal prospective study was conducted at the Department of Transfusion Medicine, Bangladesh Medical University (BMU) Dhaka, from January 2023 to January 2024. The study aimed to analyze the dynamics of White Blood Cell (WBC) and platelet counts in stored blood over 35 days. The study population comprised stored blood samples collected from healthy donors who met the eligibility criteria of the department. The preliminary screening of each donor included a complete medical history, physical examination and screening for Transfusion-Transmitted Infections (TTIs). Donors were required to be in good health, mentally and physically fit, aged between 18 and 60 years, weigh more than 50 kg and meet specific criteria regarding pulse rate, blood pressure, hemoglobin levels, and medical history. Donors with temporary deferral conditions such as recent infections, pregnancy, history of surgery or medication use were excluded for specified periods, while individuals with permanent deferral conditions such as cancer, heart disease, hepatitis, and HIV/AIDS were permanently excluded.

The study employed a convenient sampling method, and the required sample size was determined using statistical calculations based on a 5% level of significance and 80% power, resulting in a total of 42 samples. Donors were informed about the study objectives, and written consent was obtained before participation. The interview process involved face-to-face interaction, an interviewer-administered questionnaire, and a checklist for donor selection. Each blood donor's demographic details, blood group, donation history and medical background were documented. A total of 450 ml of whole blood was drawn from each donor into CPDA-1 anticoagulant-containing blood bags. After thorough mixing with anticoagulant, a 20 ml sample was transferred into a satellite bag and stored at 2-6°C for the study, while the remaining blood was utilized for transfusion purposes. The Complete Blood Count (CBC) of stored blood samples was analyzed on days 0, 7, 14, 21, 28 and 35 using an automated hematology analyzer at the department.

Data collection tools included a general questionnaire for socio-demographic data, a checklist for donor selection, and laboratory investigation reports. The study variables included donor age, sex, blood group (ABO and Rh) and hematological parameters such as red blood cell count, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, WBC count and platelet count. All blood collection and storage procedures followed Standard Operating Procedures (SOPs) to maintain quality assurance. Precautions were taken to avoid contamination and infection, including the use of sterile equipment and proper disposal of blood collection materials. Blood bags were stored in a temperature-controlled refrigerator, with temperature logs maintained and checked twice daily.

Ethical considerations were strictly adhered to, with all participants providing informed consent. The study did not impose any financial burden on participants, and they had the freedom to withdraw at any time. Approval was obtained from the Institutional Review Board (IRB) of BMU. All collected data, including laboratory test results, were kept confidential, and accessible only to investigators and authorized personnel. Statistical analyses were performed using SPSS version 22.0 for Windows. Quantitative variables were expressed as means ± standard deviations and analyzed using the Friedman test for non-parametric distributions. Qualitative data were presented as frequencies and percentages. A p-value of <0.05 was considered statistically significant. To ensure quality assurance, direct supervision by the principal investigator and co-investigators was maintained throughout the study, with periodic reviews conducted by research supervisors. The study adhered to all ethical guidelines and institutional protocols to ensure the validity and reliability of the findings.

Results

Table I Distributions of the study participants by demographic characteristics (n=42)

Demographic Characteristics	Frequency	Percentage (%)
Age (in years)		
≤20	4	9.5
21-30	19	45.3
31-40	13	31.0
>40	6	14.4
Mean±SD Range (Min-max)	29.69±7.83 18-46	
Sex		
Male	38	90.5
Female	4	9.5

Table I shows the distributions of the study participants by demographic characteristics. It was observed that almost half (45.3%) of participants belonged to age 21-30 years. The mean age was 29.69±7.83 years with ranged from 18 to 46 years. Among the participants 38 were male (90.5%) and 4 were female (9.5%).

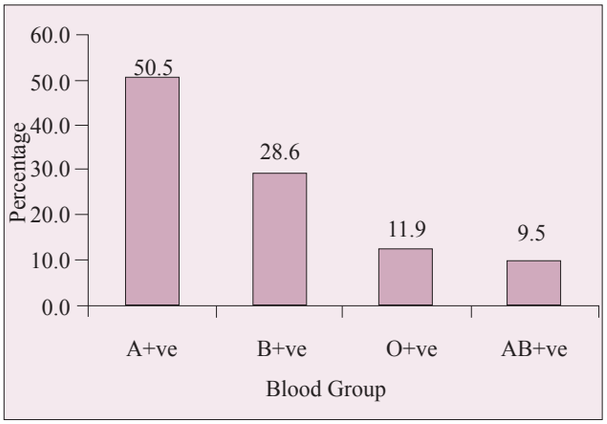

Figure 1 Distribution of the study participants by blood group

Figure 1 shows the distributions of the study participants by blood group. The participants' blood group distribution revealed that A+ve 21 (50.0% of them) and B+ve 12 (28.6% of them) were the two most prevalent blood types. The least common blood groups were O+ve 5(11.9%) with AB+ve having the lowest frequency 4(9.5%).

Table II Distributions of the study participant by WBC count on days 0, 7, 14, 21, 28 and 35 days of storage (n=42)

Days	WBC (× 10^9/L)		p-value
	Mean±SD	Range (Min-max)	
Day 0	5.76±1.45	3.7-9.9	<0.05[s]
Day 7	4.91±1.24	3.2,8.3	
Day 14	4.6±1.08	2.7-6.5	
Day 21	4.32±1	2.6-6.3	
Day 28	4.11±1.14	1.5-6.7	
Day 35	3.84±1.05	1.5-6.1	

Note: WBC was 3.84±1.05 (×10^9/L) on 35 days as a viability test was not done this count might indicate non-viable WBC.

s= significant.

p-value reached from the Friedman test

The mean WBC was 5.76±1.45 (×10^9/L) in 0 days, 4.91±1.24 (×10^9/L) in 7 days, 4.6±1.08 (×10^9/L) in 14 days, 4.32±1 (×10^9/L) in 21 days, 4.11±1.14 (×10^9/L) in 28 days, 3.84±1.05 (×10^9/L) in 35 days. WBC was decreased significantly with different follow-ups.

Table IV Distributions of the study participants by platelet count on days 0, 7, 14, 21, 28 and 35 days of storage (n=42)

Days	Platelet (× 10^9/L)		p-value
	Mean±SD	Range (Min-max)	
Day 0	216.69±70.09	120-388	<0.05[s]
Day 7	150.29±45.7	64-250	
Day 14	149.67±52.61	85-280	
Day 21	143.1±66	50-297	
Day 28	130.5±58.25	64-297	
Day 35	95.93±42.02	40-197	

Note: Platelet was 95.93±42.02 (×10^9/L) on 35 days as viability test was not done this count might indicate non-viable Platelet.

S = Significant.

p-value reached from the Friedman test.

The mean Platelet was 216.69±70.09 (×10^9/L) in 0 days, 150.29±45.7 (×10^9/L) in 7 days, 149.67±52.61 (×10^9/L) in 14 days, 143.1±66 (×10^9/L) in 21 days, 130.52±58.25 (×10^9/L) in 28 days, 95.93±42.02 (×10^9/L) in 35 days. Platelet count was decreased significantly.

Discussion

In vitro studies provide significant evidence documenting alterations in hematological parameters during storage. When categorizing observed changes in hematological parameters according to whether mean values during the initial days were maintained (Below the lowest normal value) remained normal (Within the normal range) or increased (Above the highest normal value) some of the analyzed parameters exhibited a decrease or increase.[7] This longitudinal prospective study aimed to assess the hematological parameters (WBC count, platelet count) in whole blood stored on days 0, 7, 14, 21, 28 and 35. The objective was to compare the changes in hematological parameters during the storage period at these intervals. A total of 42 selected stored blood samples collected from healthy donors after fulfilling the eligibility criteria in the Department of Transfusion Medicine, Bangladesh Medical University, Dhaka, from January 2023 to January 2024, were included in this study. Donors were required to be in good health, mentally and physically fit, and not individuals with multiple sexual partners, drug addiction, or incarceration history. The donor selection followed established guidelines. The present study findings were discussed and compared with previously published relevant studies. In this study, 45.3% of participants were aged 21-30 years, indicating a predominant representation from this age group. Following closely were individuals aged 31-40 years, constituting 31.0% of the participants. The age group above 40 years accounted for 14.4%, while those between 18 and 20 years comprised 9.5% of the study population. The mean age of participants was

29.69±7.83 years, with an age range spanning from 18 to 46 years. Previous studies provide insights into the significance of the observed age distribution concerning hematological variations. A study reported a mean age of 26.6±4.7 years, while another observed a slightly higher mean age of 29.8±6.4 years.[8,9] A substantial gender disparity was observed, with 90.5% of participants being male and 9.5% female, indicating a distinct male predominance in blood donation. A prior study explored gender patterns in blood donation, providing insights into whether the observed male predominance aligns with broader trends.[8] Regarding blood group distribution, most participants had A+ blood type, followed by B+, O+, and AB+. This distribution contrasts with another study where O-positive was the most prevalent at 35.7%, followed by O-negative and A-positive, highlighting variations in blood type frequencies across studies.[10] The baseline mean WBC count was 5.76±1.45 (x10^9/L) at day 0, followed by a gradual decline to 4.91±1.24 at day 7, 4.6±1.08 at day 14, 4.32±1 at day 21, 4.11±1.14 at day 28, and 3.84±1.05 at day 35. Statistical analysis revealed a significant difference ($p<0.05$) in WBC counts over time. A previous study reported similar variations in TWBC count during storage, with a notable decline observed beyond 14 days.[7] The reduction in WBC count is attributed to ATP depletion, leading to loss of viability. Additionally, leukocytes contribute to white blood cell-platelet micro-aggregate formation, consisting of WBCs, platelets, fibrin, cold globulin and cellular debris.[11] The clinical implication is that stored blood for transfusion may be less effective in managing aplastic anemia and other leucopenic conditions, where neutropenia is a critical factor.[12] Studies conducted in Nigeria and Italy reported similar significant reductions in WBC count over a 35-day storage period.[13,14] The mean platelet count was 216.69±70.09 (x10^9/L) on day 0, decreasing to 150.29±45.7 on day 7, 149.67±52.61 on day 14, 143.1±66 on day 21, 130.52±58.25 on day 28, and 95.93±42.02 on day 35. Statistical analysis revealed a significant difference ($p<0.05$) across the storage period. A previous study reported a continuous decrease in platelet count over 35 days, aligning with the present findings[7]. The observed decline is linked to ATP depletion and micro-aggregate formation.[11] The clinical implications include reduced platelet effectiveness and an increased risk of adverse transfusion-related events, particularly in critically ill patients.[15] Similar studies conducted in Nigeria and India support these findings, reporting significant reductions in platelet count during storage.[13,16] Based on these findings, monitoring hematological parameters during blood storage is recommended to enhance transfusion efficacy and safety.

Conclusion

This investigation was conducted to evaluate the hematological alterations in preserved whole blood. Substantial modifications in platelets, White Blood Cell (WBC) counts, Red Blood Cell (RBC) counts, and related indices were detected in stored blood, especially when maintained for a period approaching expiration, as demonstrated by the thorough examination of cellular components in this study. The significant consequence of these changes is that whole blood preserved for a prolonged duration becomes markedly ineffective as a therapeutic tool in the treatment of such conditions (Such as aplastic anemia, leukemia, renal disorder, cardiac surgery, pediatric patients).

Recommendation

It is recommended that utilization of fresh whole blood, as promptly as possible, is regarded as a preferable option for transfusion in most disease conditions.

Disclosure

All the authors declared no competing interest.

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Original Article

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Functional Outcome of Displaced Mid Shaft Clavicular Fractures Treated with Plate Fixation are Better Than Nonoperative Management with Sling, Bandage or Brace

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Abstract

Background: *The treatment of completely displaced midshaft clavicle fractures is still controversial, but surgical treatment provides a shorter recovery period and higher union rates than nonoperative treatment.We sought to compare patient-oriented outcome complication rates following nonoperative treatment and those after plate fixation of displaced midshaft clavicular fractures.*

Materials and methods: *This observational study involving a total of 200 patients was carried out at the Department of Orthopaedic and Traumatology, Chittagong Medical College Hospital, Private hospital, Chattogram, Bangladesh, from 2018 to 2022. Of these, 100 patients who underwent plate fixation were put in Group A, and 100 patients treated nonoperatively were in Group B. Each patient was followed up for a total of 1 year.*

Results: *Among the group A patients, post–operative infection was 3%, andnonunion 2%. Among the group B patients, 10% were malunion, 5% were nonunion, and 5% were delayed unions. The mean time of union in Group A was 6.8 weeks, which was significantly shorter than Group B at 9.4 weeks.*

Conclusion: *Operative fixation of a displaced fracture of the clavicular shaft results in improved functional outcome and a lower rate of malunion and nonunion compared with nonoperative treatment at one year of follow-up.*

Key words

Figure of eight bandage; Single plate fixation; Triangular sling.

Introduction

Clavicle fractures are a common type of fracture, accounting for 2.6% of all fractures and 5% of adult fracture.[1] Among clavicle fractures, middle-third fractures make up nearly 82% of cases.[2]This is largely due to the unique structure of the clavicle, which is thinnest at the junction of the outer and middle thirds and lacks additional protection from muscles and ligaments.[2,3] While there are several treatment options for clavicle fractures, the majority are traditionally treated non-operatively. However, due to its location, a clavicle fracture is often displaced, making non-surgical treatment challenging. Clavicle fractures can occur in people of all ages, but they are more common in children and young adults due to their active lifestyles.[4,5] In adolescents, clavicle injuries are often caused by falls from height or participation in sports.[5] A significant portion of fractures is also caused by high-energy injuries such as car accidents.There is a bimodal distribution of adult clavicle fractures, with a higher incidence in males under 30 years of age due to high-energy trauma and a second peak in the elderly population due to osteoporosis, which are typically associated with low-energy falls.[6] Young adults tend to fracture the mid-shaft of the clavicle, while the elderly are more likely to fracture the lateral end.[6] Displaced mid-shaft clavicular fractures, which occur in the middle part of the collarbone, can be treated with plate fixation, a surgical procedure in which a metal plate is attached to the bone using screws to hold it in place during healing. Some studies have suggested that plate fixation may lead to better functional outcomes, such as improved range of motion and strength, compared to non-operative treatment, which involves using a sling or other immobilization device to hold the bone in place while it heals. In the past, non-surgical treatment was preferred for mid-shaft clavicle fractures, even in cases of obvious displacement, due to a low rate of non-union.[7,8] However, recent research has found that the nonunion rate of

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displaced fractures after non-surgical treatment is higher than previously reported.[9,10] There is currently a consensus on non-surgical treatment for mid-shaft clavicle fractures without displacement, but the optimal treatment for displaced mid-shaft clavicle fractures remains controversial.[11] The goal of any clavicle fracture treatment method is to achieve bony union while minimizing dysfunction, morbidity and cosmetic deformity. In non-operative treatment methods, the first step is always shoulder immobilization. This is typically achieved using a simple sling or a figure-of-eight brace. However, there is no clear indication of how long immobilization should be continued, as it can vary depending on the patient's age and fracture details.[11] After immobilization, the physician needs to reposition the fractured bone to its normal location, which becomes more difficult with more compound and displaced fractures. While the movement is generally discouraged, some physicians may recommend starting isometric physiotherapy and resistance exercises after 4-8 weeks of immobilization, depending on residual pain and discomfort. Non-operative treatment can be time-consuming, with complete union often taking 5-7 months. There are several surgical treatment options for clavicle fractures, including interfragmentary screw fixation, Intramedullary (IM) fixation, cerclage wiring, and plate fixation.[12] The present study aims to evaluate the functional outcomes of plate fixation for the treatment of displaced mid-shaft clavicle fractures. Plate fixation is a type of internal fixation in which a plate made of surgical-grade stainless steel or titanium is attached to the fractured bone with screws. The plates may be removed in a subsequent surgical procedure. Plate fixation has been shown to significantly reduce the nonunion rate for various types of fractures.[13] Plate fixation provides immediate rigid fixation, including rotational stability, which is favorable for early rehabilitation protocols and is technically less demanding.Plate fixation may be an effective treatment for displaced mid-shaft clavicle fractures because it allows the bone to heal in a more anatomically correct position, potentially improving the patient's range of motion and strength. However, it is important to note that plate fixation is a major surgical procedure with risks and potential complications, including infection, nerve or blood vessel damage, and failure of the plate or screws. This study aims to determine whether the benefits of plate fixation for displaced mid-shaft clavicle fractures outweigh the risks compared to non-operative treatment methods.

Materils and methods

This observational study was conducted at the Department of Orthopedic and Traumatology, Chittagong Medical College Hospital and Private Hospitals, Chattogram, Bangladesh. The study duration was 4 years, from July 2018 to June 2022. During this period, data was collected from a total of 200 follow-up interviews who had their displaced midshaft clavicular fracture treated previously. A purposive selection method was used to select the 200-sample size, among which 100 who had been treated with plate fixation were put into Group A, while another hundred who had been treated non-operatively were put into Group B. Data was collected from their final follow-up interview which was conducted 1 year after initial treatment. Informed consent was obtained from each of the participants regarding their participation in the study and ethical approval was obtained from the ethical review committee of the study hospital.

Results

Table I Distribution of participants by demographic factors

Demographic Factors	Group A		Group B	
	n	%	n	%
	Gender			
Male	84	84.0%	81	81.0%
Female	16	16.0%	19	19.0%
	Mode of Injury			
Road traffic accident	67	67.0%	63	63.0%
Fall from height	23	23.0%	23	23.0%
High-intensity sports	10	10.0%	14	14.0%
	Side Affected			
Right	43	43.0%	40	40.0%
Left	57	57.0%	60	60.0%

Among the participants, the overall male prevalence was observed, with 84% male in Group A and 8% male in Group B. Mode of injury was road traffic injury for 67% of Group A and 63% of Group B participants, fall from height for 23% of Group A and 23% of Group B participants and high-intensity sports for 10% of Group A and 14% of Group B participants. Among the participants of both groups, the left side was more affected, at 57% of Group A and 60% of Group B.

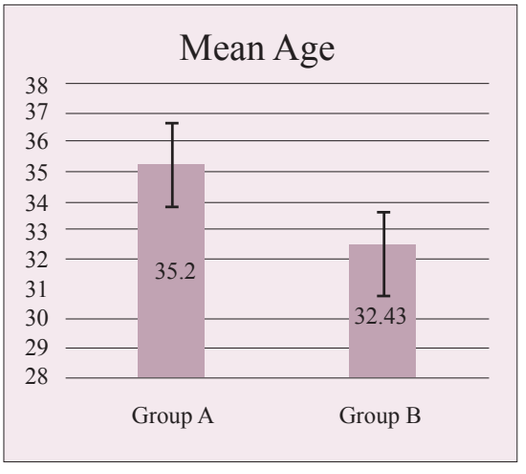

Figure 1 Distribution of participants by mean age among groups

The mean age of Group A participants was 35.2 years, while the mean age was 32.43 years for group B.

Table II Distribution of participants by post-operative complications

Post-Operative Complications	Group A		Group B		p Value
	n	%	n	%	
Post-Operative Infections	3	3.0%	0	0.0%	<0.01
Non-Union	2	2.0%	5	5.0%	
Malunion	0	0.0%	10	10.0%	
Delayed Union	0	0.0%	5	5.0%	
Total	5	5.0%	20	20.0%	

Among the participants of Group A, a total of 5% had complications, while in Group B, it was 20%. Among Group A participants, 3% had post-operative infections, while 2% had non-union. Among the participants of Group B, 5% had non-union, 10% had malunion and another 5% had delayed union. The difference in complications between the two groups was statistically significant.

Table III Distribution of participants by time to union

Time To Union	Group A		Group B		p Value
	n	%	n	%	
<6 weeks	37	37.0%	0	0.0%	<0.01
6-7 weeks	32	32.0%	12	12.0%	
7-8 weeks	14	14.0%	15	15.0%	
8-10 weeks	11	11.0%	63	61.0%	
>10 weeks	4	4.0%	5	24.0%	
Non-Union	2	2.0%	5	5.0%	
Mean weeks	6.8		9.4		

Among Group A participants, 28% had union within 6 weeks of operation, 42% had union within 6-7 weeks of operation, 15% between 7-8 weeks, 11% between 8-10 weeks and 4% took over 10 weeks for the union. Among the Group B participants, only 6% had union within 6-7 weeks, 9% had union within 7-8 weeks, 61% had union within 8-10 weeks and 24% required over 10 weeks to reunion.

Table IV Distribution of participants by Functional Outcome grading

Functional Outcome	Group A		Group B	
	n	%	n	%
Excellent	88	88.0%	71	71.0%
Good	9	9.0%	18	18.0%
Poor	3	3.0%	11	11.0%

Among the patients of Group A, 88% had excellent functional outcomes, 9% had good outcomes and only 3% had a poor outcomes. Among the Group B participants, 71% had excellent functional outcomes, 18% had good functional outcomes, and 11% had poor functional outcome levels.

Discussion

Recent studies have shown an increased tendency of treating clavicle fractures with surgery. The present study was conducted with the final follow-up data of 200 patients, 100 of whom had been treated with the surgical plate fixation method (Group-A) while another 100 had been treated non-operatively (GroupB). Male: Female ratio was similar among the participants, with higher male prevalence among both groups. This high incidence of male participants among the displaced mishit clavicular fractures was also observed in other related studies.[14] This high male prevalence can be explained by the outgoing nature of the male population, especially in the younger age, putting them at an increased risk of various types of injuries. A reflection of this understanding can be observed in the mode of injury distribution, where a large portion of both groups had suffered from road traffic accidents. Road traffic incident is an extremely common cause of injury, not only for clavicle fractures but also for other orthopedic fractures and complications, as observed from other studies.[15] The follow-up interviews of the participants revealed a significant difference in terms of postoperative complications and time to union of bone among the groups.[16] Among the present study participants, a total of 5% of the Group-A participants had postoperative complications, while this percentage was 20% among those treated non-operatively. Non-union was observed in only 2 participants of the plate fixation group and 3% had post-operative infections. On the other hand, among that treated non-operatively, 5% had non-union, another 5% had delayed union and 10% had a malunion. This stark difference in post-operative groups was also observed in other studies as well.[16,17] Infection after surgery is not uncommon and has been observed in a slightly higher or lower percentage among other studies regarding the treatment of clavicle fractures as well.[18] In general, the infection rate after a plate fixation for a clavicle fracture can have an incidence rate of 0.4%-7.8% and our study had a low infection rate.[19]Among the non-operative group participants, malunion had the highest prevalence in terms of complications. The mean union duration was 6.8 weeks for those of Group-A, while group-B participants had a mean bone union time of 9.4 weeks. This is another factor where surgical fixation has clear benefits over non-surgical fixation.[20] The higher non-union rate among the non-operative participants was also supported by the findings of other clinical trials and meta-analyses, where the non-union rate was often higher compared to our studies.[21,22] From the final follow-up data, it can be observed that functional outcome was relatively better among group.[23,24] A participants, as 88% had excellent and 9% had good outcomes, compared to 71% excellent and 18% good outcomes among the group B participants.[25,26] Poor functional outcome level was observed in 3% of the Group-A participants, which was significantly lower compared to the 11% of Group-B participants.[27] This was also supported by the findings of other studies.

Limitations

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

The operative fixation of a displaced fracture of the clavicular shaft results in improved functional outcome and a lower rate of malunion and nonunion compared with non operative treatment at one year of follow-up.

Recomendation

- As present study was done on a relatively small sample, a large-scale study to be conducted to make the findings of the study generalized to reference population.
- This procedure has wide spectrum of potential complications, which needs continuouse valuation to further improve treatment results.

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Discosure

All the authors declared no competing interest.

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Original Article

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Antenatal and Postnatal Care Practices in Tribal and Non-Tribal Populations

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Abstract

Background: *In Bangladesh, there are differences in healthcare usage and access between tribal and non-tribal communities, frequently because of socioeconomic, regional and cultural constraints. The purpose of the study was to investigate ANC (Antenatal) and PNC (Postnatal care) behaviors and the characteristics related to them among tribal and non- tribal women who live in Rangamati. The purpose of this study was to compare antenatal care practices, postnatal care practices utilization patterns, and associated maternal health outcomes in tribal and non-tribal populations.*

Materials and methods: *This retrospective study at Rangamati General Hospital analyzed data from March 2024 to February 2025. It assessed the frequency of Antenatal (ANC) and Postnatal Care (PNC) visits, comorbidities, diabetes, hypertension, iron and folic acid supplementation and institutional deliveries among tribal and non-tribal mothers. Data was analyzed using SPSS, version-27 and Microsoft Excel 2021, presented as means, frequencies and percentages in tables and charts. A Chi-square test was performed to identify statistically significant differences.*

Results: *This comparative analysis of 6,222 maternal health records (1,372 tribal and 4,850 non-tribal women) revealed significant disparities between the groups ($p < 0.0001$). Tribal women had fewer regular antenatal check-ups (29.37% vs. 39.22%) and higher rates of irregular visits (70.63% vs. 60.78%). Hypertension (7.65% vs. 11.57%) and GDM (6.48% vs. 7.69%) were less prevalent among tribal women (Both $p < 0.0001$). Iron and folic acid supplementation was markedly lower in the tribal group (28.21% vs. 55.15%). Total 4,138 deliveries were conducted during the study period, regarding delivery types, tribal women had more normal vaginal deliveries (61.31%) than LSCS (38.78%) whereas non-tribal women had higher LSCS rates (61.22%) than NVD (38.69%).*

Conclusion: *The research highlights key differences in maternal health practices between tribal and non-tribal women. Tribal women have fewer antenatal care visits, lower rates of iron and folic acid supplementation and fewer institutional deliveries. Targeted interventions are essential to address this healthcare gap.*

Key words

ANC visits; Home-delivery; Institutional deliveries; Iron-folic acid supplementation; Tribal women.

Introduction

Maternal and child health is a vital public health issue, with antenatal and postnatal care essential for reducing morbidity and mortality. In Bangladesh, disparities in healthcare access exist between tribal and non-tribal populations. A study in the Chittagong Hill Tracts found that 69% of indigenous women knew about antenatal care services, but only 53% attended at least one ANC visit during their last pregnancy.[1] Education, household income and knowledge of pregnancy complications were positively linked to ANC attendance, while non-tribal populations showed higher rates of maternal healthcare service utilization.[2] A study in rural Bangladesh revealed that 94.97% of women used Antenatal Care (ANC) services, with 44.72% attending more than four times. These findings emphasize the need for targeted interventions to improve maternal healthcare access between tribal and non-tribal communities.[3,4] Antenatal Care (ANC) and Postnatal Care (PNC) are crucial for reducing maternal and neonatal complications and mortality by facilitating early detection of issues and promoting healthy practices after delivery.[4] Tribal populations in remote areas face major barriers to quality maternal healthcare due to socio-cultural beliefs, low literacy, poor infrastructure and economic constraints.[5,6] Tribal women utilize ANC and PNC services significantly less than non-tribal women.[6,7] Cultural practices and traditional birth attendants play a dominant role in

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maternal care within tribal communities, with home deliveries being prevalent.[8] These differences reveal health inequities and the need for focused interventions. Understanding Antenatal Care (ANC) and Postnatal Care (PNC) practices in tribal and non-tribal populations is vital for creating culturally relevant maternal health programs.[9,10] Hypertension (HTN) and Gestational Diabetes Mellitus (GDM) during pregnancy can significantly impact maternal and neonatal health. A study in rural Bangladesh reported GDM prevalence at 6.8% for fasting blood glucose and 8.2% for 2-hour postprandial levels.[11] The study also reported a crude prevalence of systolic and diastolic hypertension at 6.8% and 5.4%, respectively.[12] These conditions are associated with increased risks of pre-eclampsia, preterm labor and adverse neonatal outcomes.[13] To tackle health challenges effectively, we need to understand the factors that influence healthcare utilization and to develop culturally appropriate strategies. This paper compared antenatal and postnatal care practices among tribal and non-tribal populations, focusing on institutional delivery, Hypertension (HTN) and Gestational Diabetes Mellitus (GDM) while identifying key factors and offering recommendations to improve maternal health outcomes.

Materials and methods

A retrospective record review study was conducted at Rangamati General Hospital, located in Rangamati District, Bangladesh. The study period covered twelve months, from March 2024 to February 2025. Ethical approval for the study was obtained from the Ethical Review Committee of Rangamati Medical College. Due to the retrospective nature of the study and the use of de-identified secondary data, the requirement for informed consent was waived by the committee.

The study utilized antenatal and postnatal registers maintained at the Outpatient Department of Obstetrics and Gynaecology. These records were reviewed to extract data related to maternal healthcare utilization and outcomes. Specifically, information was collected on the number and frequency of ANC and PNC visits, presence of comorbid conditions (Including diabetes and hypertension) iron and folic acid supplementation, and the status of institutional deliveries. The data were stratified and analyzed based on the maternal ethnicity, comparing tribal and non-tribal mothers.

For the purpose of this study, regular ANC care was defined in accordance with the World Health Organization (WHO) guideline as having attended a minimum of three consecutive ANC visits. The extracted data were tabulated and summarized using descriptive statistics, with results expressed as frequencies and percentages. To evaluate differences in maternal healthcare characteristics between tribal and non-tribal groups, the Chi-square (χ^2) test was applied. A p-value of less than 0.05 was considered statistically significant. Data analysis was conducted using statistical software SPSS version 27.0.

Results

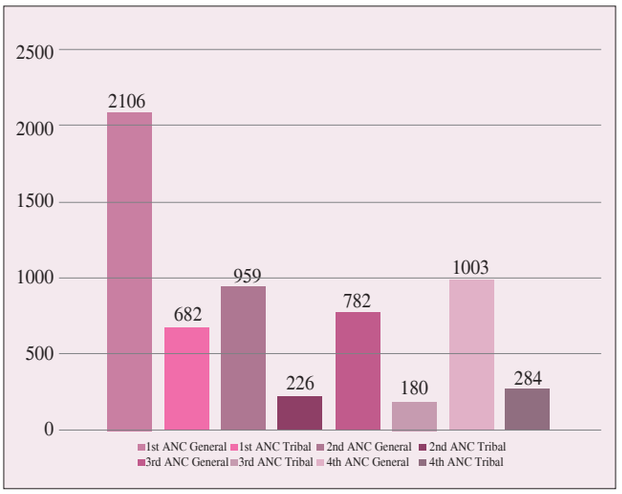

Figure 1 Distribution of ANC Visits in Different Trimesters

The ANC visit data reveals attendance trends among pregnant women at their 1st to 4th check-ups, categorized into General and Tribal groups. The highest turnout was at the 1st visit, with 2,106 women from the General group and 682 from the Tribal group. Attendance drops significantly at the 2nd visit (General: 959, Tribal: 226) and continues to decline at the 3rd visit (General: 782;, Tribal: 180). Interestingly, attendance rebounds at the 4th visit, with General rising to 1,003 and Tribal to 284. This may be due to improved outreach or compulsory check-ups closer to delivery. Although Tribal participation is consistently lower, it shows better retention by the 4th visit. Overall, initial participation in ANC is strong, but sustained follow-up, especially among Tribal groups, needs focused support (Fig-1).

Table I Clinical Parameters of Tribal and Non-Tribal Pregnant Mothers (n=6222)

Variable	Tribal (%)	Non-Tribal (%)	p Value
	Distribution of Patients		
	1372 (22.05%)	4850 (77.95%)	<0.0001
	Antenatal Check-up		
Regular	403 (29.37)	1902 (39.22)	<0.0001
Irregular	969 (70.63)	2948 (60.78)	
	Comorbidity		
HTN	105 (7.65)	561 (11.57)	<0.0001
GDM	89 (6.48)	373 (7.69)	
	Iron and Folic Acid Supplementation		
	387 (28.21)	2675 (55.15)	<0.0001

Table I Represents a comparative analysis of various maternal health indicators between tribal and non-tribal populations. A total of 6,222 patients were included in the study, comprising 1,372 (22.05%) tribal and 4,850 (77.95%) non-tribal individuals. The distribution difference between the two groups was statistically significant ($p < 0.0001$). A significantly lower proportion of tribal women had regular antenatal check-ups compared to their non-tribal counterparts (29.37% vs. 39.22%, $p < 0.0001$). Conversely, irregular check-up patterns were more prevalent among the tribal group (70.63% vs. 60.78%).The prevalence of Hypertension (HTN) was significantly lower among tribal women (7.65%) compared to non-tribal women (11.57%) ($p < 0.0001$). Similarly, the prevalence of Gestational Diabetes Mellitus (GDM) was slightly lower in the tribal group (6.48%) than in the non-tribal group (7.69%) and the difference was statistically significant ($p < 0.0001$). There was a marked difference in iron and folic acid supplementation coverage, with only 28.21% of tribal women receiving supplementation compared to 55.15% of non-tribal women ($p < 0.0001$) indicating a significant disparity in nutritional support.

Table II Mode of delivery of Tribal and Non-Tribal Pregnant Mothers (n=4138)

Variable	Tribal (%)	Non-Tribal (%)	p value
	Institutional Delivery		
LSCS	351 (38.78)	1982 (61.22)	<0.0001
NVD	554 (61.31)	1251 (38.69)	

During the study period, total 4138 patients were admitted for delivery and among them total 905 (21.87%) patients ware underwent Lower Segment Cesarean Section (LSCS) and 3233 were underwent Normal Vaginal Delivery (NVD). In terms of delivery type comparing between tribal vs. non-tribal, LSCS) were reported among tribal women (38.78%) compared to normal vaginal deliveries (61.31%). But in non-tribal women normal vaginal deliveryrate was 38.69%, which was lower than LSCS (61.22%) (Table II).

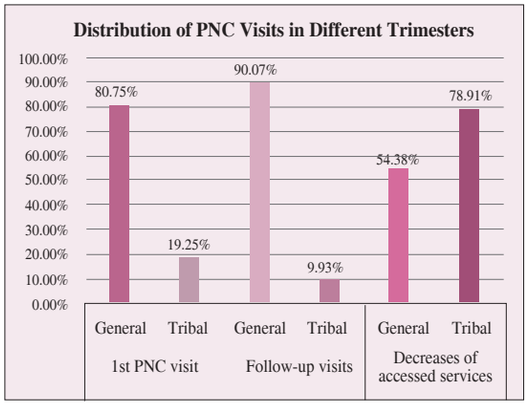

Figure 2 Distribution of PNC Visits

The data reveals the utilization of Postnatal Care (PNC) services among General and Tribal women. In the first PNC visit, 537 General women and 128 Tribal women accessed services. However, there was a significant drop in follow-up visits, with only 245 General women and 27 Tribal women attending the second visit, reflecting decreases of 54.4% and 78.9% respectively. Tribal women's representation fell from 19.25% in the first visit to 9.93% in the second. These numbers indicate that while initial care access is adequate, continued care for Tribal populations is lacking (Figure 2).

Discussion

Improving maternal health outcomes and achieving equitable ANC coverage requires addressing the complex interplay of socioeconomic, cultural, and health system factors. The first ANC visit saw the highest attendance, with 2106 General and 682 Tribal women. However, attendance significantly declined at the second visit, with 959 General and 226 Tribal women, reflecting reduced follow-up. This trend aligns with national and international findings that show many women attend one ANC appointment but fewer complete the recommended four visits.[14,15] The drop in follow-up visits, especially between the first and second appointments, reflects research from low- and middle-income countries like Bangladesh, India, showing that while initial engagement is high, maintaining attendance is difficult.[14,16,17] In India, only 23% of tribal women received adequate antenatal care.[16] Vulnerable Tribal Groups (PVTGs) face a higher risk of inadequate treatment. Study found that over 40% of Indian women lack sufficient Antenatal Care (ANC) especially among rural, less educated and impoverished populations.[17]

It is often known that tribal women consistently attend ANC at lower rates than general women.[16,18,19] Tribal groups' underutilization is frequently linked to socioeconomic position, education and geographic barriers.[16-19] Tribal women's Antenatal Care (ANC) usage was notably low, according to one study, while education beyond ninth grade was a strong positive predictor.[14] One study found that tribal women's lack of awareness and use of ANC services is influenced by poverty and literacy.[19]

There is a notable increase in attendance at the fourth ANC visit, with General reaching 1003 and Tribal at 284. This late-stage rebound may be attributed to effective outreach, increased awareness, or mandatory check-ups before delivery, despite most studies indicating a decline in ANC attendance with each subsequent visit.[14-16] In literature, late initiation and drop-off are more common, but this trend is reported less frequently.[14] Study found that improved ANC completion was linked to health professional outreach, indicating that targeted interventions later in pregnancy may explain this rebound.[16] This aligns with research showing that community outreach and health worker involvement can improve Antenatal Care (ANC) retention among marginalized populations. It suggests that

once engaged, tribal women are more likely to continue care if barriers are eliminated.[15,16]

Many reports show a strong initial uptake of ANC that declines over time, revealing ongoing disparities between General and Tribal populations.[14,16,18] Barriers related to infrastructure, education, and socioeconomic status are often highlighted as significant factors.[14-19] In the literature, which usually indicates a continuous reduction or plateauing of attendance.[14,15,19] the late-stage comeback in ANC attendance is less frequently seen. This could point to local actions or contextual elements that were missed in more general surveys.

Significant disparities in maternal healthcare exist between Tribal and Non-Tribal women. Tribal women, who comprised 22.05% of patients, had a lower rate of regular antenatal care (29.37%) compared to non-tribal women (39.22%) ($p < 0.0001$). Similarity found in a study with only 11% to 29% receiving full or regular antenatal care.[20-24] Tribal women had lower rates of regular ANC compared to non-tribal women due to factors like lack of education, poor infrastructure and limited health worker outreach.[20,22,24] Iron and folic acid supplementation is lower among tribal women (28.21%) than non-tribal women (55.15%) ($p < 0.0001$) highlighting a gap in nutritional support for tribal women.[20,22,24]

In this study, C-sections (LSCS) were more common among non-tribal women (61.22%) than tribal women (38.78%), while Normal Vaginal Deliveries (NVD) were more frequent in tribal women (61.31% vs. 38.69%), with significant differences ($p < 0.0001$). Additionally, about 40%of tribal women still give birth at home.[20,22,24] Institutional deliveries, including caesarean sections, are more prevalent among non-tribal women.[20,22] Tribal women have lower institutional delivery rates due to a combination of cultural beliefs, mistrust of the healthcare system, language challenges, and geographic isolation.[20-23]

Gestational Diabetes Mellitus (GDM) rates were similar. 6.48% in Tribal women and 7.69% in non-tribal women, with significant difference. However, non-Tribal women had higher rates of hypertension.[20,22] Tribal women's use of maternity health services is significantly influenced by socioeconomic position, education and road accessibility.[21,22,24]

In the first Postnatal Care (PNC) visit, 537 women from the General group and 128 from the Tribal group sought services, showing strong initial participation. However, there was a significant decline in follow-up visits, particularly among Tribal women. This trend underscores wider issues with PNC usage in underserved populations, driven largely by a lack of awareness about the importance and accessibility of these services. Women with higher education and experience are more likely to utilize PNC services.[25-28].

In the 2nd PNC, there was a 54.4% decrease in the General group and a significant 78.9% decline in the Tribal group, with Tribal women's representation falling from 19.2% to 9.9%. Reduced PNC uptake is associated with lower wealth and income, disproportionately affecting tribal women from lower socioeconomic classes.[24,26,29] Follow-up visits are hampered by geographic obstacles such lack of transportation and distance to medical services, especially for tribal groups in isolated places.[29-33] Motivation for ongoing care is decreased by misconceptions, customs, and the belief that PNC is not worth much for healthy moms and babies.[29] Women are further deterred from returning for follow-up visits by unfavorable provider attitudes, a lack of scheduling, and staff and supply shortages.[34,35] The complex interaction of awareness, financial, cultural and systemic restrictions means that although initial PNC access is often good, persistent utilization - particularly among Tribal women remains low. To increase PNC coverage and outcomes for all women, with an emphasis on the most vulnerable groups, targeted, community driven interventions and health system improvements are essential.

Conclusions

The study findings reveal significant disparities in maternal healthcare utilization between tribal and non-tribal women in rural Bangladesh, with tribal women showing lower rates of regular antenatal care, nutritional supplementation, institutional deliveries and postnatal follow-up. Although both groups demonstrated strong initial engagement, tribal women had a steeper decline in continuity of care. A late increase in fourth ANC visits suggests the potential impact of targeted outreach. To address these inequities, maternal health programs should implement culturally sensitive, community-based interventions, improve transportation and referral systems, strengthen the role of trained health workers and ensure routine monitoring of maternal health indicators by ethnicity to inform inclusive health policy and programming.

Discosure

All the authors declared no competing interest.

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