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Physical Activity: A Medicine for Non-Communicable Diseases

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Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure.[1] Those activities are included in sustainable physical activity, performed with sufficient duration, frequency, and intensity to promote good health and wellbeing.[2] The sedentary lifestyle is the leading cause of the increased mortality rate globally and WHO stated that about 3.2 million deaths per year are occurring due to physical inactivity across the world.[3] Physical activity plays a fundamental role in balancing energy and weight control. About 81% of school-going adolescents and 23% of adults have insufficient physical activity across the globe. In general, girls and women are less physically active than boys and men, and older adults are also inadequate physical activity than younger adults.[4]

According to the WHO, regular physical activity has various benefits for psycho-physical health. At all stages of life, physical activity plays an essential role in the prevention of chronic health conditions and non-communicable diseases. High blood pressure, high blood glucose, smoking, obesity, and physical inactivity are the five main leading factors of death.[5] It is one of the essential global targets for improving the preventive, diagnostic, and treatment measures of non-communicable diseases. Globally, physical inactivity is the main reason behind the obesity epidemic, which is further resulting in spreading chronic diseases across the world.

To promote active and healthier societies, WHO launched a program in June 2018 with the title of "More active people for a healthier world." This program's primary plan is to create more active and healthier societies by improving spaces and places for physical activity. The improved spaces and areas for physical activity will provide more opportunities for every age group to do dance, sport, walking, cycling, and play.[6] WHO has launched this global action plan to decrease physical inactivity and sedentary behavior in 2025, about 10%, and in 2030, about 15%. Physical activity has become part and parcel of a healthy life and living. An adult needs to do moderate-intensity sustainable physical activity at least 150 minutes throughout the week, according to the WHO recommendations.[7]

Now-a-days, physical activity has become the priority in public health from childhood to adults, from a young age to an older age among men and women. Globally people are less active due to technological advancement, social changes, and economic growth. In ancient times people were more active because they need to find food (hunting and gathering) and fight or flight for safety. Physical activity is allied with transportation, housework, or any other human body act that needs energy for consumption due to different economic growth interventions for economic growth.[8] According to Professor Morris's demonstration in the 1950s, the men who performed different work requiring a specific level of physical activity suffered less coronary heart disease than those who did sedentary kind of jobs.[9]

Many studies that have been conducted in different countries and populations to explore the benefits of physical activity demonstrated that physical activity is much more useful than medication in some health conditions. Physical activity and health status have a linear relationship, if physical activity increase, then physical fitness and health also improved. Regular physical activity has a substantial impact on heart health, such as improving blood circulation, improved the contract's contract, and the heart's relaxed ability, which further affects blood pumping effectiveness. Physical activity is also helpful in altering the blood lipid profile, which reduces the risk factor of stroke and heart diseases.[10,11] The liver and skeletal muscles' functions have a direct relationship with physical activity because it improves insulin sensitivity, resulting in the reduction of type-2 diabetes. Blood glucose can be better through physical activity in the long and short-term insulin action improvements.[12,13]

Regular physical activity plays a vital role in producing thicker, dense bones, healthy joints, strong muscles, ligaments, and tendons. Physical activity is significant in childhood and adolescence because of physical and bodily growth, which further ensures the proper development of musculoskeletal health during adulthood and old age. Moreover, physical activity reduces the risk of falls and hip fractures in old age and keeps active, further strengthening the body's functional strength, such as climbing stairs, lifting, and carrying.[14] So physical activity is beneficial for good health and well-being. To maintain good health, human biology needs a specific level of physical activity. Energy consumption or burning calories helps mental health, improve self-confidence, improve sleep, increase energy and thus reduce the risk of chronic diseases and non-communicable diseases.

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ORIGINAL ARTICLE

Patients' Age at Acute Myocardial Infarction for the First Time Observed at Tertiary Level Hospitals

Khan MMR[1], Jahan KI[2], Akramuzzaman M[3], Islam MS[4], Rahaman MA[5], Rahman MW[6], Hossain MA[7]

Abstract

Background: Most common form of coronary heart disease is the acute myocardial infarction (AMI) and the most important cause of premature death. This is also the most important morbidity in young worldwide. The aim of this study was to assess the age-wise prevalence of AMI patients – an effort that may help in building up awareness regarding early detection and thereby reducing the complications of AMI in younger patients.

Methods: This cross-sectional observational study conducted from June 2022 to June 2024 at Rajshahi Medical College Hospital, Rajshahi and Kushtia Medical College Hospital, Kushtia. Total 325 cases aged >20 years with first attack of AMI included by purposive sampling technique. Cases were diagnosed by clinical features, ECG changes and cardiac markers. (Troponin-I, CKMB, AST and/or LDH). Age of the patients was noted. Data was expressed as actual number and percentage of total.

Results: Mean age of AMI patients was 53.75±11.64 years. Among 325 cases, 222 (68.3%) were males and 103 (31.7%) were females. About 5 times increased incidence was observed in 31-40 years age group than in ≤30 years group; whereas, about 2 times increased incidence was observed in 41-50 years group than in 31-40 years group. But in 41-50 years, 51-60 years and >60 years groups the finding was almost similar with a ration among them almost about 1.

Conclusion: In our community incidence of AMI rises sharply after the age of 30 years up to about 40 years of age. Thereafter the incidence remains almost similar at the age of forties, fifties or even sixties. So younger patients especially men of about forties should pay attention towards their chest symptoms.

Keywords: Acute myocardial infarction, Age at first presentation.

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Introduction

Coronary heart disease (CHD) is the most significant cause of death for individuals in the West.[1-3] The fatal symptom of CHD is acute myocardial infarction (AMI), which appears as a sudden demise. Although MI primarily affects individuals over the age of 45, it may also be seen in young men or women. But, it rarely occurs in a population under the age of 45.[4]

Between 1992 and 2012, the CHD was discovered to be present in 0.5% of males and 0.18% of females between the ages of 35 and 44, as well as 20.5% of men and 17.1% of women over the age of 60.[5] In fact, due to atypical presentations and reluctance to submit themselves for further examinations, the number of diagnosed younger patients may be lower than what they are.[6] However, it was discovered that just 3% of all CHD patients were in the younger group, defined as those under the age of 40.[7]

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Coronary heart disease (CHD) accounted for 33.9% of premature death.[8] Generally, death before the age of 70 is considered an early death, or premature death. This definition is widely used by organizations like the World Health Organization (WHO) and is based on the global average life expectancy at birth, which is around 70 years. The aim of this study was to assess the age-wise prevalence of AMI patients- that will help in building awareness regarding detection and thereby reducing AMI in young patients.

Methods

This was a cross-sectional observational type of study conducted from June 2022 to June 2024 at Rajshahi Medical College Hospital, Rajshahi and Kushtia Medical College Hospital, Kushtia. A total of 325 persons of AMI patients who were aged >20 years with first time AMI arriving at CCU were included in this study by purposive sampling technique. AMI was diagnosed by their clinical features (Chest discomfort, sweating, vomiting etc.), ECG change and elevation of cardiac markers (Troponin-I, CKMB, AST and/or LDH). Age of the patients was our point of interest. Data was (recorded age) was noted from the hospital records and was verified by verbal interrogation and then was noted for analysis. Data was expressed as actual number and percentage of total.

Results

The total 325 cases were studied. Male patients were 222 (67.7%) and female patients were 103 (32.3%). (Figure 1)

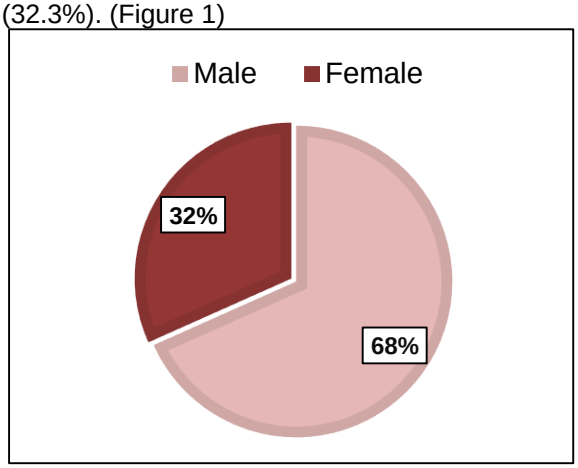


Figure 1: Age and sex distribution of AMI patients (cases=325)

The mean±SD age of the AMI patients was 53.75±11.64 years. The mean±SD age of the male was 53.51±11.63 years and the female patients was 54.28±11.78 years - the mean age of the female patients were a little bit higher than the male patients but 'Z' score for this difference was 0.378 (insignificant). Among cases (n=325) the highest percentage was in the age group 51-60 years (32%) followed by 41-50 (26.8%) and then age group >60 (23.7%). Among the male patient's highest percentage was in the age group 51-60 years (31.1%) followed by 41-50 years (27%) and then age group >60 (24.3%). However, among the female patients, highest percentage were in the age group 51-60 years (34%) followed by 40-49 years (26.2%), and then age group >60 (22.3%). Table showed that AMI patients were more in age group >40 years of age (Table I).

Table I: Age and sex distribution of acute myocardial infarction patients (cases=325).

Age groups	Sex		Total (n=325)
	Male (n=222) N (% Gr-Total) (% of 222)	Female (n=103) N (% Gr-Total) (% of 103)	N (% Gr-Total) (% of 325)
Group-A ≤ 30 years	6 (60.0) (2.7)	4 (40.0) (3.9)	10 (100.0) (3.1)
Group B 31-40 years	33(70.2) (14.9)	14 (29.8) (13.6)	47 (100.0) (14.5)
Group-C 41-50 years	60 (69.0) (27.0)	27 (31.0) (26.2)	87 (100.0) (26.8)
Group-D 51-60 years	69 (66.3) (31.1)	35 (33.7) (34.0)	104 (100.0) (32.0)
Group-E >60 years	54 (70.1) (24.3)	23 (29.9) (22.3)	77 (100.0) (23.7)
Total	222 (68.3) (100.0)	103 (31.7) (100.0)	325 (100.0) (100.0)
Mean ± SD	53.51 ± 11.63	54.28 ± 11.78	53.75 ± 11.64
	'Z' Score =0.378 (insignificant)		

About 5 times increased incidence was observed in 31-40 years age group than in ≤30 years group; whereas, about 2 times increased incidence was observed in 41-50 years group than in 31-40 years group. But in 41-50 years, 51-60 years and >60 years groups the finding was almost similar with a ration among them almost about 1 (Table II).

Table II: Proportion to previous age group.

Proportion groups	Ratio between age related incidences		
	Male	Female	Total
(31-40 yrs) / (≤ 30 yrs)	5.5	3.5	4.7
(41-50 yrs) / (31-40 yrs)	1.82	1.93	1.85
(51-60 yrs) / (41-50 yrs)	1.15	1.30	1.195
(>60 yrs) / (51-60 yrs)	0.78	0.66	0.74

Discussion

The total studied subjects were 325. In case of AMI patients (n=325) the majority (n=104, 32.0%) were in the group of 51-60 years, next were 41-50 years (n=87, 20.8%) and then>60 years (n=161, 26.8%). The mean±SD age of the cases (AMI patients) was 53.75±11.64 years.

The mean±SD age of the male of AMI was 53.51±11.63 years and the female patients was 54.28±11.78 years; though insignificant, mean age of the female patients was a little bit higher than the male patients. A study conducted by Joshi *et al.* 2010 [9] says higher age in female. Among the male patient's highest percentage was in the age group 51-60 years (31.1%) followed by 41-50 years (27%) and then age group >60 (24.3%). However, among the female patients, highest percentage were in the age group 51-60 years (34%) followed by 40-49 years (26.2%), and then age group >60 (22.3%).

In our study, incidence of AMI was lowest in the age group <30 years group and raised sharply after the age of 30 years up to about 40 years of age. Thereafter the incidence though varied remained almost similar at the age of 41-50 years, 51- 60 years or even >60 years age groups. So younger patients especially men of about forties should pay attention towards their chest symptoms as much as the elderly. This will lead to early diagnosis of ischemic heart disease and thereby will reduce complications and mortality from AMI.

The incidences for all age groups were higher in males than in females. These data showed that AMI patients were more in the age group >40 years for both sexes. In AMI patients' male is more than female (67.7% vs 32.3%).

Conclusion

In our study, incidence of AMI rises sharply after the age of 30 years up to about 40 years of age. Thereafter the incidence remains almost similar at the age of forties, fifties or even sixties. The incidences for all age groups were higher in males than in females. So younger patients especially men of about forties should pay attention towards their chest symptoms as much as the elderly in order to reduce complications and mortality from AMI.

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ORIGINAL ARTICLE

Proportion and Correlates of Suicidal Ideation in Patients with Schizophrenia

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Abstract

Background: Schizophrenia is a serious, chronic, debilitating psychiatric disorder which affects about 1% of the population worldwide. Suicide is the single leading cause of premature death among people with schizophrenia. This study aimed at estimating the proportion of suicidal ideation and find out the factors associated with suicidal ideation in patients with schizophrenia.

Methods: This cross-sectional observational study was conducted between May 2019 and July 2021 at National Institute of Mental Health (NIMH). Eighty (80) schizophrenic patients diagnosed by Psychiatrist based on DSM-5 criteria were included purposively. Information for suicidal ideation were noted using Modified Scale for Suicidal Ideation (MSSI). Statistical analyses were executed by using SPSS version 24.0 and $p< 0.05$ were considered significant.

Results: Among 80 schizophrenic patients, suicidal ideation was present in 19 (23.8%) patients. Of these, moderate suicidal ideation was present in 16.3% cases and severe ideation in 7.5% cases. Married schizophrenic patients had more likely to have suicidal ideation than unmarried, separated or divorced (p=0.037). Patients with delusions are 3.55 times more likely to report suicidal ideations than without delusions (p=0.047). Also, the presence of depression (p=0.001), previous suicidal plan (p=0.000), previous suicide attempt (p=0.000) and past history of self-harm (p=0.000) were present in schizophrenia patients with suicidal ideations.

Conclusion: Findings revealed that approximately one-quarter of schizophrenic patients had suicidal ideations. Early identification, determination of risk factors and mental health education program can prevent suicidal ideation.

Keywords: Schizophrenia; suicidal ideation; suicide, MSSI.

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Introduction

Schizophrenia is a devastating psychiatric disorder affecting approximately 1% of the population worldwide during a life time.[1] It has a syndromal presentation causing disturbances of thought, perception, speech, emotion, cognition and behavior.[2] Suicide is derived from the Latin word for "self-murder". Suicide is defined as death caused by self-directed injurious behavior with any intent to die as a result of the behavior.[3] Suicidal behavior encompasses behaviors like suicide attempt, suicidal ideation, suicidal intent, suicidal preparatory acts and other behaviors and deliberate self-harm.[4] The high incidence of suicidal behavior in schizophrenia is well documented.[5] The suicidal ideation can be considered as an early sign of suicidal behavior.[6]

The Association defines ideation as passive thoughts about wanting to be dead or active thoughts about killing oneself, not accompanied by preparatory behavior; intent as subjective expectation and desire for a self-destructive act to end in death; and preparatory behavior as the acts or preparation toward making a suicide attempt such as verbalization or thought, assembling a method (e.g., collecting pills) or preparing for one's death by suicide (e.g., suicide

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note).[7] About 34% life time suicidal ideators go on to make a suicide plan, that 72% of persons with a suicide plan go to make a suicide attempt, and that 26% of ideators without a plan make an unplanned attempt; the majority of these transitions occur within the first year after onset of suicidal ideation.[5] Approximately 10.1% of all suicides had schizophrenia and suicide rate in adults with schizophrenia is 6.8/1000 people/year with relative risk of more than 14 times to general population.[8] About 18-55% of the people with schizophrenia attempts suicide and 7.2% reports a suicide attempt in the month before admission.[9]

Bangladesh belongs to high suicide rate country. Average suicide rate is 39.6/100,000 population per year and there are variations in rate in regard to the region of the country.[10] Hence, the present study aimed to estimate the proportion of suicidal ideation and find out the factors associated with suicidal ideation in patients with schizophrenia attending a tertiary care hospital in Dhaka city.

Methods

This cross-sectional observational study was conducted between May 2019 and July 2021 in National Institute of Mental Health (NIMH), Dhaka. Eighty (80) schizophrenia patients attending at outdoor and indoor departments of NIMH, aged ≥ 12years, both male & female, diagnosed by Psychiatrist based on DSM-5 criteria and patient and caregivers who had given informed written consent were included purposively. Schizophrenia with severe disturbance not able to interview and patient with no reliable informant were excluded. Information for suicidal ideation were noted using Modified Scale for Suicidal Ideation (MSSI). Statistical analyses were executed by using SPSS version 24.0 and $p< 0.05$ were considered significant.

Severity of suicidal ideation

Severity categories based on MSSI total score are as follows:

0-8 = Low suicidal ideation
9-20 = Mild- Moderate Suicidal ideation
21+ = Severe suicidal ideation

Table-I: Criteria for "Serious Suicidal Ideation"- Must meet all of the following criteria (A-D)

Characteristic	MSSI Criteria	Meets Criteria?
A) Severe suicidal ideation	MSSI Total Score > 20	Yes / No
B) Intense suicidal thoughts	Item 7 (Intensity) > 1	Yes / No
C) Actively Suicidal	Item 3 (Desire to make active attempt) > 1	Yes / No
D) Serious Plan	Item 15 (Method-specificity) > 1	Yes / No

Diagnostic criteria of schizophrenia according to DSM-5:

Two (or more) of the following, each present for a significant portion of time during a 1 -month period (or less if successfully treated). At least one of these must be (1), (2), or (3):

1. Delusion
2. Hallucinations
3. Disorganized speech (e.g., frequent derailment or incoherence)
4. Grossly disorganized or catatonic behavior
5. Negative symptoms (i .e. diminished emotional expression or a volition).

Results

Mean (±SD) age of the patients was 29.3 (±9.5) years with a range between 14 to 59 years. Most of the participants were in 25-35 years age group. Majority of them were males (67.5%), resided in rural areas (52.5%), muslims (92.5%) and came from extended families (90%). Majority were unemployed 63.7%; also 18.8% were housewives and only 12.6% were involved in income generating activity outside home (Table II).

Figure 1 showed that, majority of the patients were unmarried (53.8%). Figure 2 showed that, most (41.3%) of the patients had completed secondary level of education. Figure 3 depicts distribution of severity of suicidal ideations among schizophrenia patients. Out of 80 schizophrenia patients, suicidal ideation was present in 19 (23.8%) patients, of which 16.3% were moderate suicidal ideation, 7.5% were severe suicidal ideation.

Table II: Socio-demographic characteristics of the patient respondents (n=80)

Characteristic	Frequency (%)
Age group (year)	
14-24	26 (32.5)
25-35	37 (46.3)
36-46	12 (15)
≥47	5 (6.3)
Gender	
Male	54 (67.5)
Female	26 (32.5)
Residence	
Urban	36 (45)
Rural	42 (52.5)
Semi-urban	1 (1.3)
Slum	1 (1.3)
Religion	
Islam	74 (92.5)
Hinduism	6 (7.5)
Family type	
Nuclear	8 (10)
Extended	72 (90)
Occupation	
Unemployed	51 (63.8)
Business	3 (3.7)
Farmer	3 (3.7)
Housewife	15 (18.8)
Service	4 (5)
Student	4 (5)

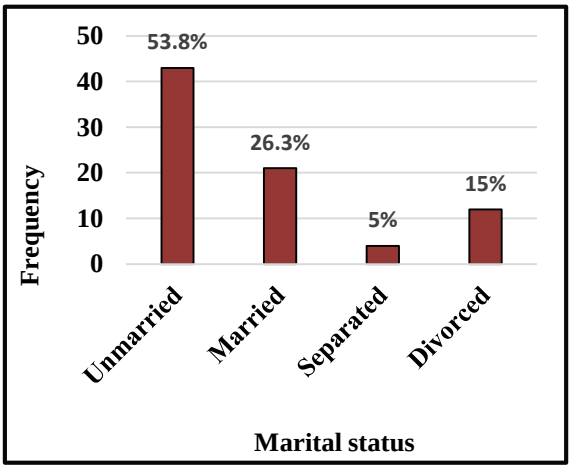


Figure 1: Marital status of schizophrenia patients (n=80)

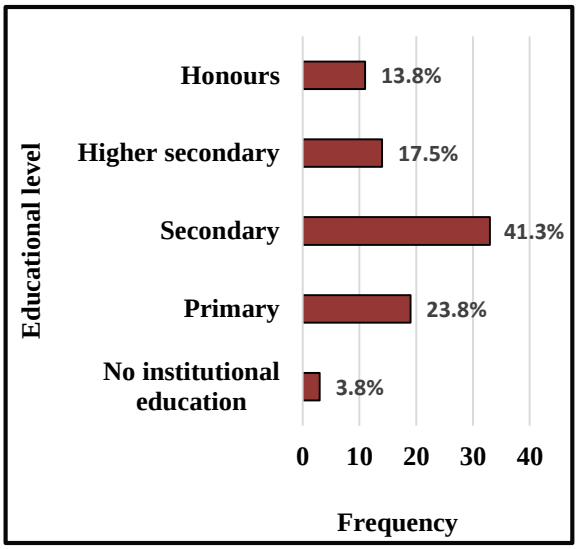


Figure 2: Educational level of the respondents (n=80)

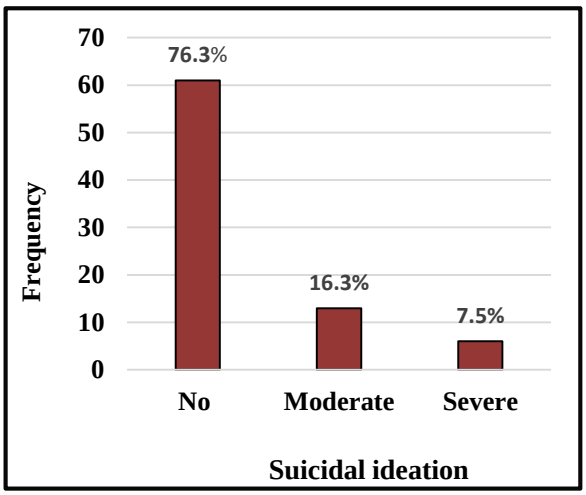


Figure 3: Suicidal ideation among patients with schizophrenia (N=80)

Married schizophrenia patients had more likely to have suicidal ideation than those who were unmarried, separated or divorced (p=0.037) (Table III).

Presence of delusions in the patients elevated the risk of suicidal ideation and those with delusions are 3.55 times more likely to report suicidal ideations than without delusions (p=0.047). (Table IV)

Table III: Differences in suicidal ideation across various socio-demographic variables (n=80)

Variable	Suicidal ideation*		OR	P value
	Present	Absent		
Gender				
Male	10 (18.5%)	44 (81.5%)	0.42	0.160
Female	9 (34.6%)	17 (65.4%)		
Residence				
Urban	8 (22.2%)	28 (77.8%)	0.85	0.798
Rural	11 (10.5%)	33 (75%)		
Family type				
Nuclear	19 (26.4%)	53 (73.6%)	-	0.188
Extended	-	8 (100%)		
Occupation				
Unemployed	9 (17.6%)	42 (82.4%)	0.40	0.107
Employed	10 (34.5%)	19 (65.5%)		
Education				
Up to primary	2 (18.2%)	18 (81.8%)	0.63	0.566
Above primary	15 (25.9%)	43 (74.1%)		
Marital status				
Unmarried	8 (18.6%)	35 (81.4%)	-	0.037**
Married	9 (42.9%)	12 (57.1%)		
Separated	2 (50%)	2 (50%)		
Divorced	2 (16.7%)	10 (83.3%)		

* P values were obtained from chi-square tests/ Fisher's Exact Test
** Denotes significant result, P<0.05

Table IV: Differences in suicidal ideation across various clinical variables (n=80)

Variable	Suicidal ideation*		OR	P value
	Present	Present		
Hallucination				
Present	11 (24.4%)	34 (75.6%)	1.09	0.869
Absent	8 (22.9%)	27 (77.1%)		
Delusion				
Present	17 (28.3%)	43 (71.7%)	3.55**	0.047**
Absent	2 (10%)	18 (90%)		
Insight				
Present	9 (20.5%)	35 (79.5%)	0.66	0.444
Absent	10 (27.8%)	26 (72.2%0		
Physical comorbidity				
Present	-	5 (100%)	-	0.332
Absent	19 (25.3%)	56 (74.7%)		
Substance abuse				
Present	2 (66.6%)	1 (33.3%)	7.05	0.139
Absent	17 (22.1%)	60 (58.7%)		
Smoking				
Present	3 (20%)	12 (80%)	0.76	1.000
Absent	16 (24.6%)	49 (75.4%)		
Drug compliance				
Present	16 (23.5%)	52 (76.5%)	0.92	1.000
Absent	3 (25%)	9 (75%)		

* P values were obtained from chi-square tests/ Fisher's Exact Test
** Denotes significant result, P<0.05

Table V: Differences in suicidal ideation across various suicide risk factors variables (n=80)

Variable	Suicidal ideation*		OR	P value
	Present	Absent		
Hopelessness				
Present	17 (23.6%)	55 (76.4%)	0.92	0.612
Absent	2 (25%)	6 (75%)		
Depression				
Present	12 (48%)	13 (52%)	6.33	0.001**
Absent	7 (12.7%0	48 (87.3%)		
Previous suicidal plan				
Present	19 (59.4%)	13 (40.6%)	-	0.000**
Absent	-	48 (100%)		
Previous suicide attempt				
Present	19 (86.4%)	3 (13.6%)	-	0.000**
Absent	-	58 (100%)		
History of self-harm				
Present	15 (62.5%	9 (37.5%)	28.4	0.000**
Absent	4 (7.1%)	52 (92.9%)		
Family history of suicide				
Present	1 (100%)	-	-	0.237
Absent	18 (22.8%)	61 (77.2%)		

* P values were obtained from chi-square tests/ Fisher's Exact Test
** Denotes significant result, P<0.05

Presence of depression (p=0.001), previous suicidal plan (p=0.000), previous suicide attempt (p=0.000) and past history of self-harm (p=0.000) were significantly present in schizophrenia patients with suicidal ideations. (Table V)

Discussion

A total of 80 patients were enrolled in this study who had a mean age of 29 years which correspond to another study where mean age was 28.5 years[11] and most of the participants were in 25-35 years age group. Miettunen et al. described that the peak age of onset for schizophrenia spectrum disorders is between 20 to 29 years.[12] Majority of the patients were males (67.5%); Miettunen et al. reported that the incidence of schizophrenia among males is 4.15 and among females 1.71 per 10,000 person-years.[12] Occupation-wise majority were unemployed 63.7% in this study sample which coincided with another study in Bangladesh where 60.8% was unemployed.[13] In this study, majority of the subjects were muslims (92.5%) which coincides with the proportion of muslim population of the country (89.1%).[14]

Regarding marital status of patients in this study

showed, 54% were unmarried. Another study in Bangladesh showed that 56.5% patients were unmarried which correspond with this study.[11] Majority of the patient completed secondary levels of education. Even in developed countries like Australia, 90% of the schizophrenia group attain literacy level at or below 8th grade which correspond with this study.[15] In our study out of 80 schizophrenia patients, suicidal ideation was present in 19 (23.8%) patients which coincided with other study 24% in India.[16]

In this study, hallucination was present in 56.3% of the patients and mainly they presented with auditory hallucinations. Chaudhury conducted a study in India and found 70% of schizophrenia patients experienced hallucinations; most common hallucinations in schizophrenia were auditory, followed by visual.[17] Delusions were present in 75% of the patients. From a 20-year follow up study Harrow and Jobe published that, 26% of the patients with schizophrenia were delusional at all follow-ups over the 20 years; 57% had frequently recurring or persistent delusions and a subgroup of over 25% of the schizophrenia patients had no delusional activity at any of the 6 follow-ups over 20 years.[18] About 19% of the schizophrenia patients were abusing nicotine in this study. Other studies found that the prevalence of cigarette smoking is significantly higher among patients with schizophrenia (60-90%) than in the general population (23-30%).[19]

Hopelessness was almost universally present (90%) in this study. Other studies reported that severe hopelessness was present in 25% of his study.[20] Estimated prevalence of depression in schizophrenia is around 40%, however the stage of illness (early vs chronic) and state (acute or post-psychotic) factors influences figures, which can thus vary considerably.[21] Results showed that about 27.5% had attempted suicide before and around 30% had history of self- harm. Jakhar et al. reported that, 23% of the 270 patients they studied had history of self-harm.[22]

Conclusion

Schizophrenia is a disorder of low incidence but high prevalence and suicidal behaviors are common in individuals with schizophrenia. So, evidence based information regarding these issue will help us to manage these individuals effectively. Therefore, this study would provide feedback to the family, community and finally to the policymakers. Nationwide survey conduction and establishment of national suicide surveillance are now a time demanded step.

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ORIGINAL ARTICLE

Association of Sunlight Exposure and Diet with Vitamin D deficiency Among Children: A Cross-Sectional Study in a District Hospital in Bangladesh

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Abstract

Background: Vitamin D deficiency is a significant public health concern among children, particularly in South Asian countries like Bangladesh. Despite the region's abundant sunlight, Vitamin D deficiency remains prevalent due to limited outdoor activity, dietary insufficiencies, and other lifestyle factors. However, limited studies have explored the combined effects of sun exposure, dietary intake on Vitamin D status in children at the district hospital level. Objectives: This study aimed to assess the association between sun exposure, dietary intake (milk and fish consumption) with Vitamin D deficiency among children attending a district hospital in Bangladesh. Additionally, we examined the interaction effect between sun exposure and dietary factors.

Methods: A cross-sectional study was conducted at a district hospital in Bangladesh, including 140 children diagnosed with Vitamin D deficiency (serum 25-hydroxyvitamin D < 20 ng/mL). Data were collected on sun exposure (hours/day), dietary intake (milk and fish consumption frequency), and anthropometric measurements. Multiple linear regression analysis was performed to determine predictors of Vitamin D levels, and interaction effects were explored.

Results: The study found that higher fish consumption and older age were significantly associated with lower Vitamin D levels ($p < 0.01$ and $p < 0.05$, respectively). Sun exposure alone was not a strong predictor; however, an interaction effect was observed, where higher sun exposure benefited children with lower fish intake but not those with high fish consumption ($p < 0.05$). Dietary milk intake and Vitamin D supplementation did not show a measurable effect on serum Vitamin D levels ($p > 0.05$), highlighting the need for alternative interventions.

Conclusion: Fish consumption and age were strong predictors of Vitamin D levels, with a notable interaction between dietary intake and sun exposure. These findings highlight the need for targeted public health interventions, including optimized dietary recommendations, increased safe sun exposure, and potential food fortification strategies to prevent Vitamin D deficiency in Bangladeshi children.

Keywords: Vitamin D deficiency, sun exposure, dietary intake, pediatric health, Bangladesh.

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Introduction

Vitamin D is an essential fat-soluble vitamin that plays a crucial role in bone health, immune function, and overall growth and development in children.[1] It is primarily synthesized in the skin upon exposure to ultraviolet B (UVB) sunlight and can also be obtained from dietary sources

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such as fatty fish, dairy products, and fortified foods.[2] Despite its importance, Vitamin D deficiency has become a significant global public health concern, particularly among children, due to insufficient sun exposure, inadequate dietary intake, and lifestyle changes.[3]

Vitamin D deficiency in children is associated with an increased risk of rickets, impaired bone mineralization, weakened immune function, and a potential predisposition to chronic diseases such as type 1 diabetes and respiratory infections.[4] Various factors influence Vitamin D levels, including sun exposure, dietary intake, body weight, genetic predisposition, and socioeconomic status.[5] However, the complex interplay between these factors remains an area of active research, particularly in regions with high prevalence rates of deficiency.[6]

Bangladesh, a South Asian country with abundant sunlight, paradoxically experiences a high burden of Vitamin D deficiency among children.[7] Studies suggest that limited outdoor activity, cultural practices involving skin-covering clothing, and inadequate dietary intake contribute to this widespread deficiency.[8] Despite this, there is a lack of district-level hospital-based studies assessing the specific determinants of Vitamin D deficiency among Bangladeshi children. Understanding these determinants is essential for developing targeted public health interventions.[9]

Previous research has explored the impact of sun exposure and dietary intake on Vitamin D levels, yet limited studies have examined the interaction between these factors, particularly in the context of Bangladesh.[10] Fish consumption, a major dietary source of Vitamin D in the region, may not always lead to improved Vitamin D status due to variations in fish species and cooking methods. Additionally, the influence of body weight and maternal Vitamin D status on childhood Vitamin D levels remains underexplored.

This study aimed to assess the association between sun exposure, dietary intake, and body weight with Vitamin D deficiency among children attending a district hospital in Bangladesh. We hypothesize that lower sun exposure and inadequate dietary intake will be significantly associated with Vitamin D deficiency, with potential interaction effects between these factors. By addressing these gaps, our findings aimed to provide insights that can inform dietary recommendations and public health strategies to combat Vitamin D deficiency among Bangladeshi children.

Methods

A cross-sectional study was conducted at the 250 Bedded General Hospital Kushtia, Bangladesh, between January and June 2023 to assess the association between sun exposure, dietary intake, and body weight with Vitamin D deficiency among children. Children aged 5–12 years with serum 25-hydroxyvitamin D levels <20 ng/mL[11] were included, while those with chronic illnesses affecting Vitamin D metabolism (e.g., chronic kidney disease, liver disorders, malabsorption syndromes)[12], ongoing supplementation, or missing key data were excluded. Participants were selected using convenience sampling from both outpatient and inpatient departments, which may limit the generalizability of findings.

Data were collected through structured parental interviews, dietary assessments, and clinical measurements. Serum 25(OH)D levels were measured using the chemiluminescent immunoassay (CLIA) method at different private laboratory. While widely used for its sensitivity and specificity[13], CLIA may underestimate Vitamin D levels compared to the LC-MS/MS method[14]. A cutoff value of <20 ng/mL was used to define Vitamin D deficiency.[15] Sun exposure was assessed based on parental reports categorizing daily exposure into <1 hour, 1–2 hours, or >2 hours. However, details like time of day and extent of skin exposure were not recorded, potentially affecting accuracy.[16] Previous studies suggest parental reports may not always reflect actual sun exposure[17], and future research should incorporate wearable UV sensors for precision.

Dietary intake was evaluated using a weekly food frequency questionnaire focusing on Vitamin D-rich foods, including milk, fish, and eggs. Variations in fish species, preparation, and portion sizes were not recorded, potentially influencing Vitamin D bioavailability.[18,19] Anthropometric measurements, including weight, height, and BMI, were recorded following WHO protocols[11,12], with duplicate measurements taken for accuracy.

Ethical approval was obtained from the Institutional Review Board, and informed consent was secured from parents or guardians. Data were analyzed using SPSS version 26.0, with Spearman's correlation and multiple linear regression assessing relationships between Vitamin D levels and key factors.[14] The final model (R^2 = 0.128) explained 12.8% of the variation in Vitamin D levels, highlighting the need for further research into unmeasured influences.

Results

A total of 140 children diagnosed with Vitamin D deficiency (serum 25-hydroxyvitamin D < 20 ng/mL) were included in this study. The mean age of participants was 7.72 years, with 54% (n = 76) male and 46% (n = 64) female. The mean serum 25-hydroxyvitamin D level was 20.36 ng/mL. Most children reported average than 1.73 hours of daily sunlight exposure per day (Table I).

Table I: Baseline characteristics of participants

Variables	n	mean
Age	140	7.728571
Sun Exposure (hours/day)	140	1.734043
Milk Consumption (times/week)	140	2.904255
Fish Consumption (times/week)	140	0.010638
Vitamin D Level (ng/mL)	140	20.36383

Spearman's correlation analysis demonstrated several significant relationships. Age was negatively correlated with Vitamin D levels (r = -0.22, p < 0.01), suggesting that older children had lower Vitamin D levels. Fish consumption also showed a negative correlation with Vitamin D levels (r = -0.30, p < 0.01), potentially indicating the presence of dietary confounders. Sun exposure exhibited a weak positive association with Vitamin D levels (r = 0.17, p >0.05), but this relationship was not statistically significant (Table II).

Table II: Correlation matrix for key variables

Variables	Age	Sun Exposure (hrs/day)	Milk Consumption (times/week)	Fish Consumption (times/week)	Vitamin D Level (ng/mL)
Age	1	0.173907	-0.00091	-0.00763	-0.16166
Sun Exposure (hrs/day)	0.173907	1	-0.16585	-0.11581	0.134182
Milk Consumption (times/week)	-0.00091	-0.16585	1	-0.09946	-0.07201
Fish Consumption (times/week)	-0.00763	-0.11581	-0.09946	1	-0.14328
Vitamin D Level (ng/mL)	-0.16166	0.134182	-0.07201	-0.14328	1

Table III: Multiple regression results (with and without outliers)

Variables	Coefficient (Î²)	P-value	95% CI Lower	95% CI Upper
Age	-0.35966	0.025869	-0.67535	-0.04396
Sun Exposure (hrs/day)	0.971894	0.067002	-0.06904	2.012826
Milk Consumption (times/week)	-0.12439	0.481785	-0.47318	0.224397
Fish Consumption (times/week)	-12.6686	0.003368	-21.0609	-4.2762
Vitamin D Supplementation	0.62725	0.771901	-3.64386	4.898358
Maternal Vitamin D Supplementation	4.199984	0.16244	-1.714	10.11397

A multiple linear regression model identified fish consumption (β = -12.67, p < 0.01) and age (β = -0.36, p < 0.05) as significant negative predictors of Vitamin D levels. Sun exposure showed a trend but was not significant (β = 0.97, p > 0.05). Milk consumption, supplementation, and BMI had no effect (p > 0.05). The model explained 12.8% of the variance (R^2 = 0.128), suggesting other unmeasured factors influence Vitamin D levels (Table III).

Table IV: Subgroup analysis (Gender and Age)

Subgroup	P-value
Gender (Male vs Female)	0.429356
Age Group Differences (0-5, 6-10, 11-15)	0.207068

No significant difference in Vitamin D levels was found between boys and girls (p > 0.05). Similarly, no significant variation was observed across different age groups (0-5, 6-10, 11-15 years) (p > 0.05). These findings suggest that gender and age-group classifications do not significantly contribute to the variability in Vitamin D levels in this population (Table IV).

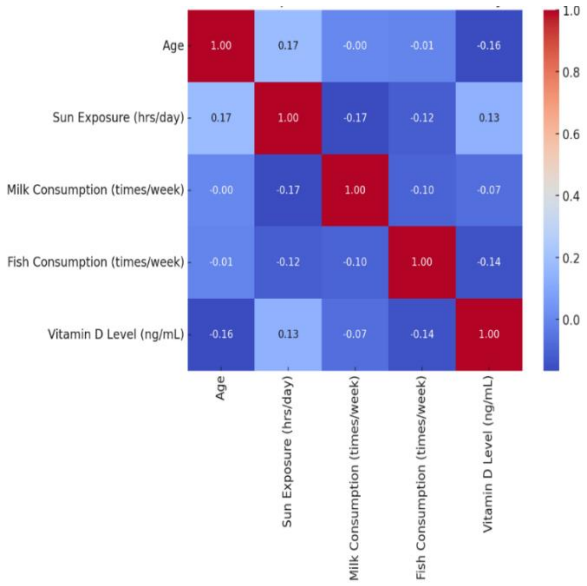


Figure 1: Correlation heatmap

The correlation heatmap visually represents the relationships among key variables. Strong negative correlations are observed between age, fish consumption, and Vitamin D levels, confirming the findings from the correlation analysis (Figure 1).

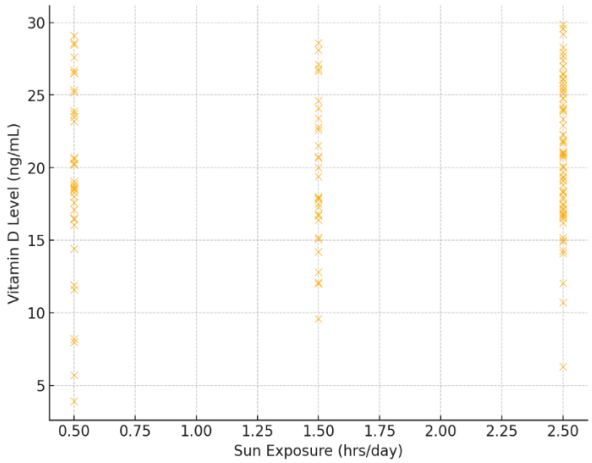


Figure 2: Scatterplot (Sun Exposure vs. Vitamin D Level)

The scatterplot depicts the association between daily sun exposure duration and Vitamin D levels. While a positive trend is noted, the wide dispersion of points indicates that sun exposure alone may not be a strong predictor of Vitamin D status in this cohort (Figure 2).

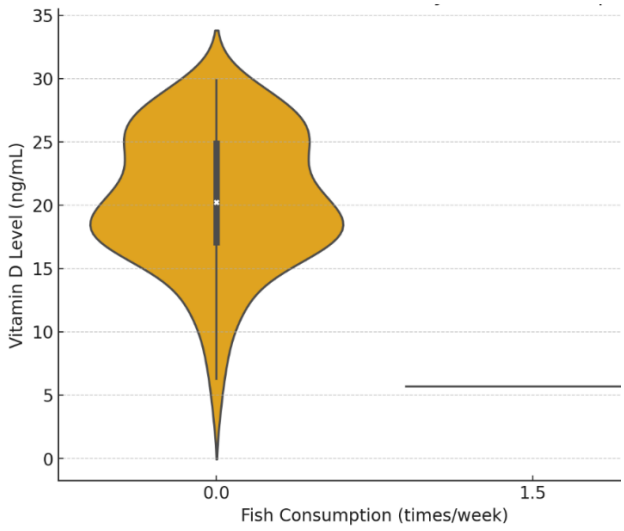


Figure 3: Violin Plot (Fish Consumption vs. Vitamin D Level)

The violin plot illustrates the distribution of Vitamin D levels across different fish consumption frequencies. The observed trend shows that children with higher fish consumption exhibit lower Vitamin D levels, reinforcing the negative association found in the regression analysis (Figure 3).

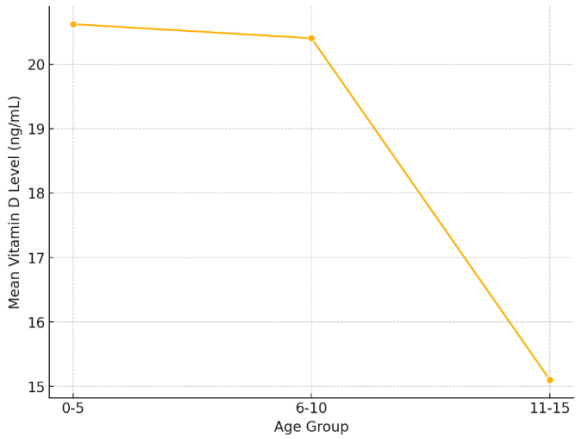


Figure 4: Line Plot (Vitamin D Levels Across Age Groups)

The line plot demonstrates the trend of Vitamin D levels across different age groups. A gradual decline in Vitamin D levels with increasing age is observed, further supporting the negative correlation between age and Vitamin D levels (Figure 4).

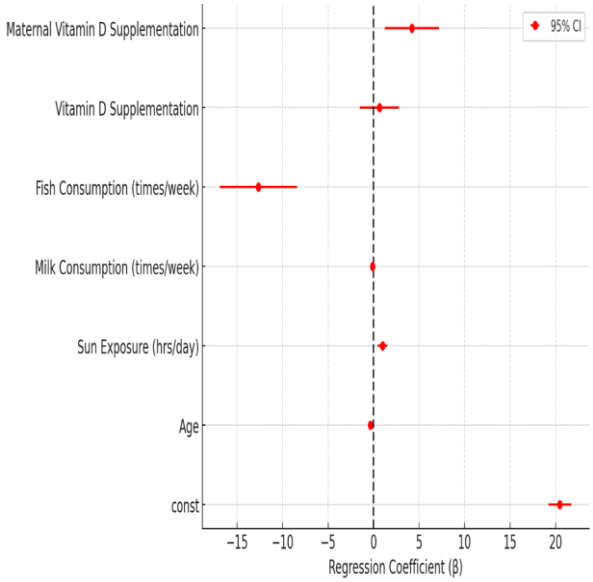


Figure 5: Forest Plot of Regression Coefficients

The forest plot provides a graphical summary of the regression analysis, displaying the effect size (β-coefficients) and confidence intervals for each predictor variable. The results confirm that fish consumption and age are significant negative predictors, while sun exposure shows a weaker association (Figure 5).

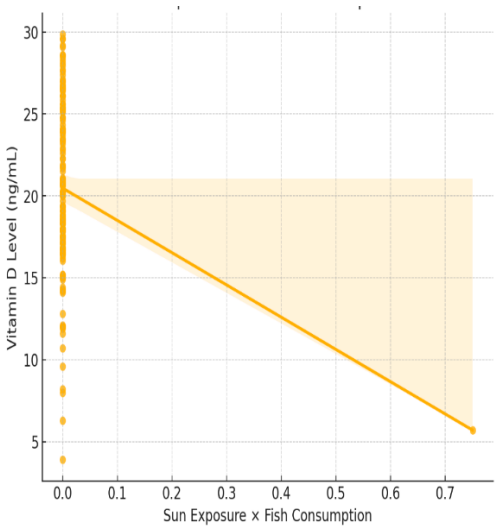


Figure 6: Interaction Effect (Sun Exposure × Fish Consumption)

To explore potential interaction effects, a multiple linear regression model was expanded to include interaction terms. Sun exposure was found to be a significant predictor only when interacting with fish consumption ($\beta = 1.05$, $p = 0.044$). Fish consumption remained a strong negative predictor ($\beta = -7.54$, $p = 0.007$). The interaction term (Sun Exposure × Fish Consumption) was significant ($\beta = -3.77$, $p = 0.007$), suggesting that higher fish consumption may reduce the benefit of sun exposure on Vitamin D levels. These results indicate that while sunlight remains a key determinant of Vitamin D levels, its effects may be moderated by dietary intake (Figure 6).

Outliers in Vitamin D levels were examined, but their removal did not change key findings. Older children had lower Vitamin D levels ($p < 0.05$), while higher fish consumption was associated with lower Vitamin D levels ($p < 0.01$). Sun exposure was a significant predictor only when interacting with fish consumption ($p < 0.05$). BMI, milk consumption, gender, and supplementation had no significant effects. These results suggest a complex interplay of dietary and lifestyle factors in Vitamin D metabolism, requiring further research.

Discussion

This study examined the associations between sun exposure, dietary intake (milk and fish

consumption), and body weight with Vitamin D deficiency among children in a district hospital in Bangladesh. The findings revealed that higher fish consumption and increasing age were significantly associated with lower Vitamin D levels, while sun exposure only influenced Vitamin D levels in children with lower fish consumption. These results contribute to research on pediatric Vitamin D deficiency and offer insights into potential public health interventions.[20,21]

Our findings align with previous research suggesting an inverse relationship between age and Vitamin D levels, with older children exhibiting lower concentrations.[22] Studies in India and the Middle East have similarly reported reduced Vitamin D levels in school-aged children due to increased time spent indoors for academic activities and decreased outdoor exposure.[23] The lack of a significant association between milk consumption and Vitamin D levels contrasts with studies from North America and Europe, where fortified dairy products are key Vitamin D sources.[24] This discrepancy may be due to the absence of fortification in most dairy products in Bangladesh and other South Asian countries.[25]

One of the most unexpected findings was the negative association between fish consumption and Vitamin D levels. Although fish is traditionally considered a rich source of Vitamin D, several factors may explain this paradox. Differences in fish species and preparation methods influence Vitamin D bioavailability.[26] Cooking techniques like deep-frying or prolonged boiling can degrade Vitamin D content, reducing its availability.[27] The fish commonly consumed in Bangladesh, such as tilapia or rohu, may have lower Vitamin D levels compared to fatty fish like salmon and mackerel, which are associated with better Vitamin D status in other populations.[28] Additionally, higher fish consumption may correlate with dietary patterns or metabolic factors that inhibit Vitamin D absorption, such as elevated calcium or phosphorus intake, genetic variations in Vitamin D metabolism, or interactions with Vitamin D-binding proteins. Further research is needed to explore these mechanisms in detail.

Another key finding was the interaction between sun exposure and fish consumption. While sun exposure alone was not a strong predictor of Vitamin D levels, its effect became significant when examined alongside fish consumption. This suggests that dietary factors may influence how sunlight-derived Vitamin D contributes to overall Vitamin D status.[29] Similar interactions have been observed in Saudi Arabia and Iran, where children with low fish consumption benefited more from sun exposure than those with high fish intake.[30] These findings highlight the complexity of Vitamin D metabolism and the need for a multifactorial approach to addressing Vitamin D deficiency, especially in populations with limited sun exposure and dietary sources.

The study's findings have important public health implications for preventing and managing Vitamin D deficiency in children. Given the high prevalence of deficiency, interventions should focus on increasing safe sun exposure through educational campaigns that encourage outdoor activities at appropriate times of the day. Optimizing dietary recommendations by promoting Vitamin D-rich fish species, exploring food fortification, and encouraging cooking methods that preserve Vitamin D content may also help improve Vitamin D intake. Healthcare professionals should consider potential dietary interactions that affect Vitamin D metabolism and tailor public health recommendations accordingly.

Despite the study's strengths, including a well-defined clinical population and robust statistical analysis, several limitations must be acknowledged. The cross-sectional nature of the study prevents establishing causality, making it unclear whether specific dietary patterns and behaviors led to low Vitamin D levels or whether pre-existing deficiency influenced dietary intake. Although our findings suggest a negative association between fish consumption and Vitamin D status, the study design does not confirm causality. Longitudinal studies and randomized trials are necessary to determine whether dietary factors directly affect Vitamin D metabolism in this population.

Another limitation is the measurement of sun exposure, which relied on parent-reported estimates and did not account for key variables such as time of day, skin exposure area, or seasonal variation, all of which influence Vitamin D synthesis. Future studies should incorporate objective assessments, such as UV index data and direct skin exposure measurements, for more

precise estimates. Similarly, dietary data were collected using a weekly food frequency questionnaire, which, while useful for estimating intake, may be subject to recall bias. Details on fish species, portion sizes, and cooking methods were not assessed, limiting the interpretation of findings.

The multiple regression model explained only 12.8% of the variation in Vitamin D levels, suggesting that additional unmeasured factors contribute to Vitamin D status. Potential contributors not examined in this study include genetic variations in Vitamin D metabolism, maternal Vitamin D status during pregnancy, and environmental factors such as air pollution, which can reduce UVB penetration. Future research should consider these factors to develop a more comprehensive understanding of the determinants of Vitamin D deficiency in children.

Conclusion

This study found that fish consumption and increasing age were significant predictors of lower Vitamin D levels among children in a district hospital in Bangladesh. Sun exposure alone was not a strong predictor, but its interaction with dietary intake suggests dietary factors influence Vitamin D status. These findings highlight the need for holistic prevention strategies, including safe sun exposure, dietary optimization, and potential food fortification. Given the study's hospital-based setting and cross-sectional design, further community-based and longitudinal research is needed to confirm these associations and explore additional determinants of Vitamin D deficiency for more effective public health interventions.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgments

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ORIGINAL ARTICLE

Comorbidity Status of COVID-19 Related Deaths in 250 Bedded General Hospital, Kushtia

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Abstract

Background: The emergence of coronavirus disease (COVID-19) as a global pandemic had resulted in the loss of many lives and a significant decline in global economic losses. Death laid its icy hands also on Bangladesh specially among the people with comorbidity. Specific patterns of comorbidities related to COVID-19 deaths have been investigated mostly in tertiary care hospital but less studied in district level hospital. This study aimed to describe the status of comorbidities and their impact on death in patients with COVID-19 in a district level hospital.

Methods: This retrospective study included 254 COVID-19 associated deceased patients admitted in 250 Bedded General Hospital, Kushtia, Bangladesh between August 2021 and October 2021. Data were collected from hospital record. Deaths were categorized into early and late with cut-off of 48 hours of hospitalization.

Results: Among 254 death cases of COVID-19 the mean age was 54.5 years, predominant age group were 45-64 years; 57.87% were male, 42.12% were female. Prevalence of comorbidities were 78.35% and without morbidity were 21.65%. Patient with DM (42.35%), IHD (48.39%) died early (within 2 days) in comparison to other groups.

Conclusion: In those deceased in-hospital due to COVID-19 in 250 Bedded General Hospital, Kushtia, Bangladesh, multiple co-morbidities specially DM, IHD, HTN were found in our study. The findings of this study will help clinicians as well as policy makers to take necessary steps to prevent death from COVID-19 in Bangladeshi population.

Keywords: COVID-19, SARS-CoV-2, Chronic disease, Risk Factors, Comorbidity, Mortality.

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Introduction

The coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected more than 18 crore people along with around four million deaths worldwide as of 04 July 2021. The situation became worse, perhaps because of new delta variant. In Bangladesh, deaths related to COVID-19 also increased during this period. The majority of the patients with COVID-19 recovered but a small portion of the affected persons were at increased risk of fatal outcome.[1] Most of the studies reported several comorbidities as risk factors of COVID-19 death.[2] Septic shock, multi-organ failure, acute and organizing diffuse alveolar damage as well as pulmonary thromboembolism etc. were reported as immediate causes of death in COVID-19 patients.[3,4] The characteristics of deceased person as well as specific patterns of comorbidities may help clinicians to identify population at risk and take appropriate management. However, the information on this aspect of COVID-19 deaths is lacking in South Asian countries, particularly from Bangladesh. This study aimed to describe the status of comorbidities and their impact on death in patients with COVID-19 in a district level hospital.

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Methods

This retrospective study was conducted in the department of medicine in 250 Bedded General Hospital, Kushtia, Bangladesh. This study included total 254 COVID-19 associated deceased patients admitted in 250 Bedded General Hospital, Kushtia, Bangladesh during the period of August 2021 to October 2021. Relevant demographic and clinical information were extracted from patients' hospital records using a structured data collection form. The primary objective of the study was to identify the presence and types of comorbidities among patients who died from COVID-19. Comorbidities were defined according to standard clinical criteria and included conditions such as hypertension, diabetes mellitus, chronic kidney disease, cardiovascular disease, chronic respiratory illnesses, and other clinically recognized disorders. Only adult and elderly population with complete documentation regarding comorbidity status were considered eligible for analysis.

All information were double-checked before analysis to ensure quality. The severity of COVID-19 was described by WHO interim guidance and the period of death was divided in to early and late by cut-off of 48 hours of hospitalization.[5,6] Data were expressed in mean± standard deviation (SD) or number (percentages, %). Chi- square test was used for analysis and $p<0.05$ were considered significant.

Results

Over three months of study period among 254 deceased patients with COVID-19 prevalence of comorbidities were 78.35% (n=199). In light of the mentioned data, without morbidity were 55 (21.65%) (Figure 1).

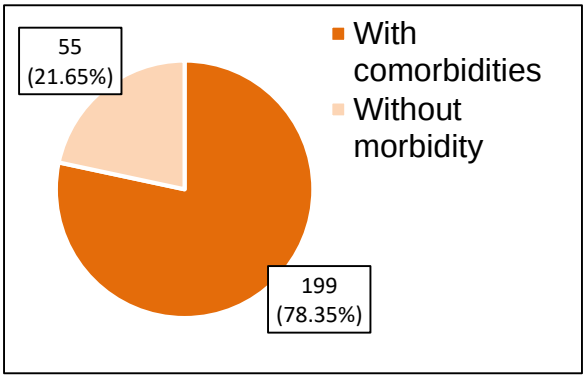


Figure 1: Distribution of the deceased patients by comorbidities (n = 254).

Table I showed age & sex distribution of deceased patients. The mean age was 54.5 years (min-max: 18 – 95 years). The majority of deaths were concentrated among middle-aged and older adults with those aged 45-64 years (44.49%), followed by the 65–74 aged (31.50%). Notably, the 75+ group, although smaller in absolute number, also had a significant proportion (14.96%) of deaths. Sex distribution showed 147 (57.87%) were male and 107 (42.12%) were female.

Table I: Age and sex wise distribution of COVID-19 related deaths by comorbidity status (n = 254)

Variables	Total Deaths n (%)	With Comorbidity (n =199) n (%)	Without Comorbidity (n =55) n (%)
Age			
Young Adults (18–44)	23 (9.05)	18 (9.05%)	5 (9.09%)
Middle-aged Adults (45–64)	113 (44.49)	85 (42.71%)	28 (50.90%)
Older Adults (65–74)	80 (31.50)	64 (32.16%)	16 (29.09%)
Elderly (75+)	38 (14.96)	32 (16.08%)	6 (10.90%)
Sex			
Male	147	109 (54.77%)	38 (69.09%)
Female	107	90(45.23%)	17(30.91%)

Table II: Association between comorbidities and hospital stay duration before death in COVID-19 patients (n=254)

Comorbidity	Total Cases	Early Deaths (Stayed ≤2 Days)	Late Deaths (Stayed >2 Days)	P-value *
Diabetes Mellitus(DM)	85	36(42.35%)	49(57.65%)	0.0367**
Ischemic Heart Disease(IHD)	31	15(48.39%)	16(51.61%)	0.0443**
Chronic Kidney Disease (CKD)	07	01(14.29%)	06(85.71%)	0.7293
Chronic Obstructive Pulmonary Disease (COPD)	09	01(11.11%)	08(88.89%)	0.4709
Cerebrovascular Disease	04	00(0.0%)	04(100%)	0.5063
Rheumatoid Arthritis	03	00(0.0%)	03(100%)	0.6809
Hypertension (HTN)	29	04(13.79%)	25(86.21%)	0.1341
Other Morbidities	31	04(12.90%)	27(87.10%)	0.0911
Without Morbidities	55	25(45.45%)	30(54.55%)	0.0095**

* P values were obtained from chi-square tests
** Denotes significant result, P<0.05

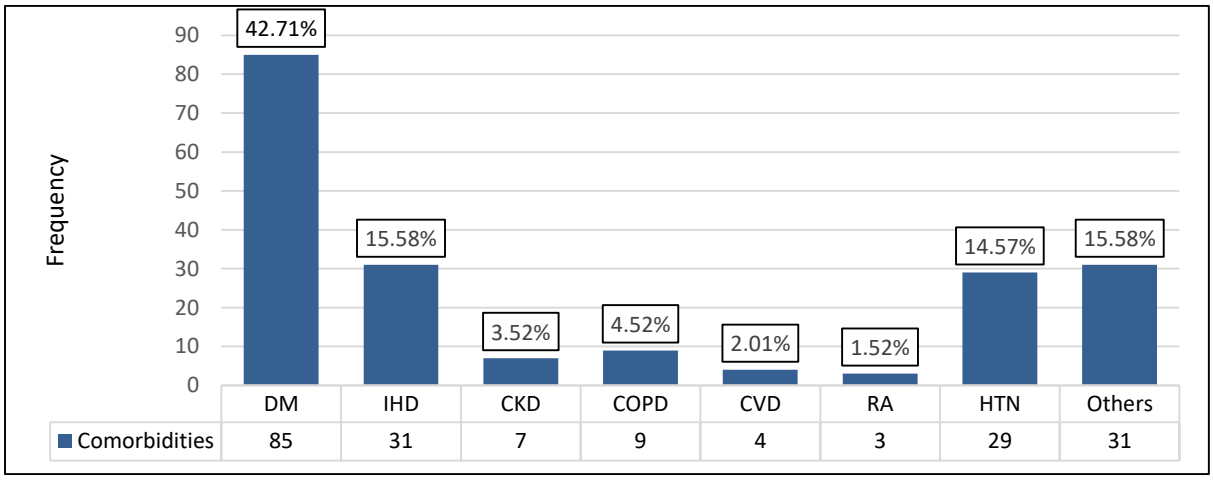


Figure 2: Average comorbidity of COVID-19 death patients (n=199)

Out of 254 COVID-19 death cases, 42.35% of patients with diabetes and 48.39% of patients with IHD died ≤2 days of hospital stay. The p-values for these two comorbidities were 0.0367 and 0.0443 respectively, which were statistically significant. This indicates that DM and IHD significantly increase the risk of early death in patients with COVID-19 (Table II).

Among the total 199 cases of comorbidities among COVID-19 death cases highlights Diabetes mellitus (DM) (42.71%) and ischemic heart disease (IHD) (15.58%) were two most prevalent underlying conditions. Hypertension (HTN) and others had 14.57% and 15.58% respectively. Other comorbidities observed in smaller proportions included Chronic Obstructive Pulmonary Disease (COPD) (4.52%), chronic kidney disease (CKD) (3.52%), cerebrovascular disease (CVD) (2.01%) and rheumatoid arthritis (RA) (1.52%). These findings highlight the predominance of diabetes and cardiovascular illnesses as significant contributors to COVID-19 mortality (Figure 2).

Discussion

This study has analysed the association of death and comorbidities during the three months study period of COVID-19 death patients. The mean age was 54.5 years and the majority of deaths were among middle-aged and older adults, with those aged 45-64 (44.49%) followed by the 65–74 age group (31.50%). The mean age thus reflects the increased vulnerability of individuals i.e. those with pre-existing comorbid conditions. Our finding is consistent with studies reported from Asian countries.[2] Age ≥65 years was found as a major risk factor for death in patients with COVID-19 in a systematic review and meta-analysis of observational studies.[7] Interestingly, more than half of our study population were younger than 60 years. This finding is in concordance with recent reviews from Bangladesh and India[8,9] suggesting that population at risk for COVID-19 mortality may be different from other regions of the world possibly due to genetic or environmental factors or possibly a shorter life expectancy. Sex distribution showed 147 (57.87%) were male and 107 (42.12%) were female. So here it can be said that the mortality rate of male is comparatively higher than female. Demographic characteristics, clinical features, co-morbidities and duration of hospital stay were similar to other studies.[10-12]

Undernutrition as a probable contributing factor of death in COVID-19 patients. Previous studies highlighted obesity, however, the scenario may be different in a developing country like Bangladesh which faces the double burden of malnutrition.13 However, data regarding body mass index was not documented in hospital records. The results showed that patients with diabetes mellitus (DM) (42.35%) and ischemic heart disease (IHD) (48.39%) had a significantly higher rate of early death ≤2 days of hospital stay. A possible reason is that diabetic patients generally have a weak immune response and a heightened inflammatory response, which can accelerate viral complications. These results align with previous studies that have identified diabetes (DM), ischemic heart disease (IHD) and hypertension (HTN) as major risk factors for severe COVID-19 outcomes, including increased morbidity. The findings also suggest that diabetes mellitus and ischemic heart disease, may influence the duration of hospital survival and underscores the need for proactive clinical management and targeted intervention strategies, especially in resource-constrained healthcare settings, to mitigate fatal outcomes. In contrast, comorbidities such as CKD, CVD, and COPD did not show significant associations, possibly due to the small number of cases. The absence of a strong correlation for other comorbidities suggests the need for further large-scale studies to explore their impact, considering confounding factors such as age, gender, and treatment protocols.

Conclusion

Our study findings showed several characteristics and unique features of deceased patients with COVID-19 than other parts of the world. These findings would help clinicians and policy makers to tailor management strategies, facilitate decision making and ultimately improve patient outcome. Further multi-center study including large sample size from different parts of the country should be conducted over a long period of time.

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ORIGINAL ARTICLE

Blood Culture Profile and its Outcome among Neonates Admitted in a District-Level Hospital in Bangladesh

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Abstract

Background: Neonatal sepsis is a significant contributor to morbidity and mortality among newborns globally. Blood culture remains the most reliable method for detecting bacterial pathogens responsible for sepsis. Identifying the causative organisms through blood culture allows healthcare providers to administer appropriate, targeted antibiotic therapy based on sensitivity patterns. This not only enhances the chances of survival but also helps reduce the misuse of antibiotics and the development of antimicrobial resistance. The objective of this study is to observe the blood culture profile and its outcome among SCANU-admitted neonates.

Methods: This prospective observational study was conducted in the Special Care Newborn Unit (SCANU) of the 250 Bedded General Hospital, Kushtia, Bangladesh, following approval from the Ethical Review Board (ERB), over a period of one year, from June 2024 to May 2025. Neonates who fulfilled the eligibility criteria were included in the study. Blood samples for culture were collected using standard sterile techniques. Data were gathered from maternal history, clinical examination of the neonates, laboratory findings, and blood culture reports. All information was recorded on a pre-designed, semi-structured data collection sheet. The enrolled neonates were followed throughout their hospital stay, and outcomes were assessed accordingly.

Results: Out of 185 patients the majority were male (55.7%) and preterm (57.8%), with a mean gestational age of 35.88 ± 3.31 weeks and a mean birth weight of 2295.98 ± 754.73 grams. Early-onset sepsis (EOS) was identified in 41.1% and late-onset sepsis (LOS) in 58.9% of cases. Blood cultures were positive in 14.6% with Staphylococcus aureus being the most common isolate (51.9%), followed by Klebsiella pneumoniae (11.1%). Multi-drug resistance (MDR) was found in 67% of culture-positive cases. Significant risk factors associated with culture-positive sepsis included foul-smelling liquor, maternal fever, prelacteal and bottle feeding, poor hand hygiene, and prolonged hospital stay ($p<0.05$). Mortality was higher among culture-positive neonates (22.3%) compared to clinical sepsis (16.4%), and this difference was statistically significant ($p=0.001$).

Conclusion: The incidence of culture-positive sepsis is 14.6% during the study period. Prolonged hospital stays, poor hand hygiene, history of prelacteal feeding, bottle feeding, mother's history of fever within two weeks before delivery, and foul-smelling liquor are important risk factors of culture-proven sepsis. Staphylococcus aureus is the most prevalent organism.

Keywords: Blood Culture, Neonates, Neonatal Sepsis.

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Introduction

Neonatal sepsis remains a significant contributor to neonatal morbidity and mortality worldwide, with an estimated 3 million cases annually and a mortality rate of 22.2%.[1] It is classified into

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early-onset sepsis (EOS), occurring within 72 hours of birth, often linked to maternal transmission, and late-onset sepsis (LOS), which typically results from nosocomial infections.

The spectrum of causative organisms varies by region. Gram-positive bacteria, such as Group B *Streptococcus*, predominate in developed countries, while Gram-negative organisms like *Klebsiella spp.* and *E. coli* are more common in developing settings.[2,3] Blood culture remains the gold standard for diagnosis, although its sensitivity is influenced by factors such as sample volume and laboratory limitations, with global culture-positivity rates ranging from 6.7% to 55.4%.[4]

Due to the nonspecific presentation of sepsis, empirical antibiotic therapy is often initiated before culture results are available. Culture and sensitivity data are essential to guide appropriate antimicrobial use, improve outcomes, and combat antibiotic resistance. There is limited district-level data from Bangladesh on microbial patterns and antibiotic use in neonatal sepsis.[5] This study aimed to assess the microbial profile, antibiotic rationale, and clinical outcomes among neonates admitted over a one-year.

Methods

Study design and place: This Prospective Observational study was done in the Special Care Newborn Unit (SCANU) in 250 Bedded General Hospital, Kushtia, from June 2024 to May 2025, after getting the approval from the Ethical Review Board. This center is the district-level referral center in Bangladesh.

Eligibility criteria: All SCANU-admitted neonates with suspected sepsis whose blood culture was sent on admission or during clinical deterioration or not improving or departmental protocol for repeat culture after 72 hours of antibiotic therapy, were included in the study. Neonates with multiple congenital anomalies were excluded from this study.

Study Procedure: Eligible neonates were enrolled after informed consent. Blood samples for culture (1–2 mL) were collected under strict aseptic precautions before other investigations. The phlebotomy site and blood culture bottle septum were disinfected using chlorhexidine gluconate (0.5% in 70% alcohol). Blood was inoculated directly into BacT/Alert Pediatric or Standard Aerobic bottles without changing the needle, and samples were transported promptly to the laboratory without refrigeration.

Data were collected using a structured sheet, including demographic details, sepsis risk factors, clinical features, and blood culture variables (site, timing, organism, sensitivity pattern). Information was obtained from maternal history, physical examination, laboratory records, and culture reports. All neonates were followed during hospital stay, and outcomes were categorized as discharge, discharge on request (DOR), left against medical advice (LAMA), or death.

Data analysis

Data were analyzed, plotted, and presented in graphs and tables. Qualitative data were expressed in proportion or percentage & statistical tests were done by chi-square test, and quantitative data were expressed as mean & SD, and statistical tests were done by student 't' test. All data were analyzed by SPSS version 25. "P<0.05" was considered a level of significance.

Results

A total of 196 admitted neonates during the study period who were eligible for this study were included. Based on exclusion criteria 11 neonates were excluded.

Most of the neonates (55.7%) were male, birth weight was mostly between 2500 g to 3999 g (36.8%), followed by between 1500 g to 2499 g (34.1%). Most of the babies were delivered by LUCS (56.8%). Organisms were isolated in 14.6% of cases. In this study about 76 (41.1%) had EOS and 109 (58.9%) had LOS (Table I)

Baseline maternal characteristics are shown in Table 2. The mean maternal age was 19.15 ± 4.90 years. Most of the mothers were multipara (72.9%), had Lower Uterine Caesarean Section (LUCS) 56.8% and vaginal delivery (VD) 43.2%. Only 19.4% mothers completed the course of ACS. 15.7% mothers had diabetes mellitus, 9.1% mothers had pre-eclampsia, 7% had APH, and 18.4% had FGR (Table II)

Table I: Baseline characteristics of enrolled neonates (N = 185)

Characteristics	Frequency (%)
Gender	
Male	103 (55.7)
Female	82 (44.3)
Gestational age category	
<28 weeks	3 (1.6)
28-32 weeks	42 (22.7)
33- 36 weeks	61 (33)
37-42 weeks	79 (42.7)
Gestational age in weeks, mean±SD = 35.88±3.31	
Birth weight category	
<1000gm	8(4.3)
1000-<1500gm	44 (23.7)
1500-<2500gm	63 (34.1)
2500-<4000gm	68 (36.8)
4000gm or more	2 (1.1)
Birth weight in grams, mean±SD = 2295.98±754.73	
Place of delivery	
Inborn	101 (54.6)
Out born	84 (45.4)
Preterm	107(57.8)
Type of sepsis	
Early Onset Sepsis (EOS)	76 (41.1)
Late Onset Sepsis (LOS)	109 (58.9)
Blood culture profile:	
Organism found	27 (14.6)
No growth	158 (85.4)

Table II: Baseline characteristics of the mothers (N=185)

Variable	Frequency (%)
Maternal age (years), mean ± SD	19.15 ± 4.90
Parity	
Primipara	50 (27.1)
Multipara	135 (72.9)
Mode of delivery	
VD	80 (43.2)
LUCS	105 (56.8)
Maternal socioeconomic condition	
Low income	54(29.2)
Middle income	118 (63.8)
High income	13 (7)
Area of residence	
Urban	43 (23.3)
Rural	142 (76.7)
Completed course of Antenatal corticosteroid (ACS)	36 (19.4)
Maternal diabetes mellitus	29 (15.7)
Pre-eclampsia	17 (9.1)
Antepartum Haemorrhage (APH)	13 (7)
Fetal growth restriction (FGR)	34 (18.4)
Rh isoimmunization	3 (1.6)

Table III: Organism isolated from blood culture (N=27)

Organisms	EOS N (%)	LOS N (%)	Total N (%)
Gram Positive Bacteria			
Staphylococcus Aureus	3 (42.8)	11 (55%)	14 (51.9%)
Coagulase negative taphylococcus (CoNS)	2 (28.5)	0 (0)	2 (7.4)
Enterococcus	0	2 (7.4)	2 (7.4)
Streptococcus	1 (14.3)	0	1 (3.7)
Gram Negative Bacteria			
Klebsiella Pneumoniae	0	3 (15)	3 (11.1)
Acinetobactet	1 (14.3)	1 (5)	2 (7.4)
Esch. Coli	0 (0)	1 (5)	1 (3.7)
Fungi			
Candida spp	0	2 (10)	2 (7.4)
Total	**7 (25.9)**	**20 (74.1)**	**27 (100)**

EOS: Early Onset Sepsis, LOS: Late Onset Sepsis

Among the culture-positive sepsis newborns, 7 (25.9%) neonates had EOS, and 20 (74.1%) neonates had LOS. Staphylococcus aureus was the predominant organism (51.9%) in both EOS and LOS, followed by Klebsiella pneumoniae (11.1%). Fungi were found in 7.4% cases. All the fungal sepsis were LOS (Table III).

Table IV: Presence of risk factors of sepsis (N= 185)

Risk factors	Culture positive sepsis N (%)	Clinical Sepsis N (%)	P Value
Prolonged rupture of the membrane	11 (40.7)	36(22.8)	0.139
Foul-smelling liquor	7 (25.9)	9 (5.7)	0.003
Maternal history of fever within 2 wks before delivery	7 (25.9)	14 (8.9)	0.018
Perinatal asphyxia requiring bag-mask ventilation	9 (33.3)	34(21.5)	0.141
Prematurity	15 (55.6)	82(51.9)	0.444
Poor cord care	5 (18.5)	12 (7.6)	0.08
Pre-lacteal feeding	11 (40.7)	20(12.7)	0.001
Bottle Feeding	11 (40.7)	19(12.1)	0.001
Prolonged hospital stays	27 (100)	109(68.9)	0.000
Poor Hand Hygiene	11 (40.7)	19 (12.1)	0.001

The presence of risk factors of sepsis includes foul smelling liquor (P value 0.003), maternal history of fever within 2 weeks before delivery (P value 0.018), history of prelacteal feeding (P value 0.001), bottle feeding (P value 0.001), poor hand hygiene (P value 0.001) and prolonged hospital stay (0.000) were found statistically significant between culture positive and clinical sepsis in this study (Table IV).

Table V: Antimicrobial resistance patterns of isolated Gram-positive bacteria

Antibiotics	Staph. aureus N (%)	CoNS N (%)	Entero-coccus N (%)	Strepto-coccus N (%)
Ampicillin	14 (100)	2 (100)	2 (100)	1 (100)
Penicillin	13 (92.9)	2 (100)	2 (100)	0
Ceftazidime	6 (42.9%)	2 (100)	1 (50)	NS
Ceftriaxone	12 (85.7)	2 (100)	2 (100)	1 (100)
Ciprofloxacin	11 (78.6)	2 (100)	2(100)	0
Cotrimoxazole	8 (57.1)	2 (100)	2 (100)	0
Vancomycin	11 (78.6)	1 (50)	NS	NS
Linezolid	3 (13.2)	0	1 (50)	0
Meropenem	6 (42.9)	2(100)	1(50)	0
Levofloxacin	5 (35.7)	2 (100)	1 (50)	0
Gentamicin	6 (42.9)	2 (100)	1 (50)	1 (100)
Amikacin	5 (35.7)	2 (100)	1 (50)	0
Clindamycin	1 (7.1)	NS	NS	1 (100)
Doxycycline	1 (7.1)	0	0	1 (100)

NS: Not Seen

Among Gram-positive isolates, *Staphylococcus aureus* was most common, followed by CoNS, *Enterococcus*, and *Streptococcus* species. All *S. aureus* isolates were resistant to Ampicillin, with high resistance to Penicillin (92.9%), Ceftriaxone (85.7%), and Ciprofloxacin (78.6%). Resistance to Vancomycin (78.6%) and Linezolid (13.2%) was also noted. CoNS showed 100% resistance to most antibiotics tested, including Ampicillin, Penicillin, and third-generation cephalosporins, with 50% resistant to Vancomycin. All CoNS isolates remained sensitive to Linezolid and Doxycycline. *Enterococcus* spp. demonstrated full resistance to Ampicillin, Penicillin, Ceftriaxone, and Ciprofloxacin, with moderate resistance (50%) to other antibiotics including Linezolid and Meropenem. *Streptococcus* isolates showed 100% resistance to several antibiotics, though the sample size was limited. Overall, high levels of multi-drug resistance, including to reserve antibiotics, were observed, highlighting the need for regular surveillance and rational antibiotic use (Table V).

Table VI: Antimicrobial resistance patterns of isolated Gram-negative bacteria

Antibiotics	Klebsiella pneumoniae N (%)	Acineto-bacter N (%)	Esch. Coli N (%)
Amikacin	3 (100)	2 (100)	0
Gentamicin	3 (100)	2 (100)	0
Ciprofloxacin	3 (100)	2 (100)	0
Levofloxacin	1 (33.3)	2 (100)	0
Ceftazidime	3 (100)	2 (100)	NS
Ceftriaxone	3 (100)	2 (100)	1 (100)
Meropenem	3 (100)	2 (100)	0
Tazobactum+ Piperacillin	3 (100)	2 (100)	NS

NS: Not Seen

Klebsiella pneumoniae and *Acinetobacter* species exhibited extremely high antimicrobial resistance, showing 100% resistance to Amikacin, Gentamicin, Ciprofloxacin, Ceftazidime, Ceftriaxone, Meropenem, and Piperacillin–Tazobactam. *Acinetobacter* also showed 100% resistance to Levofloxacin, while only 33.3% of *Klebsiella* isolates were resistant to it. Notably, both organisms were fully sensitive to Colistin, Tigecycline, and Polymyxin B. In contrast, *Escherichia coli* showed a lower resistance profile, with 100% resistance only to Ceftriaxone. All *E. coli* isolates remained sensitive to Amikacin, Gentamicin, Ciprofloxacin, and Levofloxacin (Table VI).

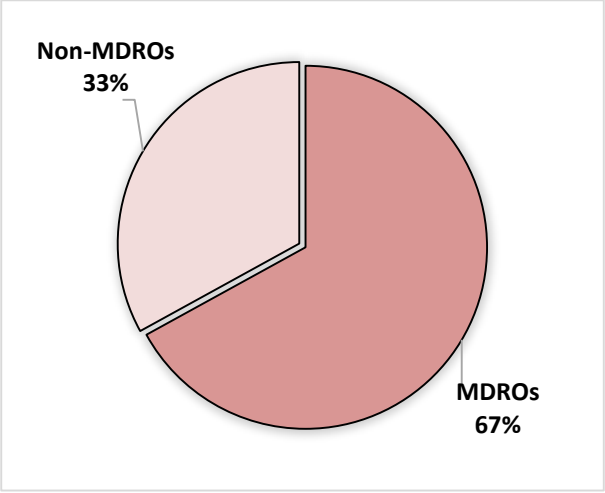


Figure 1: Multi-Drug Resistant Organisms (MDROs)

These findings highlight a concerning trend of multidrug resistance among Gram-negative pathogens, particularly *Klebsiella* and *Acinetobacter*, underscoring the need for continuous surveillance and prudent antibiotic use in neonatal care settings. Multi-Drug Resistant Organisms (MDROs) were significantly high among the studied neonates. About 18(67%) were multidrug resistant (Figure 1).

Table VII: Outcome of neonates with sepsis (N= 185)

Outcome	Blood Culture +ve N (%)	Clinical Sepsis N (%)	P value
Discharge	10 (37)	108 (68.4)	0.001
DOR	10 (37)	15 (9.5)	
LAMA	1 (3.7)	9 (5.7)	
Death	6 (22.3)	26 (16.4)	

Neonates with culture-positive sepsis had a higher mortality (22.3%) and lower discharge rates compared to those with clinical sepsis. The difference in outcomes was statistically significant (p = 0.001) (Table VII).

Discussion

Neonatal sepsis remains a significant contributor to morbidity and mortality in newborns, especially in developing countries. In this prospective study conducted in the NICU setting, we observed that 14.6% of neonates had positive blood cultures, a finding consistent with global isolation rates which range from 6.7% to 55.4%.[6] This aligns with previous research conducted at Bangladesh Medical University, Dhaka, where 22.2% of cases were confirmed through culture.[7] Similar findings were also reported by Gupta, Kashyap, and Ansari et al.[8,9] However, comparisons remain limited due to variations in methodology, as many studies report neonatal sepsis incidence per 1,000 live births rather than by culture positivity. In a related context, Kanti Children's Hospital in Nepal documented a 16.9% blood culture positivity rate along with bacteriological and antibiotic susceptibility data.[10] A retrospective study from the West Bank also revealed 884 positive blood cultures among 6,090 suspected sepsis cases, including 554 classified as primary infections.[11]

Late-onset sepsis (LOS) was more prevalent in our study, accounting for 58.9% of cases, while early-onset sepsis (EOS) constituted 41%. This trend mirrors findings from other studies, which also observed a higher frequency of LOS in NICU settings.[12,13] There was a slight male predominance (55.7%) among the affected neonates, which is comparable to the findings of Bayan et al., who reported a 59.5% male predominance.[14] This male vulnerability has been hypothesized to result from a gene located on the X chromosome that influences thymus function and immunoglobulin synthesis, potentially leading to weaker immune responses in males.[15]

Several risk factors were associated with neonatal sepsis in this study. For EOS, contributing factors included premature rupture of membranes, maternal fever, chorioamnionitis, multiple vaginal examinations, and meconium-stained amniotic fluid. Additionally, low birth weight, prematurity, instrument-assisted delivery, and low APGAR scores also increased vulnerability. For LOS, nosocomial infections and invasive hospital procedures played a significant role.[12,16-18] Prematurity, in particular, was identified as an important risk factor. Recent studies from India also confirmed that preterm infants have a higher prevalence of culture-positive sepsis.[19] This is possibly due to reduced levels of maternal immunoglobulin G (IgG) in low birth weight and preterm neonates, which compromise their immune defense[18]. Furthermore, studies by Tsai and Boghossian demonstrated an inverse relationship between gestational age and LOS, emphasizing that lower gestational age is linked with higher sepsis incidence.[20,21] Similar associations were reported in another study where prematurity (22–71%) was consistently linked to all sepsis types regardless of birth setting.[22]

In the Nepalese context, Yadav et al. reported higher culture positivity in males (52.3%), neonates aged three or more days (71.2%), low birth weight infants (62.7%), preterms (31.4%), and those delivered via caesarean section (63.3%).[10] These findings correspond with our results. When comparing neonates with culture-positive sepsis to those with only clinical suspicion, several factors emerged as statistically significant. Poor hand hygiene (p=0.001), prelacteal feeding (p=0.001), bottle feeding (p=0.001),

and prolonged hospital stay (p<0.001) were major neonatal contributors. On the maternal side, foul-smelling amniotic fluid (p=0.003) and recent maternal fever (p=0.018) were also significantly associated with positive blood cultures.

Microbiological analysis revealed a predominance of Gram-positive organisms, which contrasts with studies by Jatso, Verma, Dalal, and Shrestha who reported Gram-negative dominance.[19,23,24] However, our findings are similar to Galhotra et al., who observed a higher prevalence of Gram-positive bacteria in neonatal sepsis cases.[12] Regionally, the pattern of pathogens in Southeast Asia differs from Western countries where Group B Streptococcus (GBS) is commonly isolated.[25] Reflecting this variation, we found only one GBS isolate. The most common organism in our study was Staphylococcus aureus (51.9%), followed by Gram-negative Klebsiella pneumoniae (11.1%) and Acinetobacter species (7.4%). These findings diverge from some earlier regional reports.[26] Our results also mirror those of Xian Juan et al., who found Gram-positive organisms in 74.92% of cases, with Coagulase-negative Staphylococci (CoNS) accounting for 63.22% of isolates. Among Gram-negative bacteria, Klebsiella pneumoniae (10.01%) and Escherichia coli (8.72%) were predominant.[27] One of the most concerning observations was the high degree of antimicrobial resistance among isolated organisms. In our study, 67% of pathogens were resistant to multiple antibiotics. Bayan et al. similarly found 29% of isolates to be multidrug-resistant.[11] Sorsa et al. also noted high resistance levels to third-generation cephalosporins among both Gram-positive and Gram-negative bacteria, with multidrug resistance seen in 72% of isolates.[5] Yadav et al. reported varied antibiotic susceptibility among pathogens, while Xian Juan et al. noted increasing resistance in Gram-negative bacteria, particularly Klebsiella.[27] These resistance trends may result from excessive use of common antibiotics, driving selective resistance while sparing the rarely used drugs.

Mortality in neonates with culture-proven sepsis was 22.2% in our study, aligning closely with the rates reported by Jatso and Kayange et al.[28] Higher mortality was observed in Gram-negative infections, particularly those caused by Acinetobacter, similar to the findings of Chaudhari et al. in India.[12,29] At Muhimbili National Hospital in Tanzania, a retrospective cohort study of 238 neonates with blood culture-positive sepsis found a 45.4% mortality rate, with significant associations noted between very low birth weight (VLBW), hyperglycemia, mechanical ventilation, and increased mortality.[30] Likewise, a cross-sectional study in Addis Ababa in 2021 reported a death rate of 24.4%.[31] Death rates from similar studies varied widely, with South China reporting 9.5%[32], Uganda 15.2%[33], India 36%, Bhutan 20.5%[25], Nigeria 32.2%[32], Niger 38.2%[34], Zambia 43%[35], and Congo 21%[36]. These variations likely stem from differences in healthcare infrastructure, antibiotic policies, socioeconomic conditions, and clinical management strategies across countries.[30]

In summary, this study underscores the complex etiology, evolving resistance profiles, and significant mortality risk associated with neonatal sepsis. These findings call for vigilant infection control measures, regular surveillance of antimicrobial resistance, and the rational use of antibiotics in neonatal care units.

Conclusion

The incidence of culture-positive sepsis is high (14.6%) during the study period. Prolonged hospital stays, maternal history of fever within two weeks before delivery, foul smelling liquor, poor hand hygiene, prelacteal feeding and bottle feeding are important risk factors of culture proven sepsis. Staphylococcus aureus is the most prevalent organism in the SCANU. MDROs are high in this study. About 17.3% of neonates died due to sepsis.

Limitations of the study

Blood culture & susceptibility test was done in the microbiology lab of the three different private diagnostic centers, which may result in variation in reports. This study has enrolled neonates which were only admitted to SCANUs of Kushtia city.

Recommendation

Further multicenter study including SCANU's from different parts of the country should be conducted for the knowledge of prevalent organism and antibiotic susceptibility pattern and for strengthening this study result.

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ORIGINAL ARTICLE

A Comparison between Misoprostol and Mifepristone plus Misoprostol in the Medical Management of Abortion at a District Hospital of Bangladesh

Jahan M[1], Nawrozy MS[2], Sultana S[3], Nesa HT[4], Kamal AHM[5]

Abstract

Background: Abortion is a great reproductive health problem worldwide. Despite underlying aetiology or pathology, mainstay of treatment of incomplete abortion is to make the abortion complete – by surgical, medical, or expectant management. Taking medical management of these cases into consideration, this study was planned to compare the efficacy of two different regimens – misoprostol alone Vs misoprostol plus mifepristone in combination.

Methods: This study was conducted from November 2024 to May 2025 at 250 Bedded Mohammad Ali Hospital, Bogura. Total 84 cases were included by purposive sampling technique. Decision of applying misoprostol alone (n=50) or misoprostol plus mifepristone combination (n=29) was taken randomly. Another group (n=5) who already had a course of misoprostol but was unwilling to undergo dilatation and curettage (D&C) at instance, was also given misoprostol plus mifepristone combination. In all three groups, if no good result was achieved, D&C was done. Data was expressed as actual number and percentage of total. In addition, χ^2 (Chi Squire) test and Odd's ratio was used to verify level of significance.

Results: Among the Misoprostol applied cases 30% required D&C. But the cases where Misoprostol plus Mifepristone combination was applied 10% required D&C. The difference was insignificant for χ^2 (Chi Squire); but, Odd's ratio (OR=3.71) was in favour of Misoprostol plus Mifepristone combination. Again, avoiding D&C was possible in 60% of those 5 cases upon whom both the regimen was applied and who were all supposed to undergo D&C.

Conclusion: In conclusion we may say that, as a medical management of incomplete abortion/miscarriage mifepristone plus misoprostol combination is superior to misoprostol alone and can be safely used – a considerable number of D&C can be avoided by this measure.

Key words: Incomplete abortion, Misoprostol, Mifepristone plus Misoprostol.

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Introduction

Abortion is a great gynaecological problem worldwide. Though the true statistics is unknown, about 8-20% of clinically evident pregnancies and up to 25% of chemically evident pregnancies end in spontaneous abortion[1] – among all these cases great majority (80%) occur before 12 weeks gestation[2]. Expulsion or extraction of an embryo or a fetus of ≤500 gm weight that is not capable to survive independently is called abortion (WHO); this requires about 22 weeks of gestational age to gain that weight. Spontaneous abortion is termed as miscarriage[2]. Chemical pregnancies are those which are lost early - shortly after implantation. One study says 50-75% of all miscarriages although the pregnancy test is positive, the fetus cannot be detected on ultrasounds; it may be asymptomatic or it may have menstrual-like cramping and bleeding[3].

In about as 50% of spontaneous abortions occurring in first trimester abnormal karyotypes are found; in second and third trimesters the incidences

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decrease to 20–30% and 5–10% respectively. The major chromosomal abnormalities are trisomies (56%), polyploidy (20%) and monosomy X (18%). As well as, medical comorbidities as diabetes mellitus, infection, anatomic defects, endocrine factors, immunologic factors, exposure to toxic substances and also mothers' ages may influence the rate. The etiology remains unknown even after genetic screening in a significant proportion of miscarriage[1].

Despite the underlying aetiology or pathology, mainstay of treatment of these cases is to make the abortion complete – by surgical, medical, or expectant management. In the past, though surgery was the standard of care, more recently, medical management is acceptable[1]. For whom medical management is decided misoprostol alone (a prostaglandin E_1 analogue) or a combination of mifepristone (a progesterone receptor antagonist) plus misoprostol is given to induce uterine contraction and expulsion of the products of conception; however, repeat doses of medication may be needed to complete uterine emptying[1]. It remains a question whether we should use the single drug or the combination. And, to get an idea regarding the choice of drug selection in this regard, this study was planned to observe the efficacy of two different regimen – one is misoprostol alone and the other is misoprostol plus mifepristone in combination.

Methods

This cross sectional quasi-experimental study was conducted at the Department of Obstetrics and Gyaenecology of 250 Bedded Mohammad Ali Hospital, Bogura, Bangladesh from November 2024 to May 2025. A total of 84 cases were included by purposive sampling technique. Decision of applying misoprostol alone (n=50) or misoprostol plus mifepristone in combination (n=29) was taken randomly.

Inclusion Criteria:

All the patients with incomplete abortion, missed abortion or blighted ovum admitted into Obstetrics & Gynaecology Department of 250 Bedded Mohammad Ali Hospital, Bogura (District Hospital, Bogura).

Exclusion Criteria:

1. Patient with incomplete abortion with severe bleeding or shock.
2. Septic Abortion
3. Patient admitted with failed medical management outside hospital.

Misoprostol was given (n=50) at the buccal cavity at a dose of 600 µgm 3 hourly; total 3 doses in a day. If abortion was not completed within 7 days D&C was done. In the other group misoprostol plus mifepristone combination was given (n=29): mifepristone 200 mg orally on first day, followed by misoprostol 800 µgm in buccal cavity after 24 hours. If failed, D&C was done after 7 days. Another group (n=5) who have already had a course of misoprostol but was unwilling to undergo D&C at instance, but her general condition was more or less good, was also given misoprostol plus mifepristone combination and was observed. If no good result then, D&C was done after 7 days.

Data was expressed as actual number and percentage of total. In addition, χ^2 (Chi Squire) test and Odd's ratio was used to verify level of significance. 'P' <0.05 was considered significant.

Results

Mean (± SD) age of all the cases were 26.25 (± 6.657) years with a range of 16 to 40 years. Mean (± SD) of Gestational age was 10.02 (± 2.35) weeks with a range of 6 to 16 weeks.

Table I: Shows the results of different regimen in all the cases (n=84)

Drugs Applied	Cleared by drugs	D & C Needed	Total Cases
Group I : (n=50) Misoprostol	35 (70%)	15 (30%)	50 (100%)
Group II : (n=29) Misoprostol plus Mifepristone combination	26 (90%)	3 (10%)	29 (100%)
Group III : (n=5) Misoprostol & then Misoprostol plus Mifepristone combination	3 (60%)	2 (40%)	5 (100%)

χ^2 (Chi Squire) Group I Vs Group II = 0.037 (insignificant)
Odd's ratio for Group II Vs Group I = 3.71

Misoprostol was applied on 50 cases; among them 15 cases required D&C; whereas, misoprostol plus mifepristone combination was applied on 29 cases and 3 cases of them required D&C. The difference was insignificant for χ^2 (Chi Squire); but, Odd's ratio (OR=3.71) was in favour of misoprostol plus mifepristone combination. Out of 5 double regimen applied cases, avoiding D&C was possible in 3 cases. (Table I)

Benefits those we observed about medical management over surgical management (D&C) were –

(a) low hospital stay (hospital stay of the cases were 2 to 3 days)
(b) avoidance of invasive procedure and its complications as infection or perforation and
(c) overall cost of treatment was low.

Discussion

As it was found, the percentage of success by misoprostol plus mifepristone combination (90%) was higher than misoprostol alone (70%). χ^2 (Chi Squire) for this difference was insignificant but Odd's ratio was in favour of misoprostol plus mifepristone combination (3.71).

In another small group of 5 cases who previously received misoprostol alone, misoprostol plus mifepristone combination was given later and 3 D&C was scaped safely – this indicates that combination can be given safely in those cases too who has already previously received misoprostol alone. As misoprostol failure cases, they were all supposed to undergo D&C.

One study found that medical termination of pregnancy by combination of mifepristone with misoprostol took less induction-abortion interval compared to those using misoprostol alone. Success rate is more in the use of combination drug with less side effects. Hence, unnecessary surgical interventions and its associated complications can be avoided. They conducted the study with 122 subjects which was divided into two equal groups[4].

Another study[5] that included 31977 cases with a mean (±SD) age being 32.7 (±5.6) years with complaints of early pregnancy loss (EPL) who received medical management. Of those cases, 3.0% received mifepristone plus misoprostol combination and 97.0% received misoprostol alone. Patients who received misoprostol with pretreatment with mifepristone required less subsequent uterine aspiration (10.5% vs 14.0%; *P* = .002), and they also required less emergency department (ED) visits (3.5%vs 7.9%; *P* < .001). In multivariable analysis, use of mifepristone plus misoprostol odds ratio was in favour (adjusted odds ratio, 0.71 [95%CI, 0.57-0.87]). As per the authors' findings – mifepristone is underutilized for the medication management of EPL, but its use reduced the need for subsequent uterine aspiration.

MacNaughton et al. (2021)[6] mentioned that medication regimens using mifepristone and misoprostol are safe and effective for outpatient treatment of early pregnancy loss for up to 84 days' gestation and for medication abortion up to 77 days' gestation. They also mentioned – the most effective dose of oral mifepristone to be 200 mg followed by 800 mcg of misoprostol administered buccally or vaginally. Cramping and bleeding are expected effects of the medications, with bleeding lasting an average of nine to 16 days. The adverse effects of misoprostol (e.g., low-grade fever, gastrointestinal symptoms) can be managed with nonsteroidal anti-inflammatory drugs or antiemetics. Ongoing pregnancy, infection, hemorrhage, undiagnosed ectopic pregnancy, and the need for unplanned uterine aspiration are rare complications. Clinical history, combined with serial quantitative beta human chorionic gonadotropin levels, urine pregnancy testing, or ultrasonography, is used to demonstrate complete passage of the pregnancy tissue.

Conclusion:

In conclusion we may say that, as a medical management of incomplete abortion/miscarriage mifepristone plus misoprostol combination is superior to misoprostol alone and can be safely used – a considerable number of D&C can be avoided by using mifepristone and misoprostol in combination, better than misoprostol alone.

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Editorial policy & Instruction to Authors

KuMCJ, June 2025; Vol. 9(1): 37-40

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