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Original Article

Noncommunicable Disease Risk Factors Among Working Adults in Dhaka City: A Cross-sectional Survey

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Abstract

Background and aims: Non-communicable diseases (NCDs) are the leading cause of death and disability worldwide. The impact of NCDs on working adults extends beyond ill health and mortality with large financial consequences; however, the distribution of NCD risk factors in working adults is understudied. Therefore, this study aimed to find out the magnitude of NCD risk factors in Bangladeshi working adults.

Methods: This cross-sectional study was conducted in 2011 among 410 working adults aged between 35 to 60 years who were selected purposively and residing in Dhaka, Bangladesh. Data were collected on socio-demographic, anthropometric, and lifestyle factors. We used mean (standard deviation) or median (interquartile range) for continuous variables and frequency and percentages for categorical variables. We performed inferential statistics to investigate the determinants of hypertension.

Results: The mean age of the participants was 43.4 ± 6.9 years, and about one-fourth of the participants (24.7%) were current smokers. Smokeless tobacco consumption was moderate (16.5%), and alcoholic beverage intake was rare (3%). The majority of the participants (78%) reported insufficient physical activity. Furthermore, almost all participants had a history of inadequate fruit and vegetable intake (99.8% and 98.8%, respectively), and almost half of the participants (48.0%) were overweight. Moreover, age, occupation, physical activity, and education were significantly different ($P<0.05$) among hypertensive and non-hypertensive groups.

Conclusion: The results indicated a high proportion of NCD risk factors among working adults living in the capital city of Bangladesh. We believe that the findings of this study will bolster existing and future efforts to prevent NCDs in the working adult population.

Keywords: Prevalence, Non-communicable disease, Risk factors, Working-age population

Introduction

Non-communicable diseases (NCDs) are the leading cause of death and disability worldwide. Earlier studies revealed that NCDs cause 41 million deaths each year, and 85% of these deaths occur in low- and middle-income countries, and 15 million of these deaths took place in individuals between 30-69 years old, representing working adults.[1,2] NCDs are estimated to have caused 73.2 percent of all deaths in Bangladesh.[3] A previous study analyzing nationally representative data found that the 10-year risk of cardiovascular disease was approximately 10% among the vast majority of working adults (85.1%).[4]

Tobacco use, harmful alcohol use, unhealthy diet (insufficient fruit and vegetable intake), excessive dietary salt intake, and inadequate physical activity are identified as behavioral risk factors for NCDs and overweight, while obesity, hypertension, hyperglycemia, and hyperlipidemia are regarded as metabolic risk factors.[5] In Bangladeshi adults, the prevalence of NCD risk factors is estimated to be substantial, and more than one-third of them aged between 25 and older reported three or more common risk factors.[6] This suggests that the current prevalence of NCD risk factors is fairly high in Bangladeshi adults; therefore, we can expect a significant increase in NCDs shortly.[6]

There is a lack of data regarding NCDs among working adults in Bangladesh. NCDs summate high costs to individuals, families, and the government in terms of unemployment and work absence, potentially harming the country's economy.[7] Earlier studies found that over the next 15 years, NCD-related morbidity and mortality are expected to cost low- and middle-income countries more than $7 trillion in economic losses.[8] Since higher mortality and financial loss occur among working adults, studying such age groups is essential to know about the health-related issues linked to NCDs and make the health workforce aware of such concerns. As the impacts of NCDs on populations, particularly in working adults, extend beyond ill health and mortality with large financial consequences,[9] the present study aimed to

assess the burden of NCD risk factors among the working population.

Materials and Methods

Study Design, Participants, and Setting

The present study was a community-based cross-sectional study conducted from January to June 2011. The participants were working in different government and non-government institutions in Dhaka. A total of 410 participants were included in the study by purposive sampling after taking written voluntary informed consent. We included both genders aged between 35-60 years.

Data Collection Method

Data were collected through face-to-face interviews following the STEPwise approach to NCD risk factor surveillance (STEPS) questionnaire[10] by trained research staff. Before conducting data collection, the staff was trained by a group of experts in collecting demographic and behavioral data for two weeks. Data editing and data interpretation were done periodically during data collection.

Diagnostic Criteria or Disease Classification

Study Variables

We collected socio-demographic data, including age, gender, occupation, education, monthly income, and marital status. We also assessed anthropometric measurements such as lifestyle factors, including body mass index (BMI), smoking, drinking, physical activity, hypertension, and diet.

The level of physical activity was assessed by asking how many minutes they usually walk in a week (usually at a moderate speed), and if they followed the World Health Organization (WHO) recommendation of at least 30 minutes of moderate walking for 5 days a week, we defined them adequately physically active, otherwise inadequately active.[11] Fruit and vegetable intake was assessed in serving size (1 standard serving = 80 g of fruit and vegetable) by using standard serving bowls and serving size show-cards. In addition, an individual's consumption of at least 5 servings (400 g) of fruit and vegetables according to WHO recommendations was defined as adequate fruit and vegetable intake.[12]

Smoking history was defined as either "current" (Those who were smokers during the time of data collection), "past" (Those who quit and did not smoke for at least the last 30 days before the study), or "never" (Those who never smoke). Similarly, the history of smokeless tobacco was also defined as current, past, or never consumers. The history of drinking alcohol was defined as current, past, and never similar to smoking; however current drinking was again subdivided into regular drinker or occasional drinker.

Physical measurements (height, weight, and blood pressure) were taken appropriately by following the standard procedures. BMI was defined as body weight (kg) divided by the square of the height (m). Using an automated sphygmomanometer, the mean of two consecutive measurements on the right arm with participants in a seated position after a strict 5-minute rest period was used to determine blood pressure. Hypertension was defined as systolic blood pressure (SBP) of ≥ 140 mm Hg, diastolic blood pressure (DBP) of ≥ 90 mm Hg, or the use of antihypertensive medication.[13] Overweight and obesity were defined when BMI was ≥ 25.0. Information was also obtained on the participant's family history of chronic NCDs.

Statistical Analysis

The collected data were checked for competencies, coded, cleaned, and finally exported to the Statistical Package for Social Sciences (SPSS) software version-21 for analysis. After gathering all the required information, data were compiled, analyzed, and tabulated according to key variables. Descriptive statistics were performed to describe the distribution of risk factors among the participants. We calculated mean and standard deviations for continuous variables, whereas frequency and percentages were used for categorical variables. To assume the determinants of hypertension, we performed an independent *t* test/ Wilcoxon rank-sum test and the chi-square test as appropriate.

Results

The total number of study participants was 410, and the men and women ratio was 8:2 (80% and 20%, respectively). More than half of the participants belonged to the age group 35-44 years, and the mean age of the participants was 43.4 ± 6.9 years. Around one-fifth of the participants (21%) completed education for up to 8 years, and about 42 % had education > 12 years. Regarding income, the mean monthly income was TK 18582 (US$ 217.79), as illustrated in Table 1.

Regarding the behavioral risk factors, a quarter of the participants (25.0%) were current smokers. The mean duration of smoking was 17.5 ± 9 years, and the mean number of sticks per day was 10.0 ± 6. About one-fifth of the participants (17.0%) were current smokeless tobacco users, while only 1% were using past smokeless tobacco. Moreover, the mean duration of smokeless tobacco consumption was 9.0 ± 8 years, and only 3% of the participants were current occasional drinkers. In addition, participants taking recommended fruits and vegetables at least 5 servings per day according to WHO recommendation was 0.2% and 1.2%, respectively. Regarding physical activity, about one-third of the participants (29.8%) reported any type of physical activity in a typical week; however, 22.0% (n = 88) were found to be maintaining WHO-recommended physical activity (30 minutes of a moderate walk for at least 5 days a week). In terms of obesity, about half of the participants (48.0%) were overweight, and one-fifth of them (20.0%) were obese (Table 2). The mean BMI of the participants was 24.6 ± 3.3 kg/m^2, and obesity was higher among

Table 1. The Distribution of Socio-demographic Factors among Working adults Aged 35 to 60 in Dhaka

Variables	Values
Age (y)	43.4 ± 6.9
Age groups, No. (%)	
35-44	225 (56.2)
45-54	141 (35.2)
≥55	34 (8.5)
Gender, No. (%)	
Men	324 (81.0)
Women	76 (19.0)
Years of education, No. (%)	
~8 years	84 (21.0)
10 years	68 (17.0)
12 years	81 (20.2)
>12 years	167 (41.8)
Occupation, No. (%)	
Government employee	84 (21.0)
Non-government employee	68 (17.0)
Businessman	81 (20.0)
Technician	167 (41.8)
Monthly income in BDT (USD)	18582 ± 17705 (217.79)
Income categories, No. (%)	
≤10000 (<117.38)	118 (29.5)
10001-20000 (117.39-234.76)	187 (46.8)
20001-30000 (234.77-352.14)	57 (14.0)
30001-40000 (352.15-469.52)	19 (4.8)
>40000 (>469.52)	20 (5.0)

We calculated mean and standard deviations for continuous variables; categorical variables are in frequency and percentages. Number of observations across the categories may not add up to the total given number because of missing data.

women (26.3%) than among men (18.2%). Additionally, regarding the waist-hip ratio, 37.3% (n = 121) of men had a waist circumference above 90 cm, whereas 78.9% (n = 60) of women participants had a waist circumference above 80cm (data not shown in the tables), and about one-third of the respondents (32.0%) had hypertension. The mean of SBP was 111.5 (± 14.4) mm Hg, and the mean of DBP was 77.3 (± 11.3) mm Hg. Furthermore, the prevalence of hypertension was high in both genders, 34% in men and 25% in women. Moreover, three-fourths of the participants (72.0%) reported a family history of at least one major chronic disease. Among the chronic diseases, hypertension (38.5%), diabetes mellitus (28.5%), and heart disease (15. 6%) were found with higher proportions (Table 2).

Hypertension was significantly different among groups in relation to age ($P = 0.007$), type of occupation ($P = 0.034$), physical activity ($P = 0.044$), years of education ($P = 0.027$), and occupational status ($P = 0.033$). Though we have checked for all variables, we only reported the variables that showed significant differences among the hypertensive and non-hypertensive groups in Table 3. Other variables did not exhibit any significant difference

Table 2. The Distribution of Lifestyle Factors among Working Adults Aged 35-60 in Dhaka

Variables	Values
Smoking history	
Current smoker (yes)	99 (24.7)
Past smoker (yes)	48 (15.9)
Never smoker	253 (84.0)
Duration of smoking (Mean, SD)	17.58 ± 9.0 years
1-5	12 (12.0)
6-10	20 (20.1)
11-15	14 (14.1)
15+	53 (53.5)
No. of sticks per day (Mean, SD)	10 ± 6 sticks
1-5	30 (30.3)
6-10	39 (39.4)
10+	30 (30.3)
Smokeless tobacco (Mean, SD)	9 ± 8 years
Current user	68 (16.5)
Ex-user	4 (1.0)
Never user	338 (82.5)
Drinking alcohol (occasional drinkers, Yes), %	10 (2.5)
Fruits and vegetable intake (WHO recommendation), %	
Serving of fruits intake (<5/day)	399 (99.8)
Serving of vegetable intake (<5/day)	395 (98.8)
Physical activity history, No. (%)	
Do any sort of physical activity (Yes)	119 (29.8)
Maintain WHO-recommended physical activity (Yes)	88 (22.0)
BMI (mean)	24.6 ± 3.3 kg/m^2
BMI category, No. (%)	
Underweight (<18.5)	12 (3.0)
Normal (18.5-24.9)	119 (29.0)
Overweight (≥25)	197 (48.0)
Obese (≥30)	82 (20.0)
Hypertension (Yes), No. (%)	129 (32.2)
Men	110 (34.0)
Women	19 (25.0)
SBP (mm Hg), (Mean, SD)	111.5 (±14.4)
DBP (mm Hg), (Mean, SD)	77.3 (±11.3)
Types of family history (n = 288), No. (%)	
Hypertension	111 (38.5)
Diabetes mellitus	82 (28.5)
Heart diseases	45 (15.6)
Chronic respiratory	21 (7.3)
Cancer	10 (3.5)
Others	19 (6.6)

Note: SD: Standard deviation; WHO: World health organization; BMI: Body mass index. SBP: Systolic blood pressure; DBP: Diastolic blood pressure. We calculated the mean and standard deviations for continuous variables and the frequency and percentages for categorical variables. Fruits and vegetable intake (WHO recommendation) is ≤ 5 servings per day, and WHO recommended physical activity is at least 30 minutes walking at moderate speed for 5 days in a week. Hypertension is defined as SBP of ≥ 140 mm Hg, DBP of ≥ 90 mm Hg, or the use of antihypertensive medication. In addition, BMI was defined as body weight (kg) divided by the square of the height (m), and overweight was defined when BMI was ≥ 25.0.

Table 3. The Distribution of Determinants for Hypertension among the Working Adults Aged 30-69 in Dhaka

Variables	Categories of Hypertension		χ^2 Value	*P* Value
	Normotensive, (%)	Hypertensive, (%)		
Age groups (y)				
35-44	74.2	25.8	9.867	0.007
45-54	59.6	40.4		
≥55	58.8	41.2		
Nature of the job/work				
Mostly involved physical efforts	43.9	34.1	3.479	0.034
Mostly involved mental efforts	56.1	65.9		
Status of doing WHO recommended physical activity				
Yes	26.6	36.4	4.070	0.044
No	73.4	63.6		
Years of education				
≤10 years	41.7	30.2	4.876	0.027
>10 years	58.3	69.8		
Categories of occupation				
Employee	89.3	93.0	6.789	0.033
Businessman	10.3	4.7		
Technician	0.4	2.3		

Note. WHO: World health organization. Only significant variable's data have been presented in the table.
To assume the determinants of hypertension, we performed unpaired Student t-test/Wilcoxon rank-sum test and the chi-squared test as appropriate. *P*-value < 0.05 was marked as statistically significant to indicate the differences among hypertensive and normotensive groups.

(Table 3).

Figure 1 shows that smoking, smokeless tobacco, alcohol, inadequate fruit and vegetable intake, higher BMI, and hypertension were found to be higher among our study participants compared to the national NCD risk factor survey in Bangladesh in 2018.

Discussion

In low- and middle-income countries, research on NCDs focuses on underprivileged populations[14,15]; therefore, health-related data are extremely scarce among working adults. The present study strived to explore the magnitude of risk factors of NCDs among working adults for addressing the knowledge gap. To our best knowledge, the present study is the first that reports the magnitude of risk factors of NCDs solely among working adults residing in Dhaka, Bangladesh. In this study, a high prevalence of modifiable risk factors of NCDs was found among the selected population, including smoking, hypertension, insufficient physical activity, low intake of fruits and vegetables, overweight, and obesity.

The prevalence of current smokers (25%) in the current study was quite similar to the prevalence (26%) reported in a contemporary national NCD risk factor survey in Bangladesh in 2010.[16] However, it was a little lower in recent national NCD risk factor survey conducted in 2018 in Bangladesh (22%).[3] Nevertheless, according to a report by Global Adult Tobacco Survey, overall 35.3% (37.8 million) of all adults (above 15 years) consumed tobacco in any form[17] which is approximately 10% higher than

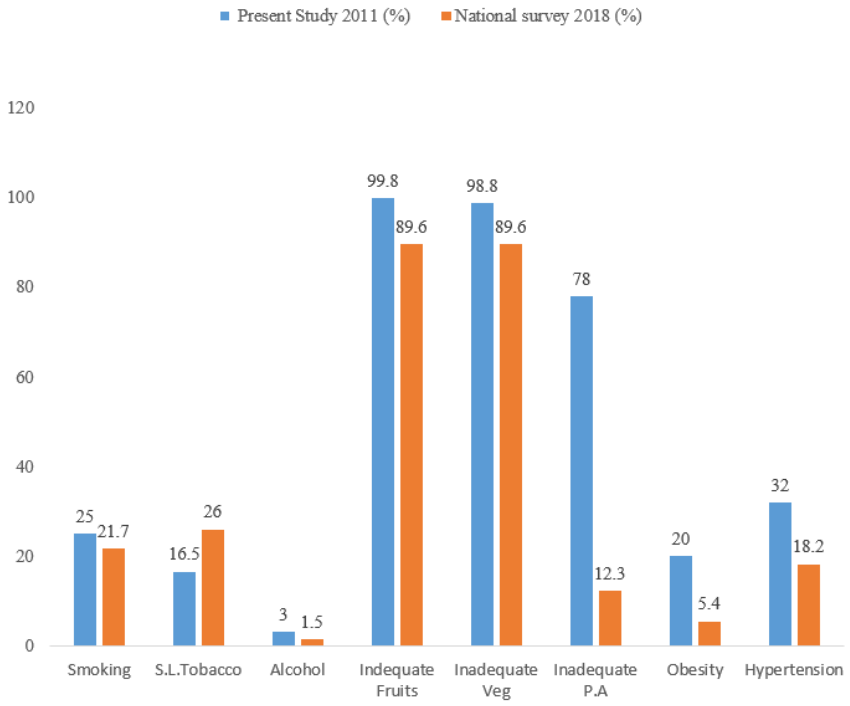

Figure 1. The Comparison between the Present Study and the NCD Nationwide Risk Factor Survey (2018). Figure 1 shows a comparative graph between the present study and the NCD nationwide risk factor survey (2018) performed in Bangladesh. The modifiable risk factors for NCDs are included in this figure. It can be observed that the proportion of NCD risk factors among working adults was higher in working adults than in the general population in Bangladesh. *Note:* NCD: Non-communicable diseases; *S.L.Tobacco: Smokeless tobacco. Blue bars indicate the present study results, whereas orange bars are for National Survey 2018 (Bangladesh). Results are showed in % (percentages).

what we found in our study. The discrepancy in smoking prevalence among different surveys and our study may be due to differences in the age group of study participants. We targeted the 35 to 60-years working group, whereas the age range of study participants was 18-69 years and above 15 years in the national STEPS survey 2018 and the Global Adult Tobacco Survey report 2017, respectively. On the other hand, studies conducted among socially disadvantaged populations found that 36% of current tobacco users live in an urban slum.[15]

A slight number of participants in this study reported using smokeless tobacco. Smokeless tobacco use is closely interlinked with poverty, low education, and gender disparity.[18] Smokeless tobacco is the single largest prevalent risk factor of NCDs, which disproportionately affects the poor and less educated population of society.[19] Exposure to tobacco through advertising and lack of cessation services are evident, leading to the prolongation of tobacco use among adolescents and adults from poor socio-economic backgrounds.[20] Research studies conducted in our neighboring countries also reported similar findings.[21]

The current study found that 42% of study participants completed more than 12 years of education while, 50% were illiterate among socially disadvantaged populations[7] and slum dwellers.[15] Therefore, it can be inferred that since urban working populations are comparably more educated than disadvantaged people, a lower proportion of smokeless tobacco consumers can be found among our study population. Moreover, Global Adult Tobacco Survey (2009) suggested that smokeless tobacco use is more prevalent in rural (29%) than in urban areas (23%),[22] which supports our findings, too.

The alcohol consumption among study population of the present study was low (3%), and all of them marked themselves as occasional drinkers, which is more or less similar to all other previous research studies conducted among Bangladeshi adults, namely, 0.9% in NCD risk factor survey Bangladesh 2010[16] and 1.5% in national STEPS survey 2018.[3] Bangladesh is a Muslim-dominant country, and we found a negligible proportion of alcohol consumption due to cultural and religious issues which corresponds to studies conducted in other Muslim countries.[23]

More than 98% and 99% of our study participants had a history of consuming inadequate fruits and vegetables, respectively, as per WHO recommendations.[12] NCD risk factor survey Bangladesh 2010 and 2018 found similar impressions among the nationwide population of Bangladesh.[3,16] National STEPS survey for NCDs risks factors in Bangladesh 2018 reported that about 90% of participants do not consume adequate fruits and vegetables.[3] The finding of the current study also coincides with our neighboring country's nationwide cross-sectional survey in which they reported that almost all of the participants (99%) have inadequate fruit and vegetable intake.[21] Such behavior may be due to the fact the population of this Indian-subcontinent region have more inclination towards starchy staple foods than towards leafy vegetables and fruits.[24]

Furthermore, the current study found a higher proportion of overweight and obesity compared to both the national NCD survey 2010 and the national STEPS survey 2018.[3,16] In the present study, about half of the study population were overweight, and one-fourth of the total population was obese. The possible reason could be that the present study focused only on the working population living in an urban city, so they were habituated to more sedentary work, as reported in the National Survey earlier.[21] In terms of obesity, considering the gender issue, it was found that the prevalence of obesity was higher among women than among men participants. This result corresponds with all nationally representative surveys and other studies.[4,3,16,25] The possible reasons could be that more sedentary activities are common among women, but we could not discuss this issue in the present study.

Moreover, it was found that hypertension was more prevalent among men (34%) than among women (25%), which is in line with other previous research findings. A cross-sectional study conducted among adult people of Dhaka found that hypertension is higher in men (24%) than in women (22%).[26] Another study assessed the prevalence and risk factors for hypertension and pre-hypertension among Bangladeshi adults and revealed that men have a higher prevalence of pre-hypertension than women in both urban and rural areas.[27] A noticeable issue found in the present study was the prevalence of overall hypertension (32%) which is much higher than that of the national NCD survey 2010 (20%)[16] and the national STEPS survey 2018 (18%).[3] There might be some reasons that are worth to be described. From our analysis, we found that among hypertensive patients, most participants are involved in a job that needs prior mental effort than physical effort. A significant percentage of the study population did not involve any work-related physical activity. A prior study also found that inadequate physical activity is associated with coronary heart disease, hypertension, diabetes, and increased premature mortality.[28] Moreover, another study conducted among general Bangladeshi adults demonstrated that lifestyle-related factors such as less physical activity may play an essential role in the pathophysiology of hypertension.[29]

The findings also revealed that among hypertensive patients, the majority of participants are educated (completed higher secondary school and above). Though a previous study[30] indicated that a lower educational level is associated with a higher likelihood of reporting diabetes, hypertension, and obesity, we found the opposite results. The results of the current study support earlier study conducted among Bangladeshi adults in which they found that higher secondary and above educational status are significant predictors of pre-hypertension.[27]

Additionally, the findings suggested that with an increase in age, the rate of hypertension also increases

because the prevalence of hypertension is only about 25% among 35-44 years of age. However, this percentage was almost double among participants aged more than 55 years, and this finding coincides with previous research studies that explored the link between hypertension and age.[4,27] Some studies found that older age is 19 times positively associated with hypertension (Odds ratio = 19.18, 95% confidence interval: 13.58-28.11),[26] and the highest proportion of hypertension was among those aged 65 years and more.[27]

The figure represented a comparison between our study and the NCD risk factor survey Bangladesh 2018 in terms of different NCD risk factors. It demonstrates the higher rates of NCD risk factors among working adults in the present study compared to the finding of a nationwide survey conducted recently in Bangladesh regarding modifiable risk factors.[3] For instance, smoking, smokeless tobacco, alcohol, inadequate fruit and vegetable intake, higher BMI, and hypertension were found to be higher among our participants compared to the earlier study conducted among all adults (Figure 1).[3]

Limitations of the Study

There are several limitations worth mentioning in the present study. Firstly, the sample size was relatively small, and we selected them purposively, which may have reduced the generalizability of the results. The study was conducted among working adults residing in urban areas that may not represent all the population across Bangladesh. Secondly, we could not include laboratory tests for some biomarkers such as lipid profile or blood glucose levels, which could describe the risk factors in a detailed way. Thirdly, there might be a recall or social desirability bias due to subjective measures of risk factors. However, we hope that the findings of this study on the overall burden of NCDs among urban working adults will bolster existing and future efforts that address initiatives to prevent NCDs from targeting a particular population.

Conclusion

This study found a high prevalence of lifestyle and biological risk factors among working adults in an urban city, Dhaka. We hope that our study findings will bolster existing and future efforts that address initiatives to prevent NCDs among particular people. We recommend that future studies include a more representative population and incorporate comprehensive qualitative research for fundamental situational analysis.

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Authors' Contribution

Conceptualization: Sabrina Ahmed, Mohammad Moniruzzaman, MSA Mansur Ahmed.
Data curation: Sabrina Ahmed, Mohammad Moniruzzaman, MSA Mansur Ahmed.
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Resources: Sabrina Ahmed, Mohammad Moniruzzaman, MSA Mansur Ahmed.
Supervision: MSA Mansur Ahmed.
Validation: Sabrina Ahmed.
Visualization: Sabrina Ahmed.
Writing — original draft: Sabrina Ahmed.
Writing — review and editing: Sabrina Ahmed, Mohammad Moniruzzaman, MSA Mansur Ahmed.

Competing Interests

None.

Ethical Approval

The study was approved by the Ethical Review Board of Bangladesh Medical Research Council (BMRC).

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