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Association of Health Risk Behaviors with Cardiovascular Diseases: A Hospital-based Case Study in Noakhali district, Bangladesh

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Abstract

Cardiovascular diseases have become the most significant cause of global mortality and morbidity, particularly for low and middle-income countries such as Bangladesh. This condition is widely attributable to unhealthy outcomes in its association with risk factors such as age, obesity, smoking, low socioeconomic state, and sedentary lifestyle, which play a significant role in the progression of cardiovascular diseases. A prospective case study conducted in a few hospitals (both government and private) of Noakhali district, Bangladesh, and 50 subjects were included in the study. About 52% of patients had total cholesterol above normal level (>200 mg/dl), 64% of patients had triglycerides >150mg/dl, and hence HDL level also showed poor level for 80% of the patients (<40mg/dl). About 58% were smokers, and 68% consumed smokeless tobacco at a certain point and mostly relied on carbohydrate consumption in their diet. 42% of them are living a sedentary lifestyle, and male patients had significantly higher triglyceride levels than females ($P<0.035$). Moreover, with the increase of age, the level of physical activity decreased with time ($p<0.003$), and female patients were more lethargic than males in doing so ($p<0.033$). Obesity creped into patients if there were either widowed or separated from their partners ($p<0.009$) with reducing physical mobility ($p<0.007$). Smokeless tobacco uses found to be high in patients with low education levels ($p<0.005$). Our study showed that the common risk factors among our subjects without comorbidity were age, obesity and overweight, physical inactivity, low socioeconomic status, and smoking.

Keywords: *Cardiovascular Diseases; Health Risk Behaviors; Obesity; Hypertension; Diabetes Mellitus; Socioeconomic Factors*

Introduction

Cardiovascular Diseases (CVDs) are one of the most significant contributors to global mortality in developed countries, and its prevalence is mounting in developing countries as well and posing a major challenge for the health sector [(1)]. According to the Heart Disease and Stroke Statistics 2016 update by the American Heart Association, heart disease, and stroke continue to be the top two killers worldwide. As of 2013, 31% of all deaths were from CVD, with 80% occurring in low and middle-income countries; stroke accounted for 11.8% of all deaths [(2)].

Cardiovascular diseases and diabetes mellitus share common risk factors, such as unhealthy lifestyle, including overweight and obesity, lack of physical activity, and an unbalanced dietary pattern [(3)]. In addition, cardiovascular diseases are considered the most common cause of hospital admission worldwide, resulting in a tremendous economic burden on health care systems [(4)]. Therefore, the prevention of these diseases and early detection of factors that may contribute to their occurrence is considered a public health necessity that should be taken into consideration [(5)]. A World Health

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Organization expert panel identified dietary habits as a major modifiable determinant of chronic diseases, having a long-lasting effect capable of shaping the development of cardiovascular disease and diabetes later in life [6].

Lifestyle modification is one of the components of CVD management. Encouraging asymptomatic individuals to change their lifestyles to lessen future risks may be challenging. Therefore, it is crucial to determine what motivates patients to develop healthier lifestyles to reduce the risk of CVD. Decisions must be taken concerning which people should be the focus of direct risk mitigation efforts. Evidence shows that adequate knowledge about CVD risk factors is an essential precondition to behavioral changes, but knowledge solely often is inadequate for eliciting preventive actions [7, 8]. The likelihood of espousing healthy behaviors may be higher if people perceive themselves at increased risk for CVD [9]. Diet modification that emphasizes on adequate intake of fruits and vegetables, whole grains, low dietary fats, low intake of dietary sodium and salt reduction has shown a positive impact in the reduction of blood pressure in normotensive and hypertensive patients [10].

Rapid urbanization, westernized diet, increased consumption of tobacco, and limited physical activity in the developing world are also associated with the higher incidences of CVD [11]. According to the INTERHEART study [12], Bangladesh has the highest prevalence of CVD risk factors among South Asian countries. In Bangladesh, 99.6% of males and 97.9% of females are exposed to at least one established CVD risk factors [13]. Nevertheless, the level of awareness among the people about CVD risk factors is shallow in Bangladesh. Concomitantly, the detection and control rates were also poor, possibly as a result of poor literacy rate, low access to healthcare facilities, or divergent priorities [14].

The study aimed to find out the extent of health behaviors and risk factors for CVD among adults in Noakhali district, Bangladesh. The findings of this study will be a step forward in this mostly unexplored area and provide information for future studies.

Methodology

Study design: It was a case study conducted among patients suffering from a different kind of cardiovascular disease attending hospitals (both government and private) for treatments in the Noakhali district, Bangladesh. A total of 50 patients participated in this study, who voluntarily agreed to share their information.

Data collection procedure: A pre-designed, pre-tested, and structured questionnaire were used to collect data, including information of interest. Different variables were considered as education, socioeconomic status, tobacco smoking, diet, physical activity, BMI, diabetes, hypertension, etc. For obtaining biochemical measurements, the patient's medical history file was analyzed after taking proper permission of the study objectives.

Data analysis: Obtained data were analyzed statistically by using SPSS software version 23. Descriptive statistics, chi-square test, and Student's t-test were conducted to find out the study objectives.

Results

Sociodemographic pattern

Of the 50 participants, 35 (70%) were males, and 15 (30%) were females. The majority of the participants (72%) were from the rural area and were married (82%) (Table 1). More than half had never attended school, and 10% were housewives (Table 1).

Smoking

Out of the total, 29 (58%) participants were smoking previously. 14 (28%) participants were currently smoking. Thirty-four (68%) respondents were using smokeless tobacco products. Gender, marital status, and occupation were significantly associated with smoking.

Table 1: Distribution of sociodemographic characteristics by gender:

	Gender		Total	P-Value
	Male	**Female**		
Age of the Respondent				
<40 Years	4 (80%)	1 (20%)	5 (10%)	0.869
40-49 Years	12 (75%)	4 (25%)	16 (32%)	
50-59 Years	8 (66.7%)	4 (33.3%)	12 (32%)	
=>60 Years	11 (64.7%)	6 (35.3%)	17 (34%)	
Marital status				
Married	34 (82.9%)	7 (17.1%)	41 (82%)	0.000
Separated and Widow	1 (11.1%)	8 (88.9%)	9 (18%)	
Education of the Respondent				
No Formal Education	19 (65.5%)	10 (34.5%)	29 (58%)	0.733
Primary	9 (75%)	3 (25)	12 (24%)	
Secondary	5 (71.4%)	2 (28.6%)	7 (14%)	
Higher Secondary	2 (100%)	0 (0%)	2 (4%)	
Occupation of the Respondent				
Day laborer	20 (100%)	0 (0%)	20 (40%)	0.000
Business	4 (100%)	0 (0%)	4 (8%)	
Unemployed	8 (44.4%)	10 (55.6%)	18 (36%)	
Retired	3 (100%)	0 (0%)	3 (6%)	
Housewife	0 (0%)	5 (100%)	5 (10%)	

Fruit and vegetable consumption

Only 2% of the participants consumed sufficient fruit, and 96% of the participants consumed sufficient vegetables. Seasonal vegetables, cauliflowers, and guava were the most common. Nearly all households (100%) used vegetable oil (mustard, soybean, sunflower oil) for cooking. Half of (26 out of 50) participants were using extra salt to a meal at the table.

Physical activity pattern

Almost 90% of unemployed participants were physically inactive. Age, marital status, and occupation were significantly associated with physical inactivity.

Table 2: Descriptive statistics and metabolic CVD risk factors

Variable Name	Frequency (valid percentage)	Variable Name	Frequency (valid percentage)
Gender		Hypertension	
Male	35 (70%)	Yes	29 (58%)
Female	15 (30%)	No	21 (42%)
Age			
<40 Years	5 (10%)	Diabetes	
40-49	16 (32%)	Yes	24 (48%)
50-59	12 (24%)	No	26 (52%)
=>60	17 (34%)		
Education			
No Formal Education	29 (58%)	Family history of cardiovascular disease	
Primary	12 (24%)	Yes	19 (38%)
Secondary	7 (14%)	No	31 (62%)
Higher Secondary	2 (4%)		
Occupation			
Day Laborer	20 (40%)	Total cholesterol (mg/dl)	
Business	4 (8%)	Normal (<200 mg/dl)	24 (48%)
Unemployed	18 (36%)	Borderline (200-239 mg/dl)	11 (22%)
Retired	3 (6%)	High (>240 mg/dl)	15 (30%)
Housewife	5 (10%)		
Monthly income		Triglycerides(mg/dl)	
<20000	19 (38%)	Normal (<150 mg/dl)	17 (34%)
20000-30000	26 (52%)	Borderline (150-199 mg/dl)	12 (24%)
>30000	5 (10%)	High (200-499 mg/dl)	21 (42%)
Body Mass Index (kg/m2)			
Below Normal (<18.5)	4 (8%)	HDL (mg/dl)	
Normal (18.5-24.9)	20 (40%)	Poor (<40 mg/dl)	40 (80%)
Overweight (25-29.9)	20 (40%)	Better (40-59 mg/dl)	10 (20%)
Obese (>30)	6 (12%)		

Obesity

The mean body mass index of total participants was 24.62. Obesity was observed in 12% of the participants (Table 2).

Hypertension

The prevalence of hypertension was 58%. Hypertension is relatively high in male, separated/ widow, unemployed participants.

Diabetes Mellitus

24 (48%) of the 50 participants had diabetes. (Table 2) The frequency of diabetes was higher in the participants with >60 years old. Male had a higher diabetes frequency than females.

Lipid Profile

Triglyceride (TG) level was above the normal limit (150 mg/dl) in 34% (17 of 50) of the participants. The average triglyceride level was 212.98 mg/dl. Substantially high TG level was at the age of less than

40, males, and unemployed persons. Compared to TG, the number of participants with a high cholesterol level (>240 mg/dl) was (30%) (Table 2)

Table 3: Distribution of anthropometric, clinical, and biochemical characteristics:

	Gender		P-Value
BMI (kg/m2)	**Male Mean (SD)**	**Female Mean (SD)**	
	24.397 (3.6610)	25.147 (4.5755)	.206
HDL (mg/dl)	36.2854 (6.34837)	33.6607 (4.33147)	.396
Total cholesterol (mg/dl)	213.8857 (47.96899)	209.2867 (44.02167)	.363
Triglycerides (mg/dl)	226.0129 (122.36125)	180.4043 (53.04495)	.035

Note BMI, Body Mass Index; TG, Triglycerides; HDL, High-Density Lipoprotein.

*P-value derived from Student's t-test.

Discussion

This study found a high prevalence of CVD risk factors among the study population. They were disproportionately distributed by age, gender, marital status, education level, and occupation. This was the hospital-based case study conducted to estimate the association of risk factors and health behaviors with cardiovascular disease in the Noakhali district, Bangladesh.

The percentage of participants who smoke earlier was 58%, which is high. 30% of participants quit smoking after they had cardiovascular disease. Notably, male and 40–50 years aged participants had more tendencies to be a smoker. Similarly, the presence of smoking habits in a large proportion of participants without formal education suggested an association between smoking and educational level. Several studies evaluated the relationship between low literacy and smoking and found that people with low reading ability were more likely to be smokers [(15)]. The presence of a large proportion of participants who quitted smoking (30%) in the study could suggest the increasing trend of cessation of smoking. That might be because of increasing literacy rate and implementation of tobacco-free initiatives thorough out the nation. The frequency of smokeless tobacco consumption is higher among the participants (68%). Older females had more tendencies to consume smokeless tobacco.

This study found that inadequate fruit consumption among the participants but the vegetable consumption was sufficient among almost every participant. Both the findings from the current study and national survey are substantially higher than that of low- and middle-income countries [(16)]. Seasonal production, insufficient supply, and the comparatively high price of fruit adversely affected on their intake. This can also be explained as insufficient knowledge about the benefits of fruit and vegetable intake.

Our study found that only 24% of people do high physical activity. Among 42%, people had a tendency to do light physical activity. Unemployed and females do less physical activity.

Lower levels of high-density lipoprotein (HDL) cholesterol and high levels of low-density lipoprotein (LDL) cholesterol cause an increased trend in CHD risk. [17] In our study, we found 80% of people who had poor HDL. The high levels of triglycerides also increase CVD risk [18]. 42% of participants, we found who had a high triglyceride level. According to the INTERHEART study, the abnormal blood lipids levels are causing myocardial infarction (MI) globally and become the most critical risk factor that can cause MI [19]. Another biological factor includes the high blood pressure also had present among 58% of participants. In our study, we found that the frequency of extra salt intake is 52%. Excessive sodium intake in-creases CVD risk significantly, while through reduced sodium intake, a significant decrease in CVD burden is re-ported. High sodium intake increases our blood pressure that is confirmed through various epidemiological, animal, studies, and genetic studies. In addition to that, reductions in sodium intake lead to declines in systolic and diastolic blood pressure that reduces heart attacks and strokes (20).

Conclusion

Besides the well-known risk factors, genetic factors, and some emerging risk factors unique to this population may play an important role in CVD. Mainly due to the unhealthy diet, smoking decreased physical activity, and many more factors, especially in developing countries. People should take some sessions on physical activity and nutrition, including awareness development about risks of overweight or obesity and calorie-dense fast food. Preventive measures, both primary and secondary, are needed to control and better manage heart diseases both in early childhood to middle age populations. Furthermore, people should be encouraged to maintain a high level of physical activity in their daily life.

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