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Original Article

Prevalence of Risk Factors for Cardiovascular Disease and Their Associations with Diet and Physical Activity: A cross-sectional study in a tertiary care hospital in Bangladesh

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ABSTRACT

Background: *Cardiovascular disease (CVD) is the leading cause of death. In recent decades, a CVD epidemic has affected many emerging nations.Smoking, binge drinking, poor eating habits, obesity, high blood pressure, diabetes, and hyperlipidemia are all established risk factors for CVDs. Following smoking (nearly 10%), overweight, and obesity (5%), physical inactivity is in second place (6%). Coronary heart disease and stroke risk are both increased by elevated blood pressure levels. Furthermore, diabetes doubles the risk of vascular disease. The risk of coronary heart disease has been linked separately to higher triglyceride and cholesterol levels.* ***Objective:****To evaluate the prevalence of CVD risk factors and examined at their associations with dietary practices and physical activity in a tertiary care hospital.* ***Materials and Methods:*** *This is a cross sectional study was conducted at Seikh Hasina Medical College Hospital from January 2019 to December2021. CVD diagnosis rate of 450 individuals was used as the sample size in calculations to assure population representation. Participants filled out multilingual, standardized questionnaires to collect data. Standard serially numbered forms were used for the participant data. The forms contained a section for demographic data that listed the campaign date, the patients' and employees' names, the CPR, the patients' and employees' ages, genders, nationalities, marital statuses, levels of education, jobs held, preferred local healthcare facilities, and contact details. The second portion of the survey asked questions*

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about behavioral risk factors for CVD such smoking status, degree of physical activity, daily fruit and vegetable consumption, and usage of seatbelts when driving. Means and standard deviations were used for quantitative data, and percentages or proportions were used for categorical variables. The spreadsheet programs SPSS and Excel were also used to create graphs and frequency tables. ***Results:*** *Overweight/obesity, diabetes, hypertension, dyslipidemia, and metabolic syndrome (MS) were the CVD risk factors with the highest age-standardized prevalence at 32.5 8.1 %, 43.6%, 27.3%, 31.3%, and 13.6%, respectively. In comparison to participants who were not physically active, the adjusted odd ratios (95% confidence interval [CI]) for overweight/obesity, diabetes, hypertension, dyslipidemia, and MS were 0.67 (0.47 to 0.85), 0.87 (0.80 to 0.95), 0.92 (0.87 to 0.98), 0.89 (0.82 to 0.96), and 0.74 (0.62 to 0.89, respectively. Participants who consumed a lot of salt had odds ratios for MS and hypertension that were adjusted (95% confidence intervals) of 1.72 (1.29 to 2.03) and 1.48 (1.16 to 1.77), respectively. Participants who ate a high-fat diet also had a higher chance of being overweight, obese, and dyslipidemic, whereas vegetarians had a lower risk of these conditions as well as MS, diabetes, hypertension, and dyslipidemia.* ***Conclusion:*** *Overweight/obesity, diabetes, hypertension, dyslipidemia, and MS all had comparatively high prevalence in this adult sample from the Hospitals. Physical activity and a healthy diet can lower the chances of developing these illnesses.*

Keywords: *Cardiovascular Disease, Diet, Physical Activity*

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INTRODUCTION

Worldwide, cardiovascular disease (CVD) is the leading cause of death. In recent decades, a CVD epidemic has affected many emerging nations. [1] Obesity is a significant CVD risk factor that can be modified. [3] Three separate risk factors for death from CVD and all causes are diabetes, hypertension, and dyslipidemia. [4–6]The term "metabolic syndrome" has recently been used to describe the grouping of risk factors that includes hyperglycemia, hypertension, hypertriglyceridemia, low high-density lipoprotein cholesterol, and overweight/obesity (MS). The relationship between MS and an elevated risk of CVD is now generally acknowledged. [7–9]

The known risk factors for CVDs include smoking, drinking alcohol harmfully, not exercising, eating poorly, being obese, having high blood pressure, diabetes, and hyperlipidemia. Physical inactivity comes in second (6%), followed by smoking (almost 10%) and overweight and obesity (5%). [5] Elevated blood pressure levels can raise the chance of having a stroke and having coronary heart disease. [6] Additionally, the risk of vascular disease is doubled in those with diabetes. 7 Higher triglyceride and cholesterol levels have been identified as separate risk factors for coronary heart disease. [8] The incidence of cardiovascular illnesses and their risk profile might also differ dramatically depending on an individual's age, sex, race, and employment.Unhealthy food, lack of exercise, cigarette use, and problematic alcohol use are the most significant behavioral risk factors for

heart disease and stroke. Blood pressure, blood sugar, blood lipids, overweight, and obesity are only a few manifestations of an individual's exposure to behavioral risk factors. These "intermediate risk factors" may be assessed in primary care settings and point to an elevated risk of heart attack, stroke, heart failure, and associated consequences. Cardiovascular disease risk can be decreased by quitting smoking, consuming less salt, increasing fruit and vegetable intake, engaging in regular physical activity, and abstaining from alcohol abuse. Health policies that foster environments where inexpensive and accessible healthy options are available are crucial for encouraging individuals to adopt and maintain healthy behaviors.The causes of CVDs are also affected by a variety of other factors. Globalization, urbanization, and population aging are the three main factors causing social, economic, and cultural change, and they are reflected in them. Poverty, stress, and inherited factors are among other CVD determinants. In order to lower cardiovascular risk and stop heart attacks and strokes in those who have these disorders, it is also required to treat hypertension, diabetes, and excessive blood lipids with medications.
Numerous observational studies have shown that behavioral changes and adjustments to behavioral risk variables are linked to a decrease in the mortality from cardiovascular disease [14–19]. A supportive environment can also be facilitated by measures to enhance public health and develop circumstances that encourage behavioral change. The World Health Organization published recommendations for the evaluation and treatment of cardiovascular risk for the prevention of cardiovascular disease based on the scientific evidence [20].The link between profession and cardiovascular health has been verified by scientific research [21–23]. As a result, understanding risk factors, including workplace ones, is crucial to promoting the effectiveness of certain health programs. Data on cardiovascular health in working people in Europe are scarce [24, 25]. The UK Healthy Universities Network's member higher education institutions (HEIs) throughout Europe are increasingly implementing "whole university" health promotion programs. By concentrating on the whole population, this plan seeks to create a supporting ethos and culture that will integrate health into the institution [26–28].In providing and advocating ways to lower the risk factors for CVD in students, professors, and staff, HEIs may play a crucial role. We evaluated the prevalence of CVD risk factors and examined at their associations with dietary practices and physical activity in a population to give fresh data for policy planners and health education programs.

OBJECTIVE

To evaluate the prevalence of CVD risk factors and examined at their associations with dietary practices and physical activity.

MATERIALS AND METHODS

Study Design and Justification: A cross-sectional work-site based survey was used to describe the prevalence of

some of CVD risk factors among patients in Sheikh Hasina Medical College, Jamalpur, Bangladesh**.**

Study Period: January, 2019 to December, 2021.

Study Place: Sheikh Hasina Medical College, Jamalpur, Bangladesh.

Identification of Sample Size:

The sample size was calculated to ensure representation of the population and was estimated to be 450 patients who are diagnosed by CVD in a tertiary care hospital.

Data Collection and Procedure:

Data were collected from the participants completed standardized questionnaires that were multilingual (Bangla and English). For the participant data, standard serially numbered forms were utilized. The forms had a section for demographic information that included the campaign date, the Patients and employee's name, the CPR, age, gender, nationality, marital status, level of education, employment, preferred local healthcare center, and contact information. Questions addressing behavioral risk factors for CVD, such as smoking status, physical activity level, daily fruit and vegetable intake, and seatbelt use while driving, made up the second half of the survey. In the third part, there were inquiries concerning any NCD that had been identified, its treatment, any relevant family history, and any prior screenings for breast or cervical cancer. The final section consisted of a record of the participants' basic physical and biochemical measurements, such as their weight in kilograms (kg), height in centimeters (cm), body mass index (BMI) in kilograms per square meter (kg/m2), waist circumference (WC) in centimeters (cm), and levels of measured expired carbon monoxide (CO) in parts per million (ppm) for smokers (represents the percentage of carboxyhemoglobin). The last portion also included a summary of the composite CVD risk factors, which were defined as current daily smoking, eating fewer than five servings of fruits and vegetables, being inactive, being overweight or obese, and having high blood pressure. The document also contained the ultimate recommendation or judgment of the doctors. Participants' conditions, including patient posture, environmental factors, cuff size, manometer calibration every six months against a mercury manometer, the procedure, and blood pressure records, were checked to make sure they complied with the BP measurement recommendations.

Considerations Regarding Ethics and Confidentiality

Confidentiality, data protection, and ethical clearances were all considered and handled expertly. However, because the study was based on a health survey in which the workers took part after being verbally informed of the need for information on CVD risk factors among employees, there were no written consents. A pharmaceutical business and the ministry of health provided funding for the health campaign.

Data Analysis

Descriptive and inferential statistics were used to input and evaluate the data. The data were compiled using descriptive statistics. For quantitative data, means and standard deviations were utilized, and for categorical

variables, percentages or proportions. Additionally, graphs and frequency tables were generated using the spreadsheet applications of SPSS and Excel.

RESULTS

The general characteristics of the study participants are shown in Table 1. The average age of the participants was 57.0 (95% CI, 46.5 to 49.6) years. The average age of men (48.7, 42.3 to 48.1) and women (45.2, 41.9 to 4 38.8) did not significantly differ (*P*> 0.05). Men had a higher body weight, SBP, DBP, and TG (*P*< 0.01 for all comparisons); women had a higher FPG, TC, LDL cholesterol, and HDL cholesterol (*P*< 0.05 for all comparisons).

Table: 1 General characteristics of the study participants, expressed as means (95% CI)

Characteristics	Total (*n* = 450)	Men (*n* = 280)	Women (*n* = 170)	*P*
Age (years)	57.0	48.7	45.2	>0.05
Weight (kg)	70.0	77.1	66.5	<0.01
BMI (kg/m^2)	21.7	27.8	24.6	>0.05
SBP (mm Hg)	129.9	128.5	126.0	<0.01
DBP (mm Hg)	83.7	84.5	80.5	<0.01
FPG (mmol/l)	6.50	5.45	5.34	<0.01
TC (mmol/L)	3.86	3.74	3.68	0.02
TG (mmol/L)	1.78	1.67	1.58	<0.01
HDL-C (mmol/L)	1.47	1.31	1.30	<0.01
LDL-C (mmol/L)	2.69	2.56	2.47	<0.0

Overweight/obesity, diabetes, hypertension, dyslipidemia, and MS had age-standardized prevalences of 32.5 8.1 %, 43.6%, 27.3%, 31.3%, and 13.6%, respectively (Table 2). Men were more likely than women to have overweight or obesity, hypertension, dyslipidemia, and MS (P 0.01 for all comparisons). However, women were more likely than males to have diabetes (P = 0.01). Age-related increases in the prevalence of diabetes, hypertension, and MS were seen in both men and women (P for trend 0.01 across the board). The prevalence of overweight/obesity rose in persons under 50 years old and fell in participants over 50 years old in both sexes (P for trend, 0.01 for both). In women, the prevalence of dyslipidemia increased with age (P for trend, 0.01), but in males older than 50, the prevalence of dyslipidemia decreased with age (P for trend, 0.01).

Table: 2 Prevalence of CVD risk factors by sex and age, expressed as percentages (SE)

	Overweight/obesity	Diabetes	Hypertension	Dyslipidemia	MS
Total[a]	32.5 (0.8)	8.1 (0.3)	43.6 (1.2)	27.3 (1.0)	13.6 (0.6)
Men					
Overall[a]	34.4 (1.1)	5.6 (0.5)	38.7 (1.5)	33.6 (1.2)	11.2 (0.9)
Age, y					
18–29	28.3 (1.1)	3.2 (0.4)	8.8 (0.5)	18.4 (0.8)	2.6 (0.5)
30–39	32.6 (1.3)	2.3 (0.3)	19.9 (0.9)	28.8 (1.2)	5.7 (0.8)
40–49	35.1 (1.6)	5.3 (0.5)	35.2 (1.2)	37.9 (1.5)	13.1 (0.9)
50–59	33.8 (1.5)	7.1 (0.7)	43.4 (1.7)	33.4 (1.4)	14.7 (1.1)
60–69	27.4 (1.3)	8.7 (0.9)	58.9 (2.2)	27.8 (1.1)	15.7 (1.3)
≥70	26.5 (1.4)	9.4 (1.0)	59.3 (2.5)	26.2 (1.2)	22.6 (1.5)
Women					
Overall[a]	25.6 (1.0)	7.4 (0.4)	37.3 (1.3)	24.1 (1.1)	13.2 (0.7)
Age, y					
18–29	23.4 (0.9)	2.3 (0.3)	3.3(0.3)	11.6 (0.7)	2.0 (0.4)
30–39	28.5 (1.1)	3.7 (0.5)	9.7 (0.7)	15.8 (0.8)	4.7 (0.9)
40–49	37.6 (1.5)	5.5 (0.5)	29.9 (1.1)	23.7 (1.2)	10.2 (1.0)
50–59	32.1 (1.5)	6.9 (0.6)	41.5 (1.7)	36.7 (1.3)	13.3 (0.9)
60–69	26.7 (1.3)	7.2 (0.8)	54.5 (2.1)	39.8 (1.3)	17.5 (1.4)
≥70	29.2 (1.6)	8.8 (1.0)	59.8 (2.6)	38.4 (1.6)	25.8 (1.6)

Table 3 demonstrates the correlation between CVD risk factor prevalence's and food and physical activity patterns. Participants who engaged in physical activity for more than 30 minutes each session and more than three times per week were less likely to have MS (9.8% vs. 13.2%), diabetes (5.0% vs. 6.9%), hypertension (31.4% vs. 35.2%), dyslipidemia (27.5% vs. 33.1%), or to be overweight or obese (P 0.05 for all comparisons). Those with a high-salt diet were more likely to have hypertension (37.3 vs. 30.7%) and multiple sclerosis (12.4% vs. 10.3%) than participants with a low-salt diet (P 0.05 for both). Participants who consumed a lot of sugar had greater prevalences of obesity, diabetes, and MS than those who consumed a lot less sugar (P 0.05 for all comparisons). A high-fat diet was associated with greater rates of overweight/obesity (35.6% vs. 27.9%), dyslipidemia (33.9% vs. 27.2%), and MS (13.0% vs. 10.2%) than a high-fat diet was associated with (P 0.05 for all comparisons). The prevalences of obesity, diabetes,

hypertension, dyslipidemia, and MS were lower among vegetarians and vegans (P 0.05 for all comparisons).

Table:3Prevalence of CVD risk factors by physical activity and dietary habits, expressed as percentages (SE)

Groups	Overweight/ obesity	Diabetes	Hypertension	Dyslipidemia	MS
Total[a]	32.5 (0.8)	8.1 (0.3)	43.6 (1.2)	27.3 (1.1)	13.6 (0.6)
Physical activity					
Inactive	32.7 (1.2)	7.9 (0.5)	37.2 (1.4)	32.1 (1.3)	12.2 (0.9)
Active[b]	29.3 (1.0)[d]	4.0 (0.3)[c]	34.4 (1.2)[c]	29.5 (1.2)[c]	9.8 (0.7)[d]
Dietary habits					
Salt appetite					
No	35.6 (1.1)	7.2 (0.4)	39.7 (1.2)	28.1 (1.2)	11.3 (0.5)
Yes	33.3 (1.2)	9.9 (0.4)	36.3 (1.5)[d]	36.8 (1.4)	13.4 (0.8)[c]
Sugar preference					
No	27.0 (1.1)	4.1 (0.4)	32.9 (1.3)	26.9 (1.2)	11.1 (0.6)
Yes	34.7 (1.3)[c]	7.8 (0.5)[c]	37.1 (1.4)	30.6 (1.3)	12.8 (0.7)[c]
High-fat preference					
No	28.9 (1.1)	6.8 (0.5)	34.0 (1.2)	25.2 (1.1)	13.2 (0.6)
Yes	32.6 (1.3)[d]	7.4 (0.4)	38.4 (1.3)	32.9 (1.4)[d]	12.0 (0.8)[c]
Vegetarian					
No	35.8 (1.4)	6.0 (0.5)	32.3 (1.5)	39.7 (1.3)	14.9 (0.8)
Yes	28.5 (1.1)[d]	4.0 (0.4)[d]	30.1 (1.3)[c]	25.0 (1.2)[c]	11.0 (0.7)[c]

DISCUSSION

The most significant causes of CVD prevalence and death are unhealthy behavioral factors, such as sedentary lifestyles and high-fat, high-salt, and high-calorie diets. 20 The average Chinese diet nowadays, particularly in metropolitan areas, is high in fat (the CNNS of 2002 found that the fat energy percentage was 29.6%), sodium, and energy intake, but low in fruit and vegetable intake.As urbanization and industrialization have advanced, Chinese energy consumption has decreased as well. [21]Numerous studies have demonstrated a significant correlation between rising salt intake and the prevalence of hypertension. [22,23] Because patients with high salt intake had higher prevalence and risk of both

hypertension and MS, we also noticed that excessive salt intake was clearly linked to hypertension (1 component of which is hypertension). The highest limit of the daily recommended salt intake for Chinese is 6 grams, but the estimated average salt intake is 12 grams per day,24 above the upper limit. These results imply that the potential health advantages of salt restriction are very significant for China's public health. A high incidence of type 2 diabetes, which is also a risk factor for CVD, is linked to heavy consumption of sweets and desserts like cake and sugar-sweetened soft drinks. [25] A low-glycemic index diet may benefit long-term glycemic control in persons with type 2 diabetes, as well as other CVD risk factors. 26 The participants in the current study who consumed a high sugar diet had significant prevalences and risks of diabetes, MS, and overweight/obesity. The present study also emphasized the dangers of a high-fat diet and the protection provided by a vegetarian diet. Vegetarian and other low-fat diets typically increase dietary intakes of carbohydrates, fiber, and a number of micronutrients, which are linked to lower CVD occurrences and the risk factors for it, such as obesity, type 2 diabetes, and plasma cholesterol. [32,33]According to a randomized intervention trial, CVD patients who ate a low-fat diet with more fruit and vegetables lived longer (relative risk: 0.59, 95% confidence interval: 0.46 to 0.74). [34] Fiber and phytochemicals, which are frequently found in fruit and vegetables, were said to be responsible for these health impacts. [34]Due to physical inactivity brought on by urbanization and industrialisation, which has increased time spent watching television, playing video games, driving to work, and using the Internet, energy expenditure has gradually decreased among Chinese people. There is strong evidence linking physical exercise to well-known CVD risk factors such MS, diabetes, hypertension, dyslipidemia, and general and abdominal obesity. [25–30]In a nutshell, vigorous exercise lowers age-related increases in waist circumference and weight gain, improves lipid profiles and blood pressure, and reduces weight gain. 41 On the other hand, a decline in physical activity may make both sexes' CVD risk factor profiles worse. [23]

CONCLUSION

These risk factors are becoming a serious public health concern rapidly urbanizing regions due to their high and rising prevalence, which is likely explained by economic development and the associated changes in food and lifestyle. Healthy eating and regular exercise are effective at reducing these risk factors, according to the current study and earlier research. To lessen the prevalence and societal costs of CVD in Bangladesh, comprehensive national programs focused at the prevention of risk factors are urgently required.

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