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Research Article

Assessment of C-Reactive Protein in Psoriasis Patients

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Abstract

Diabetes mellitus is related to cardiovascular disease, is one of the main global health problems. A cross-sectional epidemiological study was conducted to find out diabetes mellitus and pre-diabetes among adults in selected districts in Bangladesh A convenient non-probability sampling technique was used to select study participants. The World Health Organization stepwise approach for non-communicable diseases surveillance was deployed to collect data. Glucose meter was used to check randomly venous blood glucose level. A total of 400 participants were included in the study. The prevalence of DM was found 9.75%. The prevalence of prediabetes was also found to be 10.5%. The age, gender, waist circumference, nutritional status, smoking habit, physical activities were significantly associated with diabetes mellitus. In this study, higher prevalence of diabetes mellitus was observed than other studies.

Key words: diabetes mellitus; associated factors; bangladesh

Introduction

Diabetes mellitus is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism [1]. It is one of the chronic non-communicable diseases which have emerged as a leading global health problem. It is also a known risk factor for blindness, vascular brain diseases, renal failure, and limb amputations [2]. According to the International Diabetes Federation Atlas guideline report, currently, there are 352 million adults with impaired glucose tolerance who are at high risk of developing diabetes in the future. In 2017, it was estimated that 425 million people (20-79 years of age) suffered from DM, and the number is expected to rise to 629 million by 2045 [3]. Its global prevalence was about 8% in 2011 and is predicted to rise to 10% by 2030.Nearly 80% of people with diabetes live in low- and middle-income countries. Asia and the eastern Pacific region are particularly affected: in 2011, China was home to the largest number of adults with diabetes (i.e. 90.0 million, or 9% of the population), followed by India and Bangladesh [4]. However, many governments and public health planners remain largely unaware of the current prevalence of diabetes and prediabetes, the potential for a future rise in prevalence and the serious complications associated with the disease. Consequently, knowledge of the prevalence of diabetes and prediabetes and of related risk factors could raise awareness of the disease and lead to new policies and strategies for prevention and management. According to the International Diabetes Federation, the prevalence will be 13% by 2030 [4,5]. However, no nationally representative, epidemiological study of the prevalence of diabetes mellitus and pre-diabetes has been carried out in the country.

Methods

The study was conducted in Dhaka, Sirajganj, Habiganj and Jessore District in Bangladesh. A community-based cross sectional study was conducted. The source population was individuals aged 18 years and above permanently living there. The sample size was calculated was found to be four hundreds. Convenient sampling technique was used; the primary sampling units, four districts were randomly selected. Sample size was equally distributed to each of the selected districts. Finally, systematic random sampling technique was employed to select households to be visited for data collection. From the selected households, eligible adults were identified, and if there were more than one in a household, then one were randomly selected. Individuals who were taking any drug with possible impact on glucose metabolism other than antidiabetes drugs were excluded to avoid false positive pre-diabetes or diabetes mellitus. Data on demographic and behavioral characteristics

were collected by trained personnel through a face-to-face interview using a questionnaire. The field study team was composed of enumerators, laboratory technicians, nurses, and supervisors. The World Health Organization stepwise approach for non-communicable disease surveillance was used to collect the data [6]. In this step, demographic and behavioral risk factors were collected through face-to-face interviews using an interviewer-administered questionnaire. Each participant was questioned for age, sex, educational status, marital status, occupation type, physical activity, history of raised blood pressure and diabetes, fruit and vegetable intake, alcohol consumption, and smoking habit. Physical measurements of height and weight needed to calculate body mass index (BMI), waist circumference, and blood pressure were taken in this step. Blood pressure (BP) was taken in a sitting position from the right arm using a digital sphygmomanometer. Two readings were taken 5 minutes apart, and the mean was considered as the final BP result. Prehypertension is defined as systolic BP of 120–139 and diastolic BP 80–89 mmHg. Hypertension is defined as systolic BP of ≥140 mmHg or diastolic BP of ≥90 mmHg. A portable weight and height scale was used to measure the weight of the participant wearing light clothes and height in upright standing position on a flat surface. Then, body mass index (BMI) was calculated by weight in kilograms divided by height in meters squared formula. BMI <18.5 kg/m2 is considered as underweight, 18.5-24.9 kg/m2 as normal, 25-29.9 kg/m2 as overweight, and ≥30 kg/m2 as obese. Waist circumference (WC) was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a flexible plastic tape. WC values >94 and >80 cm for men and women, respectively, were considered high according to the World Health Organization recommendation. The Accu-Chek Active system uses a capillary blood sample which is set to plasma serum standard, showing result in plasma glucose values. This measurement was immediately performed for all participants, and the results were recorded in the questionnaire. Fasting capillary blood samples were collected three times at different occasions (for three consecutive days) from a single study participant, and glucose measurement was carried out within fractions of seconds after sample collection. Then, their average was taken for analysis, and this might have minimized the appearance of abnormal results. The diagnosis of DM was based on the American Diabetes Association diabetes mellitus classification criteria with fasting blood glucose of ≥126 mg/dl being considered as positive for DM; impaired fasting glucose, FBG: ≤110 mg/dl to <126 mg/dl; normoglycemic, FBG: ≤61 mg/dl to <110 mg/dl), and hypoglycemic, <61 mg/dl [7]. The data were entered, cleaned, and analyzed using the SPSS version 23.0 software package.

Results

The mean age of participants was 43.43±19.82 years. Two hundred forty-one (60.25%) of the participants were younger than 50 years old. 58.75% of study participants were male. More than half (56.75%) of adults either attended primary education or did not attend formal education. Two thirds of them (68.5%) were married while 86 (21.5%) were single. Concerning occupation, 140 (35%) adults were farmer whereas 88 (22%) were housewife (Table 1).

	Characteristics	Frequency	Percent
Sex			
Male	235	58.75	
Female	165	41.25	
Age			
18-35	115	28.75	
36-50	126	31.5	
51-65	74	18.5	
66-93	85	21.25	
Education			
HSC and above	101		13.5
SSC	119	29.75	
Primary	154		38.5
No education	73		18.25
Marital status			
Married	274		68.5
Single	86	21.5	
Divorced	23		5.75
Widowed	17		4.25
Occupation			
Housewife	88		22
Farmer	140	35	
Private Job	72		18
Other†	100	25	

Table 1: Sociodemographic characteristics.

From total of participants responding, 173(43.25%) were smokers. Only Ten (2.5%) participants consumed alcohol over the last 30 days proceeding the time of data collection. Three hundred six (76.5%) participants ate fruits two or fewer days a week. Forty-seven (11.75%) participants ate vegetables for two or fewer days during regular week days. One hundred thirty seven (34.25%) adults were not involved in adequate physical activity or physical inactivity (Table 2).

Tobacco status	Frequency	Percent
Ever smoking cigarette		
Yes	173	43.25
No	227	56.75
Current alcohol consumption		
Yes	10	2.5
No	390	97.5
Fruits consumption per week		
Two or fewer	306	76.5
Three to four	73	18.25
Five or more	21	5.25
Vegetables consumption per week		
Two or fewer	47	11.75
Three to four	82	20.5
Five or more	271	67.75
Total physical activities		
Active	263	65.75
Inactive	137	34.25

Table 2: Distribution of adults' behavioral characteristics.

Variables	Frequency	Percent
Hypertension		
Yes	159	39.75
No	241	60.25
Waist circumference		
Normal	216	54
High	184	46
Body mass index		
Underweight	46	11.5
Normal	234	58.5
Overweight	93	23.25
Obese	27	6.75
Fasting blood glucose		
Diabetic	39	9.75
Pre-diabetic	46	11.5
Normoglycemic	305	76.25
Hypoglycemic	10	2.5

Table 3: Physical and biochemical measurement characteristics of study population.

The majority, 76.25% (305/400), of the study participants were normoglycemic, whilst 11.5% (46/400) of the respondents were pre-diabetics (Table 3) (Figure-1). The prevalence of DM was found to be 9.75% (39 out of 400).

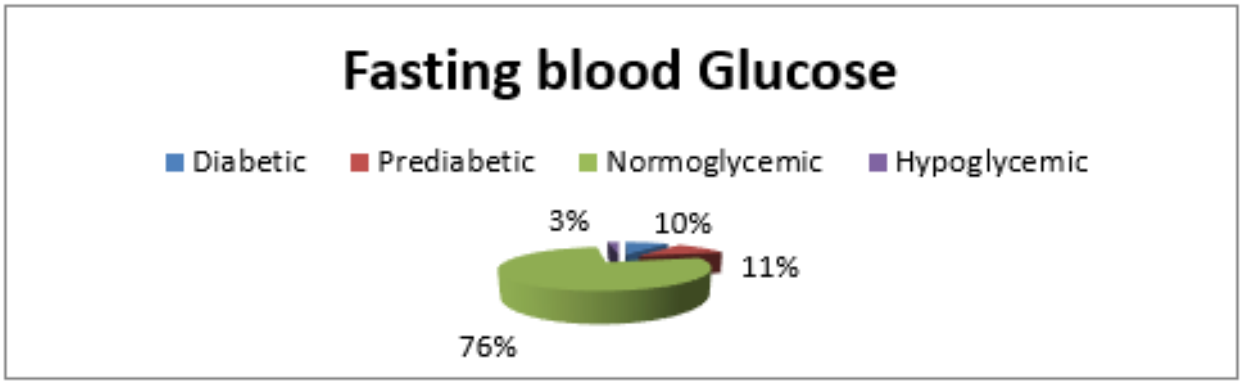

Figure 1: Prevalence of diabetes and prediabetes.

Study participants with high waist circumference were 2.57 times more likely to be DM positive compared to those whose waist circumference was normal (OR = 2.57) Regarding body mass index, being overweight and obesity was also independently associated with the prevalence of DM. Respondents who were overweight were 2.587 times at more risk of being DM positive than those with normal body mass index (OR = 2.587). Respondents who were obese were 4.17 times at more risk of being DM positive than those with normal body mass index (OR = 4.17). Similarly, individuals with smoking habit were about 1.253 times more likely to be DM positive when compared to participants who never smoked in their lifetime (OR = 1.253). Respondents who were inactive were 5.587 times at more risk of being DM positive than those were active (OR = 5.587). Female respondents who were 1.568 times at more risk of being DM positive than male respondents (OR = 1.568). Age of respondents was also independently associated with the prevalence of DM. Respondents aged 36-50 years old, 51-65 years old and 66-93 years old were 1.475 times, 2.136 times and 2.563 times respectively at more risk of being DM positive than 18-35 years old respondents. (Table 4)

Variable	DM status		OR	p-value
	Yes (%)	No (%)		
Sex				
Male	19(8.09)	216(91.91)	1	
Female	20(12.12)	145(87.88)	1.568	0.043
Age				
18-35	7(6.08)	108(93.92)	1	
36-50	11(8.73)	115(91.27)	1.475	
51-65	9(12.16)	65(87.84)	2.136	0.0037
66-93	12(14.12)	73(85.88)	2.536	
Occupation				
Housewife	7(7.95)	81(92.05)	0.993	
Farmer	13(9.28)	127(90.72)	1.17	0.0739
Private Job	11(15.27)	61(84.73)	2.07	
Other†	8(8)	92(92)	1	
Ever smoking cigarette				
Yes	19(10.98)	154(89.02)	1.253	
No	20(8.81)	207(91.19)	1	0.039
Current alcohol consumption				
Yes	1(10)	9(90)	1.029	
No	38(9.74)	352(90.26)	1	0.913
Total physical activities				
Active	14(5.38)	249(94.62)	1	
Inactive	25(18.25)	112(81.75)	5.587	0.0034
Nutritional Status				
Underweight	4(8.69)	42(91.31)	1.39	
Normal Weight	15(6.41)	219(93.59)	1	
Overweight	14(15.05)	79(84.95)	2.587	0.0431
Obese	6(22.22)	21(77.78)	4.17	
Hypertension				
Yes	13(8.17)	146(91.83)	0.736	
No	26(11.26)	215(88.74)	1	0.121
Waist Circumference				
Normal	13(6.02)	203(93.98)	1	
High	26(14.13)	158(85.87)	2.57	0.0427

Table 4: Multivariable analysis of factors associated with diabetes mellitus.

Discussion

This study shows that the prevalence of DM is found to be 9.75%. In 2013 according to IDF the prevalence of diabetes in Bangladesh was 6.3%, in 2017 6.9%, but some studies estimated 8.5% to 10%. The prevalence of prediabetes in the present study was found to be 11.5%. This is higher than the estimated Bangladeshi national prevalence of 5–8%. This suggests that the prevalence of DM in the study area may increase in the near future as there is a risk of progression of pre-diabetic condition to diabetic. The present study has described some proven and hypothesized associated factors. This study revealed that there was a significant association between smoking habit and diabetes mellitus. The exact mechanism why smoking increases the risk of diabetes and deteriorates glucose homeostasis has not been fully elucidated, but the available evidence shows that the habit increases insulin resistance. Smoking has also further been associated with the risk of chronic pancreatitis and pancreatic cancer [8]. It has been postulated that expanded abdominal fat stores affect insulin action by releasing free fatty acids. In addition, fat cells secrete signaling factors, for example, interlukein-6 (IL-6) and tumor necrosis factor-α which are involved in the development of insulin resistance [9]. The major limitation of this study is that diabetes mellitus was diagnosed by glucose meter from capillary blood; this is not as accurate and reliable as plasma glucose estimation diagnosed using a spectrophotometer/colorimeter. Moreover, it is possible that participants did not trace their exact fasting time and this might have affected the overall DM prevalence.

Conclusion

This study indicated 9.75% prevalence of diabetes mellitus which was somewhat higher than the projected national prevalence of DM (5-8%). This result is an alarming condition as it has been predicted that much of the global increase in DM is forecasted to be in Bangladesh. Waist circumferences, body mass index, smoking habit, hypertension, and physical activities were significantly associated with the diabetes. These factors associated with DM were potentially modifiable. Therefore, targeting the prevention strategy to such modifiable risk factors might reduce the prevalence of diabetes mellitus in the area.

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