Original Article

Status of diabetes mellitus and pre-diabetes among the government civil employees in a selected secondary care hospital in Chattogram division, Bangladesh

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Abstract

Background: Diabetes mellitus (DM) is a chronic metabolic disorder. The prevalence of diabetes and prediabetes are increasing worldwide especially in urban areas.

Objective: This study's objective was to ascertain the frequency of diabetes mellitus, prediabetes, and the underlying risk factors for these conditions among Bangladesh Armed Forces personnel who were admitted to BNS Patenga (Navy Hospital), Chattogram.

Methods: This cross-sectional survey was done among the Bangladesh Armed Forces employees in the Chattogram region, who were admitted in to BNS Patenga (Navy Hospital), Chattogram. A total of 150 samples were selected by convenient sampling. A semi-structured questionnaire and check list was used for data collection. Data on age, gender, food intake, obesity, family history and blood pressure were collected from the study subjects. The ADA Guidelines 2022 were used to define pre-diabetes and diabetes mellitus. SPSS version 19 statistical software was used for data analysis.

Results: This study included 150 civil government employees, out of which 130 males (86.7%) and 20 females (13.3%); 56% were 40-60 years of age. The overall age-adjusted frequency of diabetes mellitus and pre-diabetes among 150 participants were 8% and 10%, respectively. Among them 80 (53%) had sedentary life style, 48 (32%) use to take high calorie food, 33 (22%) had the habit of smoking and family history each, 26 (17%) had Hypertension (HTN) and 17(11%) had obesity. Both prediabetes and diabetes were more prevalent in male, 66.7% and 75.0% respectively.

Conclusion: The prevention of diabetes mellitus and pre-diabetes requires population-based intervention programs and policies that promote lifestyle adjustment and enhanced knowledge on risk factors.

Keywords: Diabetes Mellitus, Prediabetes, Risk factors.

Introduction:

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia. Worldwide people with diabetes mellitus have more than doubled during the past 20 years and this rapid increase is due to emergence of type 2 diabetes in children, adolescents, and young adults. Globally, diabetes mellitus (DM) is among the leading medical conditions that cause mortality. It accounts for 30% of all fatalities.[1] Diabetes is a major cause of cardiovascular disease and also the leading cause of chronic kidney disease (CKD.[2] Data sources from 130 countries representing 382 million people had diabetes in 2013; this number is expected to rise to 592 million by 2035.[3] In South East-Asia (SEA) Region consisting of India, Sri Lanka, Bangladesh, Bhutan, Mauritius and Maldives, is expected to exceed 123 million adults with diabetes in 2035.Nearly 95% of people with diabetes have type 2 diabetes (T2DM). Numerous research studies have demonstrated the direct or indirect effects of gender, age, lifestyle, obesity, smoking, family history of diabetes, dietary habits, and other factors on the onset and course of diabetes.[4]

Diabetes and prediabetes are not as common in emerging nations as they are in wealthy nations. Our clinical experience demonstrates that the urban population of Bangladesh has experienced a sharp rise in the overall prevalence of diabetes and prediabetes in recent years.[5]

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A metabolic condition called diabetes is brought on by unusually high blood sugar levels. Type 1 diabetes, type 2 diabetes, maturity onset diabetes of the young (MODY), gestational diabetes, neonatal diabetes, and secondary causes like suspected endocrinopathies, steroid use, etc. are among the various categories of this complex illness. Type 1 diabetes is typically caused by a deficiency in insulin production and type 2 diabetes by defect in action. Type 2 diabetes usually affects middle-aged and older adults who have high blood sugar levels for an extended period because of poor dietary and lifestyle choices.

Because of their distinct pathophysiology, T1D and T2D have distinct etiologies, symptoms, and courses of treatment.[6] Numerous consequences, such as microvascular, macrovascular, and neuropathic issues, are linked to diabetes. Depending on the severity and length of poorly managed diabetes, microvascular and macrovascular complications can include nephropathy, retinopathy, neuropathy, and atherosclerotic cardiovascular disease (ASCVD) events.[7] These complications are particularly dangerous when dyslipidaemia and hypertension are present. The common complication macroangiopathy in T2D concerns serious heart and vascular lesions that lead to hypertension, artery narrowing, coronary artery disease, stroke and 75% of deaths in these patients are due to underlying coronary artery disease.[8] Heart attacks or strokes claim the lives of about two thirds of diabetics. Higher fasting blood glucose levels in people with type 2 diabetes greatly raise the risk of ASCVD.[7]

In general population both overweight and obesity are increasing due to unhealthy multifaceted lifestyle factors. These are contributing as hidden public health threat to diabetes and prediabetes. Creating awareness and screening of high-risk groups combined with a tailored approach are essential for halting the epidemic of diabetes and pre-diabetes in Bangladesh.[9] The objective of our study was to ascertain the frequency of diabetes mellitus, prediabetes, and the underlying risk factors for these conditions among Bangladesh Armed Forces personnel who were admitted to BNS Patenga (Navy Hospital), Chattogram.

Materials and Methods:

A descriptive cross-sectional study was conducted in BNS Patenga (Navy Hospital), Chattogram in between 01 January 2023 to 30 June 2023 (06 months). One hundred and fifty (150) government civil employees working in Bangladesh Armed Forces at Chattogram area were selected by convenient sampling from admitted patients in BNS Patenga(Navy Hospital), Chattogram. Data were collected with pretested semi-structured questionnaire and checklist by face-to-face interview and reviewing medical and laboratory record. Variables were age, gender, food intake, obesity, physical activity, smoking, sedentary life style, family history of diabetes mellitus, blood pressure and blood sugar status.

Diabetes Mellitus and pre-diabetes were defined according to ADA Guidelines 2022.[10] Institutional approval from proper authority was taken. The participants were briefed properly and informed consent was taken from them.

Information on age, sex, sedentary life style, smoking habit, body weight in kg and Height in cm, by BMI classification (18.5-≤25=normal, 25-<30= overweight, >30= obese), stressful life (pattern of job, working environment, working time, sleeping pattern), family history (history of diabetes or prediabetes etc.) and intake of high caloric diet (>2500 kcal/day).

Population category is as follows:

a. Normal: FBS < 6.1 mmol/L, RBS < 7.8 mmol/L
b. Prediabetes: FBS 6.1-6.9 mmol/L, RBS 7.8-11.0 mmol/L
c. Diabetes: FBS ≥ 7.0 mmol/L, RBS ≥ 11.1 mmol/L

For biochemical test of all measurements were done in fasting condition in the pathology department of the above-mentioned hospital by auto analyzer machine (Model: Dimension Xpand plus with HM, Country of origin: USA).

Data were analysed by statistical software, IBM SPSS version 19. Descriptive frequency was used for data presentation and analysis.

Results:

Table 1: Age group and sex distribution of the population (n=150)

A) Age group (years)	Frequency (n)	Percent (%)
>20-30	18	12
31-40	48	32
>40-50	72	48
51-60	12	8
Total	**150**	**100**
B)Sex	**Frequency (n)**	**Percent (%)**
Male	130	86.7
Female	20	13.3
Total	**150**	**100**

Among 150 participants, 84 (56%) were above 40 years to 60 years and 66(44%) were >20 years to 40 years' age group. Male were 87% and female were 13% as shown in Table 1A and 1B.

Table 2: Distribution of normal population in contrast to prediabetes & diabetes (n=150)

Category	Frequency (n)	Percent (%)
Normal	123	82
Prediabetes	15	10
Diabetes	12	8
Total	**150**	**100**

Table 2 shows, out of 150 participants 15 (10%) were pre-diabetic and 12 (8%) were diabetic; rest 82% was non diabetic.

Table 3: Gender wise distribution of diabetes and prediabetes (n=27)

Category	Male No. (%)	Female No. (%)	Total No. (%)
Prediabete	10 (66.7)	5 (33.3)	15 (100)
Diabetes	9 (75)	3 (25)	12 (100)

Table 3 shows among prediabetics, 66.7% are male and 33.3% are female, among diabetics, 75% are male and 25% are female.

Table 4: Distribution of risk factors of diabetes and prediabetes (n=150)

Risk Factor	Normal No.	Prediabetes No.	Diabetes No.	Prediabetes and Diabetes in risk group No. (%)	Total (%)
Smoking	25	5	3	8 (24%)	33 (22%)
Obesity	11	4	2	6 (35%)	17 (11%)
High calorie food	30	10	8	18 (38%)	48 (32%)
Sedentary lifestyle	58	12	10	22 (28%)	80 (53%)
HTN	20	4	2	6 (23%)	26 (17%)
Family history	24	6	3	9 (27%)	33 (22%)

Table 4 shows among the participants, 80 (53%) had sedentary life style, 48 (32%) use to take high calorie food, 33 (22%) had the habit of smoking and family history each, 26 (17%) had HTN and 17(11%) had obesity.

Discussion:

In comparison to the other groups, majority (56%) of the participants were in the age group of 40 years to 60 years as shown in Table 1A. We observed that 130 (86.7%) of the participants in our study were male and 20 (13.3%) were female (Table 1B). Our results are consistent with a recent study that indicated men of 40 years of age and older had the highest risk of diabetes mellitus.[11]

Ten percent of the participants in this study had prediabetes, and 8% had diabetes (Table 2). One research of Bangladeshi individuals found that the prevalence of diabetes and prediabetes was nearly identical.[12]

In our study, we observed that males were more likely to have diabetes and prediabetes. Table 3 shows that 75.0% of individuals with diabetes and 66.7% of prediabetic cases were male. Some subsequent studies revealed similar results.[11,12]

Furthermore, it was discovered that individuals who used to consume high-calorie foods had the greatest percentage of diabetes mellitus and prediabetes (38.0%) as shown in Table 4. A cross-sectional study conducted at a hospital revealed a favourable correlation between diabetes mellitus and higher calorie intake.[13] According to Table 4, there is a higher prevalence of diabetes mellitus and prediabetes among those who are obese (35%), smoker (24.0%), lead sedentary lives (28%) and have a positive family history (27%). Similar findings have been discovered in several earlier Asian population studies.[14] Physical inactivity decreases insulin sensitivity with progressive loss of beta-cells, leads to impaired glucose tolerance and eventually type 2 diabetes. Physical inactivity can cause obesity which in turn is a significant risk factor for type 2 diabetes.[15] Diabetes is one of the main diseases linked to obesity and high-calorie diets in most western countries. The Bangladeshi population's dietary habits have changed because of the increasing attention and popularity of western meals over time. As a result, it contributes to both prediabetes and diabetes.[16-17] In a study, smokers are 30-40% more likely to develop type 2 diabetes compared to non-smokers.[18] When an individual smokes, the level of nicotine increases in his/her body which leads to a reduction in muscle glucose intake, developing insulin resistance and leading to type 2 diabetes.[19] Compared to the nonhypertensive group in our study, the hypertension group exhibited a higher prevalence of prediabetes and diabetes mellitus (23.0%). Furthermore, an obese individual with hypertension is at higher risk compared to a non-obese. Hypertension is associated with the development of type 2 diabetes in both men and women. However, the association is ethnicity-dependent.[15]

Family history information can serve as a useful tool for prognosis or diagnosis and public health. Family history of diabetes reflects both genetic as well as environmental factors and can lead to better prediction of incidence type 2 diabetes than only genetic factors and environmental factors alone.[20]

To recommend potential interventions based on the risk factor analysis, the study also sought to identify the numerous risk factors for diabetes and prediabetes. We emphasize that people in this age group to keep their BMI within a normal range, cut back on high-fat food intake, improve their physical activity levels, give up smoking, and regularly check their blood pressure, fasting blood sugar and 02 hours after breakfast. Thus, individuals may be able to manage their prediabetes and diabetes more effectively.

Conclusion:

According to the study's findings, prediabetes and diabetes are prevalent among Bangladesh Army officials. Additionally, high frequency of diabetes and pre-diabetes was found among those with high calorie food intake, smoking, obesity, family history of diabetes, sedentary lifestyle, and hypertension. The study's findings on diabetes and pre-diabetes condition highlighted the necessity of comprehensive and holistic policy to manage this issue for employees. To ascertain the connection between pre-diabetic prevalence and diabetes, more investigation is required. Additionally, we advise Bangladeshi government workers to maintain a low-calorie diet, stop smoking, exercise frequently, and manage their high blood pressure. Periodic survey that include the demographic and lifestyle features of the citizens will give beneficial outcome. And that oiutcome can be used along with allied health professionationals to develop a nation - wide diabetes prevention plan.

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