Original Article

Assessment Of Cardiovascular Disease Risk with Type 2 Diabetes Mellitus At A Tertiary Care Hospital, Satkhira, Bangladesh

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ABSTRACT

Introduction: *Type 2 diabetes mellitus (T2DM) is increasing at pandemic rates, accompanied by a rapid increase in associated comorbidities such as cardiovascular disease (CVD). This problem is even more severe in South Asians, as the prevalence of T2DM and CVD is much higher in these populations, occurs at a younger age, and is associated with early onset and high mortality.* ***Study Objective:*** *The study objective was to determine the risk of cardiovascular disease in type 2 diabetes in a tertiary care hospital in Satkhira, Bangladesh.* ***Methods & Materials:*** *This observational cross-sectional study was conducted at the Faculty of Medicine and Hospital, Satkhira Medical College, Bangladesh. The study enrolled and analyzed 220 patients from March 2022 to February 2023.* ***Result:*** *A total 220 patients were enrolled and analyzed. Most of the patients were aged more than 60 years which is 45.91%, 62(28.18%) patients were from the age range 51-60 years, 44(20.00%) patients were from the age range 41-50 years, and 13(5.91%) patients were from the age range 31-40 years The mean and standard deviation of the biochemical parameters. In this study, we assess the study population's CVD risk factors. Following the risk reduction intervention,*

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antihypertensive medications were majorly used in this study (74.09%); 99 (45.00%) patients used ACE inhibitors and 76(34.55%) patients used AT receptor blockage. ***Conclusion:*** Bangladeshi patients with diabetes showed a significant burden of CVD risk at a relatively younger age. Strategies for reducing tobacco use and improving BP control in people with diabetes are needed to lower future CVD risks.

Keywords: *Cardiovascular diseases, Diabetes, Hypertension.*

INTRODUCTION

Diabetes is a leading cause of global disease burden, mortality, morbidity, and associated poor health outcomes. Over the past three decades, the number of people with diabetes worldwide has increased fourfold[1]. According to the International Diabetes Federation, an estimated 463 million adults worldwide had diabetes in 2019. By 2045, the number of adults with diabetes is expected to increase to 700 million[2]. Low- and middle-income countries (LMICs) are undergoing economic and epidemiological transitions. Several factors, such as population aging, are expected to disproportionately affect diabetes[1,3]. Asia is the epicenter of the global diabetes pandemic[1]. Like many other Asian countries, the prevalence of diabetes has been increasing in Bangladesh in recent decades[4,5]. Diabetes therefore poses a significant challenge to the Bangladeshi health system[6]. South Asians originate from the Indian subcontinent (India, Pakistan, Bangladesh, Sri Lanka, and Nepal) and make up 20% of the world's population. After World War II, there has been a large migration of people from these countries to many countries in Europe and North America. In the UK, they are the largest ethnic minority group, making up more than 4% of the total UK population[7]. Cardiovascular diseases (CVDs), including coronary heart disease (CHD) and stroke, are in a pandemic state with significant mortality and morbidity and resulting economic impacts[8,9]. However, their distribution varies greatly among ethnic groups. South Asians, who live in the subcontinent but also in the diaspora, are at highest risk of developing these diseases. According to some projections, by 2020, South Asians will bear 40% of the global CVD burden[10-13]. Moreover, CVD and type 2 diabetes mellitus (T2DM) develop earlier and the associated complications are more common in South Asians than in European Caucasians[12-19]. The reasons for this increased risk of cardiovascular disease in South Asians are not entirely clear; however, it is believed to be primarily related to the high prevalence of insulin resistance and its associated atherogenic risk factors in this population[12,20]. Additionally, factors associated with urban lifestyles and migration, such as a high-calorie diet and lack of physical activity, may further exacerbate underlying insulin resistance and cardiovascular risk. This issue is further exacerbated by the lack of evidence-based knowledge and guidelines for primary and secondary prevention of cardiovascular disease specific to this ethnic community[21]. The aim of this study was to examine the risk of cardiovascular disease in type 2 diabetes in a tertiary care hospital in Satkhira, Bangladesh.

METHODS & MATERIALS

This cross-sectional study was conducted at Satkhira Medical College and Hospital, Bangladesh. The study involved 220 patients and was analyzed from March 2022 to February 2023. Study participants were type 2 diabetes patients (ADA criteria). Given a 50% prevalence of CVD in type 2 diabetes patients, the significance level would be 95% and absolute precision would be 50%. Study participants were interviewed and screened using a structured questionnaire to determine the presence of CVD risk factors, the extent to which these factors had already been identified, and the proportion of individuals with risk factors who received preventive therapy.

Information about the diet was obtained from a 24-h food recall. Blood pressure was measured using a mercury sphygmomanometer a minimum of two times in every participant sitting, and the mean of the readings was used for analysis. After asking the participants to fast overnight, the lipid profile and fasting blood sugar were determined by analyzing a venous blood sample. Weight (kg), height (m), and waist and hip circumference (cm) were measured using standardized equipment and procedures. Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on the weighing sc, feet apart, and weight equally distributed on both legs. Height was measured (to the nearest 0.5 cm) with the subject standing erect against a vertical scale so that the top of the external auditory meatus is at level with the inferior margin of the bony orbit. BMI was calculated as weight divided by height (kg/m2).\

Inclusion criteria:

- Patients who had cardiovascular disease with type-2 diabetes mellitus.

Exclusion criteria:

- Patients with apparent CVD, such as AMI, stroke or angina, peripheral vascular disease, and pregnant women with gestational diabetes, were excluded from the study.

All data were presented in a suitable table or graph according to their affinity. Each table and the graph were described to understand them clearly. All statistical analysis was performed using the statistical package for the social science (SPSS) program and Windows. Continuous parameters were expressed as mean±SD and categorical parameters as frequency and percentage. Student's t-test made comparisons between groups (continuous parameters). Categorical parameters compared by Chi-Square test. The significance of the results, as determined by a 95.0% confidence interval and a value of $P<0.05$, was considered statistically significant.

RESULTS

This is a cross-sectional study; 220 patients were enrolled and analyzed. Most of the patients were aged more than 60 years which is 45.91%, 62(28.18%) patients were from the age range 51-60 years, 44(20.00%) patients were from the age range 41-50 years, and 13(5.91%) patients were from the age range 31-40 years **[Table I]**.

Table I: Age distribution of the study population (*n*=220).

Age group (years)	Frequency	%
31-40	13	5.91
41-50	44	20.00
51-60	62	28.18
60>	101	45.91

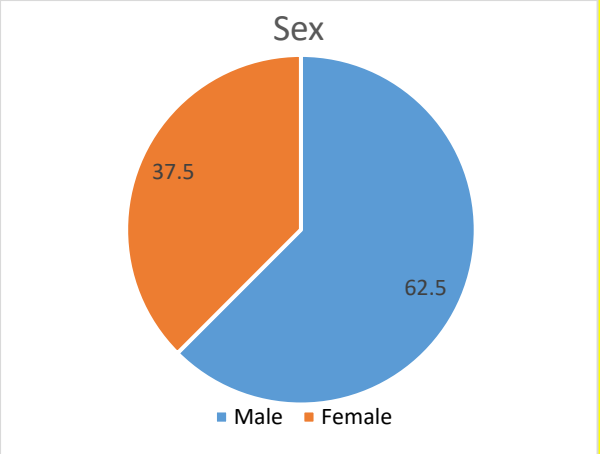

Figure I: Sex distribution of the study population (*n*=220).

Figure 1 shows the sex distribution of the study population, where males were 62.5%, and females were 37.5%.

Table II: Demographical characteristics of the study population (*n*=220).

Variables	Frequency	%
Residence		
Rural	154	70.00
Urban	66	30.00
Body Mass Index (BMI)		
Underweight	44	20.00
Normal	115	52.27
Overweight (25-29.9)	50	22.73
Obesity (>=30)	11	5.00
Current tobacco/alcohol use		
Tobacco	147	66.82
Alcohol	73	33.18
Green leafy vegetables or/and fruits		
< 3 servings per week	169	76.82
3 to 6 servings per week	46	20.91
> 6 servings per week	5	2.27

Most 70% of patients were from rural areas, and 30% were from urban areas. Most of the study population had normal BMI (52.27%). This study found that almost all patients were current tobacco or alcohol users **[Table II]**.

Table III: Diabetes history and blood pressure among study participants.

Variables	Frequency	%
Duration of DM		
Recently diagnosed (> 1 month)	28	12.73
1 month to 5 years	117	53.18
5 years to 10 years	34	15.45
More than 10 years	41	18.64
Current antidiabetes medication		
Biguinades	78	35.45
Insulin	16	7.27
Sulphonylurea	12	5.45
Biguinades + Sulphonylurea	57	25.91
Biguinades + Insulin	23	10.45
Biguinades + Insulin + Sulphonylurea	13	5.91
Biguinades + Acarbose inhibitor	5	2.27
Other combinations of the above-mentioned drugs	16	7.27
Blood pressure (mmHg) JNC 8 criteria		
Normal	60	27.27
Prehypertension	101	45.91

Hypertension, stage 1	48	21.82
Hypertension, stage 2	11	5.00

According to the duration of diabetes milletus, 117(53.18%) patients had a history of 1 month to 5 years, 41(18.64%) patients had a history of >10 years, and 28(12.73%) patients had recently been diagnosed. All participants were using antidiabetes medicine; Biguinades mostly used a medicine which was almost 36%, and only 5(2.27%) patients were taking Biguinades with Acarbose inhibitor. There was a large percentage of the study population had pre-hypertension (45.91%), and 60(27.27%) patients had normal blood pressure **[Table III]**.

Table IV: Mean and standard deviation of biochemical parameters.

Biochemical parameters	Mean±SD
RBS (mg/dL)	279.16±126.70
FBS (mg/dL)	160.66±76.38
PMBS (mg/dL)	243.73±96.32
T-Cholesterol (mg/dL)	174.55±48.63
HDL, (mg/dL)	38.88±4.94
LDL, (mg/dL)	102.15±35.04
TG, (mg/dL)	163.65±87.96

Table V: CVD risk assessment and risk reduction interventions by participants in recent six months.

Characteristics	No	%
Assessment of CVD risk factors		
Assessed for tobacco use	70	31.82
Assessed for Alcohol use	41	18.64
Assessed for nutrition/dietary intake	39	17.73
Assessed for physical activity	38	17.27
Estimated BMI	32	14.55
Measured Blood pressure	183	83.18
Blood sugar (FBS+PMBS) assessment	87	39.55
Lipid profile	48	21.82
Risk reduction interventions		
Asprin	22	10.00
Statins	12	5.45
Clopidogrel	8	3.64
Antihypertensive medications	163	74.09
ACE inhibitor	99	45.00
AT receptor blockage	76	34.55
Calcium channel blocker	23	10.45
Beta-blocker	22	10.00
Advised for low salt diet and blood pressure	38	17.27
Advised for quitting tobacco and cut down on alcohol	51	23.18
Advised for physical activity and weight reduction	64	29.09
Counselled for dietary modification and diet plan prepared	19	8.64

Table IV shows the mean and standard deviation of the biochemical parameters. In this study, we assess the study population's CVD risk factors. Following the risk reduction intervention, antihypertensive medications were majorly used in this study (74.09%); 99 (45.00%) patients used ACE inhibitors and 76(34.55%) patients used AT receptor blockage **[Table V]**.

DISCUSSION

This study showed a high prevalence of cardiovascular risk factors in patients with type 2 diabetes. Comprehensive assessment of CVD risk plays an important role in preventing CVD complications in patients with type 2 diabetes, but has not been performed in most patients. The most common risk factors were a diet high in carbohydrates and fat and low in fruits and vegetables, physical inactivity, smoking, hypertension, poor glycemic control, and low HDL. Nearly 25% of participants had one or more CVD risk factors. Epidemiological studies have reported that physical inactivity increases the risk of cardiovascular disease[22,23]. In the present study, 17.27% of participants were physically inactive. Similar observations were made in a study in India[24]. Sedentary lifestyle was more prevalent among women than men, which may be due to several social and cultural factors in rural India[25]. 115 (52.27%) participants had normal BMI or were underweight. Abdominal obesity as a risk factor was defined as female participants with waist circumference >80 cm and male participants with waist circumference >90 cm. Only 5% of participants in our study were abdominally obese, most of whom were women. The prevalence of a sedentary lifestyle, an aging population, an unhealthy diet, and low awareness of salt restriction and smoking may have increased the risk of hypertension in the study participants. The study also observed low HDL cholesterol as a risk factor, which was more common in women than in men. Possible causes of low HDL cholesterol include a sedentary lifestyle, obesity, and ethnicity, as shown in previous studies on Asian immigrants[26]. Fasting and postprandial blood glucose levels were measured to assess glycemic control[27]. Approximately two-thirds of the subjects had FBS values ≥ 100 and PMBS values ≥ 140. Patients with type 2 diabetes are at high risk for cardiovascular disease, and there is a linear relationship between blood glucose and cardiovascular disease. Current guidelines for the treatment of cardiovascular disease in diabetes are based on the premise that most diabetic patients are at high risk for future cardiovascular events. Even in the absence of cardiovascular disease, the ADA and AHA have identified diabetes as a high-risk state for complications in patients with type 2 diabetes[28]. It is widely accepted that the absolute risk of cardiovascular disease varies among diabetic patients, and accurate risk assessment depends on patient characteristics[29]. Therefore, assessing risk factors for cardiovascular disease in diabetic patients is of paramount importance for the primary and secondary prevention of future cardiovascular disease. Furthermore, these diabetic patients should be educated about their risk factor status and measures to reduce the risk of cardiovascular disease.The study retrieved the CVD risk assessment of the study participants in the past 6 months. The study revealed that except for blood sugar and blood pressure assessment, only one-third of participants were assessed for other risk factors such as tobacco use, harmful use of alcohol, physical activity, BMI, and lipid profile. Almost all participants were counselled to cut down on sweets and undertake regular follow-ups for blood pressure assessment, but only one-third received advice to reduce salt intake. Only around one-fifth of the participants mentioned that they

received advice regarding calories and lipid restriction in diet, cutting down harmful use of alcohol, and physical activity. Primary care practice in rural India faces multiple challenges in delivering diabetes diagnosis and care services due to the lack of trained diabetes care providers[30]. Despite the increased risk of CVD in persons with T2DM and the benefits of management of this risk factor, our study revealed that only a few received comprehensive risk assessment and treatment for these risk factors. However, we have not assessed the physician's or care providers' views on this issue. This study showed a high prevalence of cardiovascular risk factors in people with T2DM, a comprehensive assessment of the CVD risk was done in very few patients despite its role in preventing CVD complications in persons with T2DM. The most common risk factors were a diet high in carbohydrates and fats, low in fruit and vegetable, physical inactivity, tobacco consumption, hypertension, poor glycemic control, and low HDL.

Conclusion and Recommendations:

The Bangladeshi population has a high CVD burden, especially people with diabetes. Our study indicated a high risk of CVD in the Bangladeshi population at a younger age and in those who have higher education and income. Randomized controlled trials are needed to further look into the risk factors of CVD among the Bangladeshi population both in urban and rural settings. Also, new and improved strategies are required to manage and prevent diabetes as well as CVD.

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