Nutritional Status and Prevalence of Hypertension among Type 2 Diabetes Patients from Selected Hospitals in Dhaka City

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Abstract

Over 150 million people worldwide suffer from type 2 diabetes. Numerous studies show an increased prevalence of hypertension among diabetic patient. About 32% to 82% type 2 diabetic patients suffer from hypertension compared to non diabetic patients regardless of age and sex. Synergistic existence of type 2 diabetes and hypertension aggravates the macrovascular complications in the individuals. A cross-sectional study was conducted to estimate the prevalence of hypertension among diabetes patients of Dhaka Medical College (DMC) and Hospital and Bangabandhu Sheikh Mujib Medical College University (BSMMU). Subjects recruited were of age ≥40 years with type 2 diabetic patients. Identity, family history and duration of hypertension, smoking status, physical activity level and anthropometry were recorded. Blood pressure and fasting blood glucose level was collected from the outdoor doctor. The prevalence of hypertension was found to be 19.56% in male and 18.52% in female, it was 33.33% in overweight. The mean systolic and diastolic pressures were 134.35±5.75 mmHg and 94.57±7.32 mmHg respectively. High prevalence was found in current smokers (41.18%), primary education (63.16%), no physical activity (33.33%) and in 5 to 10 years of duration of diabetes (35.60%). Systolic blood pressure was found to be positively associated with smoking habit and physical activity, while duration of diabetes and smoking were positively associated with diastolic blood pressure.

Key words: Type 2 diabetes, Hypertension, blood pressure, nutritional status

Introduction

Almost 20-60% of diabetic patients suffer from hypertension[1]. Hypertension can be defined as a blood pressure >140/90 mmHg. The condition also depends on age, ethnicity and obesity. Insulin resistance in type 2 diabetic patients can also induce hypertension along with obesity and dyslipidemia. The onset of diabetic neuropathy may be influenced by hypertension in type 2 diabetic patients[2]. In developing countries, the mortality risk of hypertension with diabetes increases by 7.2 times[3]. In recent years, adequate data from well-designed randomized clinical trials have demonstrated the effectiveness of insistent treatment of hypertension in reducing diabetes complications. The structural alterations in the microcirculation of the heart, kidney, brain and eye increase the risk factors of cardiovascular mortality and morbidity in diabetic patients. Oxidative stress, inflammation, or endothelial dysfunction also plays an important role in this alteration[4]. Hardening of the arteries in the feet and legs, peripheral vascular diseases, stroke, and other coronary artery diseases are more prevalent among diabetic patients diagnosed with hypertension. Elevated blood pressure also causes heart failure in this case[5]. Diabetes increases the risk of coronary events twofold in men and fourfold in women. Part of this increase is due to the frequency of associated cardiovascular risk factors such as hypertension, dyslipidemia, and dotting abnormalities. In observational studies, people with diabetes and hypertension have approximately twice the risk of cardiovascular disease as non diabetics with hypertension.

Diabetic nephropathy and retinopathy frequently results in diabetic patients with hypertension. Epidemiological studies have found that the risk of diabetes complications significantly decrease by 12% with each decrease of 10 mmHg systolic blood pressure. It also significantly reduced the diabetic death by 15%, macrovascular complications by 13% and myocardial infarction by 1%[6]. The prevalence of HTN may vary in

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different regions, for example, it is 25-50% in Europe and 20% in USA alone. In Bangladesh Non-communicable Disease (NCD) Risk Factor Survey 2010 observed 14.8% population was hypertensive excluding medication but that number changed when previous history of ant-hypertensive drugs was considered. The percentage was increased by 4% and those patients are more at risk of dire outcomes[1].

Hypertension in diabetic individuals increases the healthcare cost and also complicates treatment strategies.[7] In order to estimate the global burden of hypertension around the world in 2025, a pooled data analysis was done in 2010. By 2025, the prevalence of adult hypertensive patients predicted to be increased by 60% and 29.2% would have adverse health conditions, among which 26.6% will be men and women will be 26.1%. In developed countries the total number of hypertensive adults was 982 million. In developing countries, it was found 639 million in 2010[1]. Systolic blood pressure >140 mmHg, or diastolic >90 mmHg were taking under consideration for hypertension[8]. In high-income countries, the prevalence of hypertension decreased by 2.6%, but at the same time in low and middle income countries it was increased by 7.7% between the year 2000 and 2010. Approximately, 1.39 billion people have hypertension around the world, of which 1.04 billion are in low- middle income countries. During this time period, there have not enough substantial increase in awareness and treatment in low-middle income countries. The control was decreased in low-middle income countries compared to the high-income countries[9]. It is crucial to identify the associated factors of hypertension in diabetic individuals. There is a lack of data and sample evidence on the prevalence of hypertension among diabetic patients in Bangladesh. Therefore, the objective of this study was to determine the prevalence and associated risk factors of hypertension in type 2 diabetic patients.

Methods and Materials

The study was a cross-sectional study, which purposively selected 200 type 2 diabetes patients of above 40 years; 100 patients from Dhaka Medical College (DMC) and 100 from BSMMU in Dhaka city. It was conducted during the period of August and December 2018. Weight and height of the subjects were recorded to the nearest 0.1 kg and 0.1 cm respectively, and then the Body Mass Index (BMI) was calculated. Blood pressure (BP) was measured by physician. Fasting finger stick capillary blood was used to measure blood glucose level by the technician usng glucose oxidase impregnated strips (Accu check).

SPSS 20 software was used to analyse the data. Chi square test was done to compare means between two independent variables. Correlation was performed to measure the association within different variables. P-value <0.05 was considered significant.

Results

Table 1 shows the mean age, height, BMI, systolic BP, diastolic BP and FBG. About 16.6% patients in DMC and 24.27% in BSMMU were hypertensive with type 2 diabetes (table 2).

Table1: Clinical and anthropometric parameters of the study subjects

Variables	Range	Mean ±SD
Age (yrs)	40-75	58±11
Height (cm)	137-177	157±9
Weight (kg)	31-90.50	61±11
BMI	14.95-30.7	23±4
Systolic BP (mmHg)	80-200	135±6
Diastolic BP (mmHg)	66-121	95±8
FBG (mmol/L)	3.50-16.40	7.23±1.91

Table 2: Distribution of subjects with hypertension by hospital*

Hospital	Normal	Hyprtensive	Total
DMC	81(83.50%)	16(16.5%)	97 (100%)
BSMMU	78(75.72%)	25(24.27%)	103(100%)
Total	159(79.50%)	41(20.50%)	200(100%)

*HTN: Hypertension DMC: Dhaka Medical College BSMMU: Bangabandhu Sheikh Mujib Medical University

Table 3 shows that 23.19% hypertensive patients had income level between 50,000 to 99,999 taka. Hypertension were more prevalent in patients aged over 60 years. Patients with higher education also showed higher prevalence of hypertension. Those who do not do physical activity and BMI >23 also had higher prevalence of hypertension than others. Former smokers and patients with duration of diabetes above10 years had high prevalence of hypertension.

Table 3: Distribution of hypertension by variables

Variables		Hypertension		Total
		Absent (n (%)	Present (n (%)	
Family member	Father	83(83)	17(17)	100
	Mother	50(75.75)	16(24.25)	66
	Brother	19(83.50)	4(17.40)	23
	Sister	9(1.82)	2(18.18)	11
Family income	<49,999	46(88.46)	6(11.58)	52
	50,000 -99,999	53(76.81)	16(23.19)	69
	1,00,000 -1,99,999	37(78.72)	10(21.28)	47
	>2,00,000	25(78.12)	7(21.88)	32
Age	<50 yrs	87(89.70)	10(10.36)	97
	50 -60 yrs	59(81.94)	13(18.06)	72
	>60 yrs	15(48.38)	16(52.62)	31
Educational level	Uneducated	2(40)	3(60)	5
	Primary education	7(36.84)	12(63.16)	19
	Secondary education	21(18.42)	93(81.58)	114
	Higher education	9(14.51)	53(85.49)	62
BMI	<23	128(79.50	33(20.50)	161
	>23	26(66.67)	13(33.33)	39
PAL	>3 times/week	85(90.43)	9(9.57)	94
	1-2 times/week	42(76.36)	13(23.64)	55
	No physical activity	34(66.67)	17(33.33)	51
Duration of diabetes	<5 yrs	112(94.92)	6(5.08)	118
	5-10 yrs	38(64.40)	21(35.60)	59
	>10 yrs	11(47.82)	12(52.18)	23
Smoking status	Current smoker	10(58.82)	7(41.18)	17
	Former smoker	45(66.18)	23(33.82)	68
	Non -smoker	106(92.17)	9(7.82)	115

*HTN: Hypertension, N: Number BMI: Body Mass Index PAL: Physical Activity Level

Table 4 shows that smoking habit, which was found to be positively associated with systolic BP, diastolic BP and duration of diabetes. Systolic BP was shown to be also positively associated with physical activity, and the diastolic BP was positively associated with diabetes and duration of diabetes.

Table 4: Correlation* between hypertension and selected variables

Variable	Correlation				
	Systolic BP	Diastolic BP	Duration of T2D	Smoking	PAL
Systolic BP	1	0.25	0.45	0.27**	0.72
		0.785	0.628	0.038	0.026
Diastolic BP	0.025	1	0.408**	0.306**	0.039
	0.785		0.000	0.001	0.672
Duration of diabetes	0.045	0.408**	1	0.699**	0.091
	0.628	0.000		0.000	0.323
Smoking habit	0.27**	0.306**	0.699**	1	0.058
	0.038	0.001	0.001		0.528
Physical activity level (PAL)	0.72**	0.039	0.091	0.058	1
	0.026	0.672	0.323	0.528	

*Pearson correlation (2- tailed)

About 75.77% diabetic patients had normal weight and 24.23% patients were overweight (figure 1); 19.56% of male and 18.52% female patients were hypertensive and in combined gender 19% were hypertensive (figure 2). Around 33.33% hypertensive patients were overweight, and 66.67% were normal (figure 3).

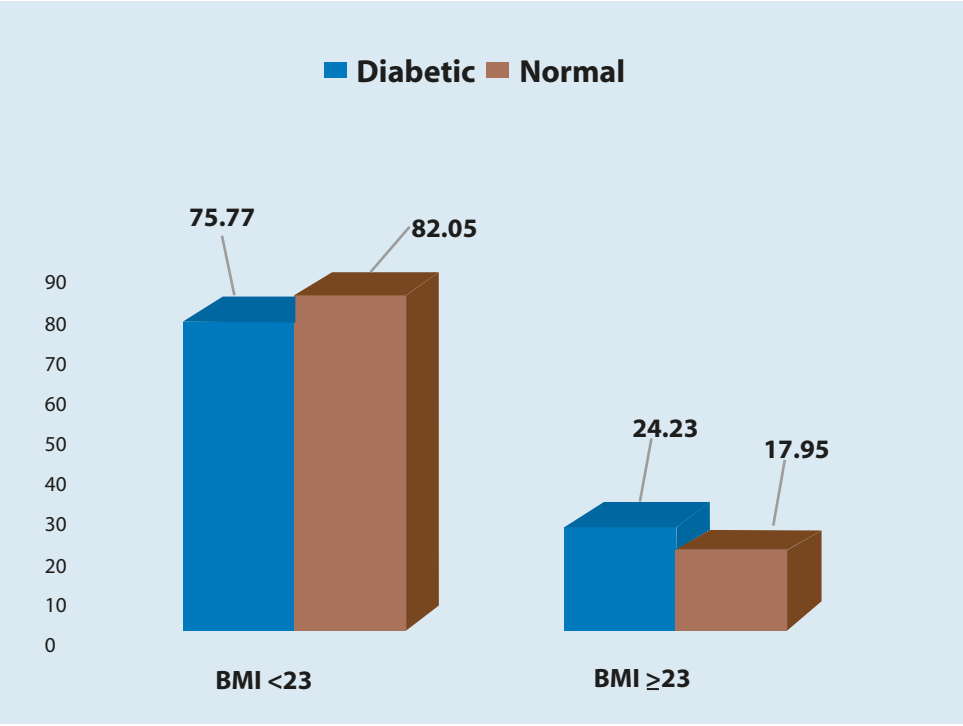

Figure 1: Distribution of diabetic patients according to BMI

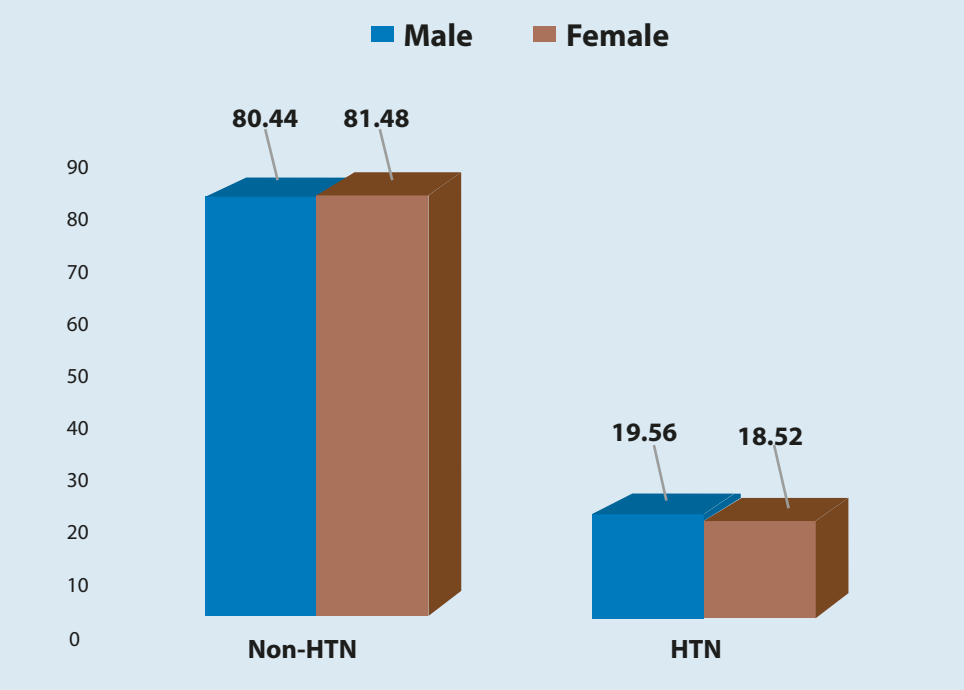

Figure 2: Distribution of HTN among gender

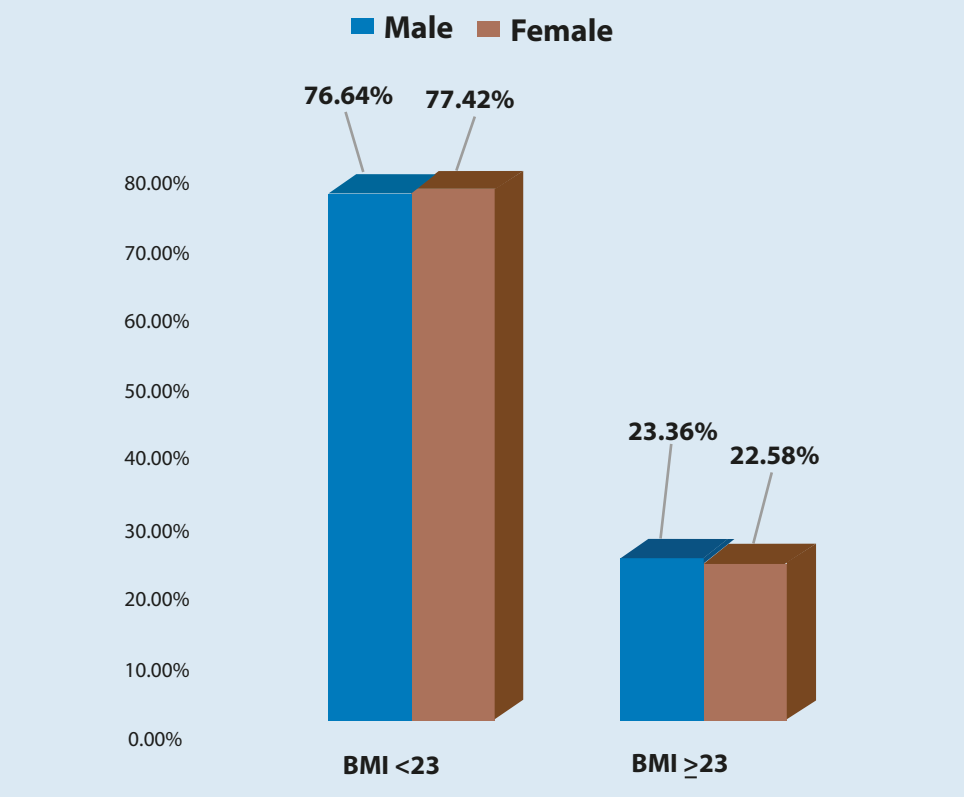

Figure 3: Distribution of hypertension according to BMI.

Discussion

In the present study, hypertension was found to be prevalent among type 2 diabetics in Bangladesh patients. Hypertension was found positively associated with age, BMI and duration of diabetes. The prevalence of hypertensive diabetic patients was 20.2% in 2010 study conducted by Bangladesh. The prevalence of hypertension reported in this study was relatively higher than expected. The most diabetic patients over 50 years old and over had hypertension which is consistent with a reported in conducted in Ethiopian in 2019[10]. Association of hypertension with type 2 diabetics was also reported in some studies elsewhere[11-13].

This study also indicated that hypertension was more likely prevalent in obese and overweight diabetics compared to those with normal BMI, Leggio et al and other also reported similar finding[14-17]. Moreover, cardiovascular complications and other morbidities were also highly associated with the coexistence of hypertension, diabetes and obesity[18,19], which were implicated to the oresent outcome. Duration of the diabetic was reported to affect severity of macro- and micro-vascular complications, which later develop hypertension[20-22]. The present finding showed an association between hypertension and smoking, which is in agreement with that of Li et al finding[23]. The frequency of unknown hypertension in this group of diabetic population was also found high (19.0%). Prevalence of uncontrolled hypertension is also related to poor education, which is prevalent in low income level[24,25]. Findings from several other studies also support this finding[26,27]. Physical activity and systolic blood were observed to have positive correlation [28-30]. It has also been reported 44.8% hypertensive patients in Bangladesh[31].

Conclusion

Type 2 diabetes is associated with hypertension, which is found to be coexisted. Obesity, overweight and smoking are also correlated to both diabetic and hypertension. Adequate health education along with effective therapeutic approach may contribute to the management of diabetics.

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