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Original Research Article

Prevalence of Hypertension in Type-2 Diabetes Mellitus: An Observational Study

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Abstract

Background: Now a day, type-2 diabetes mellitus and hypertension are considered to be the first and second leading causes of all deaths and morbidities respectively. Increasing age, trend of obesity and worsening renal function increasing the prevalence of hypertension in people with type-2 diabetes mellitus. We have very few research-based information regarding these issues. ***Aim of the study:*** The aim of this study was to assess the prevalence of hypertension in patients with type-2 diabetes mellitus. ***Methods:*** This was a cross-sectional study which was conducted in the Department of Medicine, Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh during the period from January 202018 to December 2019. In total 142 patients with type-2 diabetes mellitus attended to the mentioned hospital with proper documents were finalized as the study people. Besides data regarding type 2 diabetes mellitus, data of blood pressure and macro-vascular as well as micro-vascular complications were collected. A predesigned questioner was applied to collect patient data. All data were processed, analyzed and disseminated by MS Office and SPSS version 20. ***Result:*** In this study, among total participants in analyzing the prevalence of hypertension we observed out of 142 patients with T2DM only 45 were with hypertension which was 32%. In analyzing the stages of hypertension among total participants we found, 23.39% were with normal and 35.92% pre-hypertension (In total 68.31%). On the other hand, among 32% hypertensive participants, 19.72% (n=28) were with stage I HTN whereas 11.97% (n=17) were with stage II HTN. ***Conclusion:*** In this study, the prevalence of hypertension among type 2 diabetes patients was found some higher than that in normal. But if we consider the number of pre-hypertensive patients as a potential concern, then it is alarming. The findings of this study may be helpful in the treatment arena of diabetes and in similar further studies.

Keywords: Endocrinology, Prevalence, Hypertension, Type-2 diabetes mellitus, T2DM.

INTRODUCTION

Worldwide type 2 diabetes mellitus and hypertension considered as two major medical and public health issues. T2DM is a very common and serious disease with chronic complications and constitutes a substantial burden for both patient and total health care system of a country. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030 [1]. Type 2 DM account about 90–95% of all cases of DM, and it increases the risk of both macrovascular diseases (CAD, cerebrovascular disease or "stroke," and peripheral vascular disease) and microvascular diseases (retinopathy, nephropathy, and neuropathy) [2]. Cardiovascular disease is the major cause of morbidity and mortality among diabetic patients, accounting for 75% of hospitalizations and 70-80% of deaths [3]. In fact, coronary heart disease (CHD) is the leading cause of death among diabetic patients, who have a two to fourfold higher risk of CHD mortality and incidence of nonfatal CHD events compared with patients without diabetes [4]. Diabetes mellitus and hypertension are inter-related diseases that strongly predispose an individual to atherosclerotic cardiovascular disease [5]. Hypertension is about twice as frequent in individuals with diabetes as in those without [6]. The prevalence of coexisting hypertension and diabetes appears to be increasing in industrialized nations because populations are aging and both hypertension and non-insulin dependent diabetes mellitus incidence increases with age.[6] Indeed, an estimated 35-75% of diabetic cardiovascular and renal complications can be attributed to hypertension. Hypertension also contributes to diabetic retinopathy, which is the leading cause of newly diagnosed blindness. For all these reasons, hypertension and diabetes should be recognized and treated early and aggressively. Chen et al., [7] stated

that hypertension to account for 30% of deaths in diabetes patients and for 25% of cardiovascular events in diabetes patients. There is so many evidence for an increased prevalence of hypertension in diabetic persons [8]. The prevalence rate of hypertension among type 2 diabetics is higher than that of age and sex-matched patients without diabetes, ranging between 32% and 82% [9]. In generally, tight HTN control seems to be more effective than glycemic control in reducing microvascular events mainly kidney disease. UK Prospective Diabetes Study showed that blood pressure control helps to avoid cardiovascular complications in patients with type 2 diabetes each 10 mmHg decrease in mean systolic blood pressure was associated with 12% reduction in the risk for any complication related to diabetes, 15% reduction in deaths related to diabetes, 11% reduction in myocardial infarction, and 13% reduction in microvascular complications [10]. All steps of this study were performed to fulfill the main objective of this study.

OBJECTIVES

General Objective

- To assess the prevalence of hypertension in patients with type-2 diabetes mellitus.

Specific Objective

- To collect the demographic information of the participants.
- To collect the clinical information of the participants.

METHODOLOGY & MATERIALS

This was a cross-sectional study which was conducted in the Department of Medicine, Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh during the period from January 202018 to December 2019. In total 142 patients with type-2 diabetes mellitus attended to the mentioned hospital with proper documents were finalized as the study people. Besides data regarding type 2 diabetes mellitus, data of blood pressure and macro-vascular as well as micro-vascular complications were collected. A predesigned questioner was applied to collect patient data. The patients were included in the study according to inclusion criteria. Samples were drawn randomly; there was no cut-off age or body mass index (BMI). The duration of the study was 24 months and for an individual patient, duration of the study was 1-3 visits. All the data were recorded during their routine visit to the outpatient department. Detailed history of all the patients regarding the duration of diabetes, mode of diagnosis was recorded. Detailed history regarding personal habits like smoking, alcoholism, tobacco-chewing was noted. Information about family history of diabetes was recorded also. General and systemic examination were done for each study subject. Physical examination was undertaken after the interview was over. It included height, weight, and blood pressure. For recording blood pressure, students were individually called in a room and were allowed to be seated quietly for 5-10 minutes to alley anxiety and restlessness. Blood pressure (BP) was recorded in sitting position in right arm. Systolic blood pressure (SBP) was determined by the onset of the "tapping" Korotkoff sounds (K1) and fifth Korotkoff sound (K5), or the disappearance of Korotkoff sounds, was recorded as diastolic blood pressure (DBP). Hypertension was defined as average of two readings recorded 3 minutes apart on two separate occasions that are greater than or equal to SBP 140 and/or DBP 90 mm of Hg. All data were processed, analyzed and disseminated by MS Office and SPSS version 20.

RESULT

In nature, this was a cross-sectional study which was conducted in the Department of Medicine, Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh during the period from January 202018 to December 2019. In total 142 patients with type-2 diabetes mellitus attended to the mentioned hospital with proper documents were finalized as the study people. In this study, among total 142 participants 55.63% (n=79) were male whereas 44.37% (n=63) were female. So male participants were dominating in number and the male-female ratio 1.25:1. In analyzing the ages of the participants we observed, the highest number of participants were from 41-50 years' age group which was 35.21%. Besides this 10.56%, 26.06% and 28.17% participants were from ≤30, 31-40 and >50 years' age groups respectively. According to the BMI (Body mass index) status of all the participants we observed, 7.75%, 35.21%, 29.58% and the rest 27.46% participants were with underweight (BMI<18), normal weight (BMI=18.1-24.9), overweight (BMI=25-29.9) and obesity (BMI ≥ 30) respectively. In analyzing the duration of type 2 diabetes among participant we observed 45.77%, 25.35%, 18.31% and 10.56% participants suffered from T2DM for 1-5, 6-10, 11-15 and >15 years respectively. Finally, among total participants in analyzing the prevalence of hypertension we observed out of 142 patients with T2DM only 45 were with hypertension which was 32%. On the other hand, in analyzing the stages of hypertension among total participants we found, 23.39% and 35.92% participants were with normal and pre-hypertension (In total 68.31%) respectively. On the other hand, among 32% hypertensive participants, 19.72% (n=28) were with stage I HTN whereas 11.97% (n=17) were with stage II HTN.

Table-1: Demographic status of participants (n=142)

Gender distribution		
Gender	n	%
Male	79	55.63
Female	63	44.37
Age distribution in year		
Age	n	%

Gender distribution		
≤30	15	10.56
31-40	37	26.06
41-50	50	35.21
>50	40	28.17
BMI distribution		
BMI	n	%
<18	11	7.75
18.1-24.9	50	35.21
25-29.9	42	29.58
≥30	39	27.46

Table-2: Duration of T2DM among participants (n=142)

Duration	n	%
1-5 Years	65	45.77
6-10 Years	36	25.35
11-15 Years	26	18.31
>15 Years	15	10.56

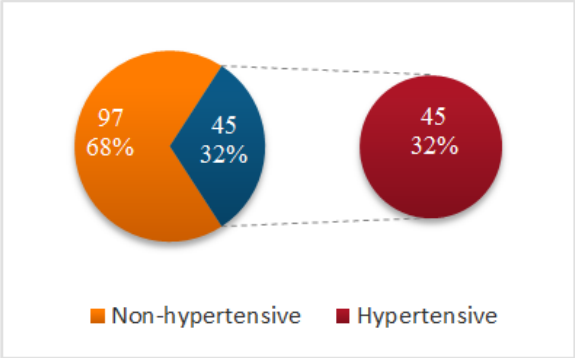

Fig-1: Prevalence of hypertension among participants (n=142)

Table-3: Status of hypertension among total participants (n=142)

HTN Status	n	%
Normal	46	32.39
Pre HTN	51	35.92
Stage I HTN	28	19.72
Stage II HTN	17	11.97

DISCUSSION

The aim of this study was to assess the prevalence of hypertension in patients with type-2 diabetes mellitus. In our study, prevalence of hypertension was noted in 45 (32%) patients. Priya et al., [11] observed hypertension in 42.7% of the patients. In a study by Ramachandran et al., [12] 38% study subjects were hypertensive. Essential hypertension accounts for the majority of hypertension in individuals with diabetes, particularly those with Type-2 diabetes, who constitute more than 90% of people with a dual diagnosis of diabetes and hypertension.[5] Recent observations suggest that, impaired cellular response to insulin predisposes to increased vascular smooth muscle tone. Recently reported studies from laboratory demonstrate that insulin in physiological doses attenuates the vascular contractile response to phenylephrine, serotonin, and potassium chloride. Thus, insulin appears to normally modulate (attenuate) VSM contractile responses to vasoactive factors, and insulin resistance should accordingly be associated with enhanced vascular reactivity [13]. The overabundance of oxidants is mechanistically connected with the multifactorial etiology of insulin resistance, primarily in skeletal muscle tissue and the subsequent development of Type-2 diabetes. Strategies to prevent and ameliorate oxidative stress remain important in the overall treatment of insulin resistance and Type-2 diabetes [14]. Hypertension often antedates and likely contributes to the development of nephropathy in many diabetic individuals [15]. Diabetic nephropathy, which occurs after 15 years of diabetes in one-third of people with insulin dependent diabetes mellitus (Type-1 diabetes) and 20% of those with NIDDM, is an important contributing factor to the development of hypertension in the diabetic individual [5]. The high BP associated with diabetic nephropathy is usually characterized by sodium and fluid retention and increased peripheral vascular resistance [6]. Isolated systolic hypertension is considerably more common in diabetics, and supine hypertension with orthostatic hypotension is not uncommon in diabetic individuals with autonomic neuropathy.[5] Although hypertension and diabetes mellitus are both independent risk factors for ischemic heart disease, insulin resistance, and hyperinsulinemia associated with hypertension and NIDDM also likely contribute to accelerated atherogenesis [16]. Hypertension is acknowledged to be a major risk factor in the progression of diabetic renal disease [6]. Diabetic nephropathy, defined as the appearance of proteinuria, elevated arterial BP, and diminished glomerular filtration rate, will develop in as many as 40% of IDDM patients [6]. In analyzing the stages of hypertension among total participants we found, 23.39% and 35.92% participants were with normal and pre-hypertension (In total 68.31%) respectively. In this study, among 32% hypertensive participants, 19.72% (n=28) were with stage I HTN whereas 11.97% (n=17) were with stage II HTN. So, if we consider the number of pre-hypertensive patients as a potential concern then it was alarming.

Limitations of the study

This was a single centered study with a small sized sample. So the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION AND RECOMMENDATIONS

In this study, in analyzing the prevalence of hypertension among type 2 diabetes patients was found some higher than that in normal. But if we consider the number of pre-hypertensive patients as a potential concern then it is alarming. The findings of this study

may be helpful in the treatment arena of diabetes and in similar further studies. But as this study run with some unavoidable limitations, to get more specific results we would like to recommend for conducting similar more studies in several places with larger size sample.

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