ORIGINAL RESEARCH

Evaluation of Hypertension and Its Associated Factors Among Type 2 Diabetics: An Institutional Based Study

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ABSTRACT
Background: Diabetes mellitus (DM) is probably one of the oldest diseases known to man. Hypertension is twice as frequent in patients with diabetes compared with those who do not have diabetes. Hence, the present study was conducted for evaluation of hypertension and its associated factors among type 2 diabetics.**Materials &Methods:**A total of 300 patients who had type 2 diabetes were evaluated. Incidence of hypertension was assessed in all these patients. Complete demographic and clinical details of all the patients were recorded. Hemodynamic profile, biochemical variables and anthropometric measurements were assessed. ECG was also done for all study subjects. Factors associated with hypertension were evaluated separately. Results were recorded on Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Results:**A total of 300 diabetic patients were evaluated. The mean age of the patients was 53.9 years. Majority proportion of patients were males. Hypertension was seen in 67.33 percent of the patients. While assessing various associated factors statistically, it was seen that poor socio-economic status, obesity,dyslipidemia, longer duration of diabetes and high HbA1c value were significantly associated with occurrence of hypertension. **Conclusion:**Diabetic patients should be screened periodically for early detection of hypertension and related cardiovascular risk factors.
Key words: Diabetes, Hypertension.

INTRODUCTION

Diabetes mellitus (DM) is probably one of the oldest diseases known to man. It was first reported in Egyptian manuscript about 3000 years ago. In 1936, the distinction between type 1 and type 2 DM was clearly made. Type 2 DM was first described as a component of metabolic syndrome in 1988. Type 2 DM (formerly known as non-insulin dependent DM) is the most common form of DM characterized by hyperglycemia, insulin resistance, and relative insulin deficiency. Type 2 DM results from interaction between genetic, environmental and behavioral risk factors.[1-3]

Hypertension and type 2 diabetes are common comorbidities. Hypertension is twice as frequent in patients with diabetes compared with those who do not have diabetes. Moreover, patients with hypertension often exhibit insulin resistance and are at greater risk of developing diabetes than are normotensive individuals. The major cause of morbidity and mortality in diabetes is cardiovascular disease, which is exacerbated by hypertension. Accordingly, diabetes and hypertension are closely interlinked because of similar risk factors, such as endothelial dysfunction, vascular inflammation, arterial remodelling, atherosclerosis, dyslipidemia, and obesity. There is also substantial overlap in the cardiovascular complications of diabetes and hypertension related primarily to microvascular and macrovascular disease.[4-6] Hence; the present study was conducted for evaluation of hypertension and its associated factors among type 2 diabetics.

MATERIALS & METHODS

The present study was conducted for evaluation of hypertension and its associated factors among type 2 diabetics. A total of 300 patients were type 2 diabetes were evaluated. Incidence of hypertension was

assessed in all these patients. Complete demographic and clinical details of all the patients were recorded. Hemodynamic profile, biochemical variables and anthropometric measurements were assessed. ECG was also done for all study subjects. Factors associated with hypertension were evaluated separately. Results were recorded on Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

A total of 300 diabetic patients were evaluated. The mean age of the patients was 53.9 years. Majority proportion of patients were males. Hypertension was seen in 67.33 percent of the patients. While assessing various associated factors statistically, it was seen that poor socio-economic status, obesity,dyslipidemia, Higher duration of diabetes and High HbA1c value were significantly associated with occurrence of hypertension.

Table 1: Incidence of hypertension among diabetic patients

Hypertension	Number	Percentage
Present	202	67.33
Absent	98	32.67
Total	300	100

Table 2: Hypertension associated factors

Hypertension associated factors	r-value	p-value
Poor socio-economic status	-0.912	0.0038*
Obesity	1.825	0.0001*
Dyslipidemia	2.313	0.0021*
Higher duration of diabetes	2.847	0.0029*
High HbA1c value	-0.812	0.0045*

*: Significant

DISCUSSION

Elevated blood pressure is closely related to increased circulatory fluid volume and peripheral vascular resistance. Patients with diabetes mellitus experience increased peripheral vascular resistance caused by vascular remodeling and increased body fluid volume associated with insulin resistance-induced hyperinsulinemia and hyperglycemia. Both of these mechanisms elevate systemic blood pressure. Thus, fully understanding the pathophysiology of hypertension in diabetes mellitus requires knowing the natural history of type 2 diabetes. Patients exhibit hyperinsulinemia with insulin resistance due to impaired glucose tolerance and early-stage diabetes. Hypertension occurs because of increased body fluid volume. After reaching mid-stage diabetes the vascular remodeling has progressed and peripheral vascular resistance also contributes to hypertension. Moreover, vascular remodeling strongly influences diabetic complications. Specifically, afferent arteriolar remodeling during diabetic nephropathy leads to increased glomerular pressure.[7-9] Population studies suggest that elevated insulin levels, which often occurs in type II diabetes mellitus, is an independent risk factor for cardiovascular disease. Other cardiovascular risk factors in diabetic individuals include abnormalities of lipid metabolism, platelet function, and clotting factors. The goal of antihypertensive therapy in the patient with coexistent diabetes is to reduce the inordinate cardiovascular risk as well as lowering blood pressure.[10-12]

A total of 300 diabetic patients were evaluated. The mean age of the patients was 53.9 years. Majority proportion of patients were males. Hypertension was seen in 67.33 percent of the patients. Mengesha AY et aldetermined the prevalence of hypertension and related cardiovascular risk factors among DM patients.A total of 401 patients were included in a cross-sectional study during a three-month period.During the study it was found out that 61.2%of DM patients had hypertension, 56.4% obesity, 33.5% hypercholesterolemia and 38.9% hypertriglyceredemia. In the study, hypertension was associated with age, sex, type of DM, body mass index (BMI) and hypertriglyceredemia.The study found out that most DM patients suffer from co-existing hypertension and related cardiovascular risk factors.[13]Kemche Bet alidentified risk factors of hypertension among diabetic patients at different stages. The prevalence of hypertension was 86.2%. Of the total, 13.8% participants were normotensive, 32.1% stage 1 hypertensive, and 54.1% stage 2 hypertensive. Being a male (p = 0.046) and not smoking (p = 0.036) were negatively associated with stage 1 hypertension whereas eating less than 3 times (p = 0.046) and duration of diabetes greater than 9 years among women were positively associated. Age above 40 yearswas negatively associated with stage 2 hypertension. However, age above 40 years had a negative effect among Christian, less educated diabetics, people having diabetes for more than 9 years, and those on medical treatment. Duration of diabetes and abnormal waist circumference were positively associated with stage 2. Abnormal waist-to-hip ratioand feeding rate greater than 2 times a day were positively associated with hypertension (stages 1 and 2).[14]

While assessing various associated factors statistically, it was seen that poor socio-economic status, obesity, dyslipidemia, longer duration of diabetes and high HbA1c value were significantly associated with occurrence of hypertension. Mubarak FM et al assessed the prevalence of hypertension, risk factors, and the level of awareness and control of hypertension among outpatients with type 2 diabetes.A cross-sectional study was carried out on a sample of 1000 patients with type 2 diabetes. Data were collected from medical records and through a structured interview questionnaire. Logistic regression analysis was used to assess the independent effect of variables on hypertension.The prevalence of hypertension (BP >130/80 or on medication for high blood pressure) was 72.4% (70.9% of males and 73.9% of females). The logistic regression indicated that hypertension was positively associated with age (P=.001), body mass index (P=.001), and duration of diabetes (P=.001). About one-half of patients who were aware of having hypertension failed to keep their blood pressure under control.Hypertension is a common co-morbidity among diabetic patients. Despite a high rate of awareness of hypertension among study subjects (93%), hypertension was not controlled to the recommended levels of blood pressure in about one-half (50.4%) of patients.[15]The SANDS trial of 499 American Indian men and women with type 2 diabetes and no history of previous CVD events showed no difference in clinical CV mortality with aggressive therapy (≤115 mmHg) and higher adverse events related to antihypertensive agents.[16] Conducted in nondiabetic patients at increased CV risk, The Systolic Blood Pressure Intervention Trial (SPRINT) showed that targeting a systolic pressure less than 120 mmHg compared with less than 140 mmHg reduced CV events and mortality when using automated oscillometric blood pressure (AOBP). AOBP readings were typically 5–10 mm lower than with manual measurement. The mean systolic pressure was 121 mmHg in the intensive lowering group.[17]

CONCLUSION
Diabetic patients should be screened periodically for early detection of hypertension and related cardiovascular risk factors.

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