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Original Research

Assessment of prevalence of hypertension in type 2 DM patients

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ABSTRACT:

Background: Diabetes is a complex metabolic disorder characterized by chronic hyperglycaemia, which leads to microvascular and macrovascular complications. Hypertension is a progressive CV syndrome arising from complex and interrelated etiologies. The present study was conducted for assessing the prevalence of hypertension in type 2 DM patients. **Materials & methods:**A total of 200 individuals diagnosed with type 2 diabetes mellitus were included in the study. Detailed demographic information was collected for each participant. Blood samples were drawn from all subjects and sent to the laboratory for analysis of biochemical parameters and glycemic indices. Blood pressure measurements were taken over three consecutive days, and the average of the three readings was calculated and used as the final value. The prevalence of hypertension among the participants was documented. All data were compiled in Microsoft Excel and analyzed statistically using SPSS software. **Results:**The mean age of the study participants was 52.3 years. Among the 200 individuals with type 2 diabetes mellitus, 121 (60.5%) were male and 79 (39.5%) were female. A majority of the subjects, 138 (69%), resided in rural areas, while 62 (31%) were from urban regions.Out of the 200 diabetic patients evaluated, hypertension was identified in 88 individuals, accounting for 44% of the study population. The remaining 112 patients (56%) did not exhibit elevated blood pressure levels.A significant correlation was found between hypertension and glycemic status. Patients with hypertension had a mean HbA1c level of 12.1, compared to 8.9 in those without hypertension. The observed difference was statistically significant ($p = 0.001$), indicating poorer glycemic control among hypertensive diabetic patients. **Conclusion:** A well-established association exists between type 2 diabetes mellitus and hypertension, with both conditions frequently coexisting and contributing synergistically to adverse cardiovascular outcomes. This interrelationship is rooted in shared pathophysiological mechanisms such as insulin resistance, endothelial dysfunction, and chronic low-grade inflammation. Given the compounded risk these comorbidities pose, particularly in accelerating microvascular and macrovascular complications, it is imperative to implement vigilant and routine monitoring of modifiable risk factors—including glycemic control, blood pressure levels, lipid profiles, body weight, and lifestyle behaviors.

Key words: Hypertension, Diabetes

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a progressive metabolic disorder characterized by chronic hyperglycemia resulting from insulin resistance and/or inadequate insulin secretion. The global prevalence of T2DM has been rising at an alarming rate, with several nations approaching epidemic thresholds. This surge is largely attributable to demographic shifts such as population ageing, which is expected to cause a twofold increase in disease incidence over the coming decade, thereby exacerbating the strain on healthcare systems, particularly in resource-limited settings.[1- 3]

Despite significant progress in elucidating the underlying mechanisms of hypertension and the development of a wide array of efficacious and well-tolerated antihypertensive pharmacological agents, inadequate blood pressure (BP) control remains the foremost modifiable risk factor for cardiovascular morbidity and mortality. Globally, it is implicated in over 7 million deaths each year.The regulation of arterial pressure over both acute and chronic timeframes is governed by the coordinated interplay of multiple physiological systems, including the cardiovascular, renal, neural, endocrine, and local tissue regulatory networks. Substantial clinical and experimental evidence underscores the pivotal role of the kidneys in maintaining long-term BP homeostasis. In particular, impairment in the renal-pressure natriuresis mechanism—a key process by which the

kidneys excrete sodium in response to elevated arterial pressure—is consistently observed across all chronic hypertensive states, highlighting renal dysfunction as a central pathophysiological component in sustained hypertension.[4- 6] Hence; the present study was conducted for assessing the prevalence of hypertension in type 2 DM patients.

MATERIALS & METHODS

The current study was designed to evaluate the prevalence of hypertension among individuals diagnosed with type 2 diabetes mellitus (T2DM). A total of 200 patients with established T2DM were recruited for the investigation. Comprehensive demographic information—including age, gender, and duration of diabetes—was collected for each participant. Venous blood samples were obtained from all enrolled subjects and processed in the laboratory to assess their biochemical parameters, including glycemic control indicators such as fasting blood glucose and HbA1c levels.To eliminate potential confounding factors, individuals with a prior diagnosis of cardiovascular diseases were excluded from the study cohort. Blood pressure (BP) measurements were obtained over three consecutive days, with each patient undergoing standardized BP recording during each visit. The average of these three readings was calculated and considered the final representative value for each participant.The presence of hypertension was determined based on these mean values, in accordance with established diagnostic thresholds. All collected data were compiled using Microsoft Excel and subsequently analyzed using SPSS statistical software to determine the prevalence and potential correlations between hypertension and clinical variables in patients with T2DM.

RESULTS

The mean age of the study participants was 52.3 years. Among the 200 individuals with type 2 diabetes mellitus, 121 (60.5%) were male and 79 (39.5%) were female. A majority of the subjects, 138 (69%), resided in rural areas, while 62 (31%) were from urban regions.Out of the 200 diabetic patients evaluated, hypertension was identified in 88 individuals, accounting for 44% of the study population. The remaining 112 patients (56%) did not exhibit elevated blood pressure levels.A significant correlation was found between hypertension and glycemic status. Patients with hypertension had a mean HbA1c level of 12.1, compared to 8.9 in those without hypertension. The observed difference was statistically significant ($p = 0.001$), indicating poorer glycemic control among hypertensive diabetic patients.

Table 1: Demographic data

Variable	Number	Percentage
Mean age (years)	52.3	
Males	121	60.5
Females	79	39.5
Rural residence	138	69
Urban residence	62	31

Table 2: Prevalence of hypertension

Hypertension	Number	Percentage
Present	88	44
Absent	112	56
Total	200	100

Table 3: Correlation of occurrence of hypertension with glycemic profile

Hypertension	Mean HbA1c levels	p-value
Present	12.1	0.001 (Significant)
Absent	8.9	

DISCUSSION

Type 2 diabetes mellitus primarily arises from a combination of genetic predisposition and lifestyle-related influences. Several behavioral and environmental factors have been identified as significant contributors to the development of this condition. These include reduced physical activity, prolonged sedentary behavior, tobacco use, and excessive alcohol intake. Obesity plays a major role, being associated with approximately 55% of type 2 diabetes cases. The rising prevalence of obesity in children and adolescents from the 1960s through the early 2000s is considered a major factor behind the increasing incidence of type 2 diabetes in younger populations. Additionally, exposure to certain environmental contaminants has been implicated in the growing rates of the disease. For instance, a mild positive association has been observed between urinary levels of bisphenol A—an industrial compound used in the manufacture of plastics—and the occurrence of type 2 diabetes.[6- 8]Epidemiological data indicate that approximately 3% to 30% of individuals diagnosed with hypertension require three or more antihypertensive agents to attain optimal blood pressure control. Despite this wide range, the precise incidence of resistant hypertension remains

inadequately characterized and has been designated as a critical area of research by the American Heart Association (AHA). Enhanced insight into both the incidence and clinical outcomes associated with resistant hypertension is essential for optimizing therapeutic strategies in this patient population.[9-11]Hence; the present study was conducted for assessing the prevalence of hypertension in type 2 DM patients.

The mean age of the study participants was 52.3 years. Among the 200 individuals with type 2 diabetes mellitus, 121 (60.5%) were male and 79 (39.5%) were female. A majority of the subjects, 138 (69%), resided in rural areas, while 62 (31%) were from urban regions.Out of the 200 diabetic patients evaluated, hypertension was identified in 88 individuals, accounting for 44% of the study population. The remaining 112 patients (56%) did not exhibit elevated blood pressure levels.A significant correlation was found between hypertension and glycemic status. Patients with hypertension had a mean HbA1c level of 12.1, compared to 8.9 in those without hypertension. The observed difference was statistically significant ($p = 0.001$), indicating poorer glycemic control among hypertensive diabetic patients. In a previous study conducted by Colosia AD et al, authors assessed the prevalence of hypertension and obesity in patients with type 2 diabetes mellitus in observational studies: a systematic literature review. From a total of 2,688 studies, 92 observational studies provided prevalence rates for hypertension and/or obesity specifically in adults with T2DM. Fifteen studies of specific subtypes of hypertension or subpopulations with T2DM were subsequently excluded, leaving 78 studies (in 77 articles) for inclusion in this article. Of these, 61studies reported hypertension prevalence, 44 reported obesity prevalence, and 12 reported the prevalence of hypertension with obesity. Most studies had a low risk of bias regarding diagnosis of T2DM (70/78), hypertension (59/69), or obesity (45/47). The continental regions with the most observational studies of hypertension or obesity prevalence were Europe (n = 30) and Asia (n = 26). Hypertension rates typically were high in all regions; most studies presented rates above 50%, and many presented rates above 75%. Obesity rates exceeded 30% in 38 of 44 studies and 50% in 14 of 44 studies, especially those assessing central obesity (based on waist circumference). Among obese adults, hypertension rates were at or above 70% in Asia and above 80% in Europe; rates were lower in North and South America but still above 30%.Around the world, hypertension and obesity, separately or together, are common comorbidities in adults with T2DM.[11]Berraho M et al, in another previous study, assess the prevalence of hypertension and its associated risk factors among a group of patients with type 2 diabetes and to examine the level of control of hypertension among type 2 diabetic patients with hypertension.A cross-sectional study was carried out on 525 type 2 diabetics in three Moroccan regions. The structured questionnaire was used to gather information on sociodemographic variables, history of hypertension, use of anti-hypertensive medications and duration of diabetes. Anthropometric measurements including weight and height were measured by trained staff. Blood pressure was measured using standardized sphygmomanometers.The prevalence of hypertension was 70.4%. The logistic regression indicated that hypertension was positively associated with age ($p<10–4$), BMI ($p<0.0002$) and duration of diabetes (p)Hypertension is a common co-morbidity among Moroccan diabetic patients with high rate of ignorance of hypertension among study subjects.[12]

CONCLUSION

A well-established association exists between type 2 diabetes mellitus and hypertension, with both conditions frequently coexisting and contributing synergistically to adverse cardiovascular outcomes. Given the compounded risk these comorbidities pose, particularly in accelerating microvascular and macrovascular complications, it is imperative to implement vigilant and routine monitoring of modifiable risk factors—including glycemic control, blood pressure levels, lipid profiles, body weight, and lifestyle behaviors.

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