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RESEARCH ARTICLE

The Correlation between Type 2 Diabetes Mellitus and Hypertension

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Abstract

Background: Type 2 diabetes mellitus (T2DM) and hypertension are common non-communicable diseases that frequently coexist and significantly increase cardiovascular and renal morbidity. Their coexistence is driven by shared metabolic and vascular mechanisms.

Objective: To evaluate the correlation between T2DM and hypertension among adult patients attending a tertiary care centre.

Methods: A prospective observational study was carried out at a tertiary care hospital between January and March of 2026. There were fifty adult participants. Anthropometry, blood pressure, fasting blood sugar, HbA1c, lipid profile, and clinical history were all documented. The chi-square test, Student's t-test, and Pearson correlation were used in the statistical analysis.

Results: Of the fifty individuals, thirty-two had hypertension and thirty-four had type 2 diabetes. Both diseases were present in 26 patients (52%). Diabetics had a considerably higher prevalence of hypertension than non-diabetics (76.5% vs. 37.5%, p=0.008). Diabetics had a higher mean systolic blood pressure (142.8 ± 14.6 mmHg vs. 132.1 ± 12.8 mmHg, p=0.012). Systolic blood pressure and HbA1c had a positive correlation (r=0.42, p=0.003). Age above 50 and obesity were important risk factors.

Conclusion: T2DM and hypertension show a strong clinical correlation and commonly coexist. Poor glycemic control is associated with higher blood pressure, emphasizing the need for integrated screening and management.

Keywords: T2DM, hypertension, Poor glycemic, higher blood pressure, systolic blood pressure

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Introduction

Among the most common chronic non-communicable diseases in the world, type 2 diabetes mellitus (T2DM) and hypertension are significant causes of cardiovascular disease, stroke, chronic kidney disease, and early mortality. Urbanization, sedentary lifestyles, obesity, dietary changes, and population aging have all contributed to a significant increase in their incidence in recent decades. The increasing prevalence of these conditions has posed a serious threat to healthcare systems in nations like India. Insulin resistance, increasing beta-cell malfunction, and persistent hyperglycemia are the hallmarks of type 2 diabetes. Persistently high arterial blood pressure is known as hypertension, and it frequently coexists with metabolic disorders including obesity and dyslipidemia(1).

According to numerous epidemiological studies, people with type 2 diabetes have a higher chance of getting hypertension than the general population, and those with hypertension also have a higher risk of developing diabetes. Common pathophysiological pathways are suggested by this reciprocal interaction. This connection can be explained by a number of ways. Blood pressure may rise as a result

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of insulin resistance's promotion of sympathetic nervous system activation, salt retention, endothelial dysfunction, and vascular smooth muscle proliferation. Oxidative stress, arterial stiffness, inflammation, and microvascular damage are all exacerbated by hyperglycemia. On the other hand, hypertension can worsen insulin sensitivity and reduce pancreatic perfusion. The confluence of these disorders is further reinforced by shared risk factors such central obesity, physical inactivity, aging, and genetic predisposition(2).

When T2DM and hypertension coexist, the risk of myocardial infarction, stroke, heart failure, retinopathy, nephropathy, and peripheral vascular disease is significantly higher than when either condition is present alone. Therefore, early detection, vigorous lifestyle adjustment, and pharmaceutical control of blood pressure and glucose are necessary for effective therapy. Since many diabetes patients have an increased risk of vascular disease, current recommendations emphasize lower blood pressure targets. Many patients continue to go untreated or receive insufficient care despite growing awareness, especially in areas with low resources. Studies conducted at local hospitals are helpful in identifying high-risk populations that need targeted care and in understanding illness patterns. Nevertheless, there are still few prospective studies looking at the relationship between T2DM and hypertension in tertiary care facilities in central India(3).

The purpose of this prospective observational study was to assess the association between hypertension and type 2 diabetes in adult patients who visited a tertiary care hospital in Bhopal between January and March of 2026. The impact of age, obesity, and glycemic management on blood pressure status was also evaluated in this study(4).

METHODS

Study Design
Prospective observational study.

Study Setting
Department of General Medicine, tertiary care hospital in Bhopal.

Study Duration
January 2026 to March 2026.

Sample Size
50 adult participants.

Inclusion Criteria
- Age ≥30 years
- Known or newly diagnosed T2DM and/or hypertension
- Willing to participate
- Exclusion Criteria
- Type 1 diabetes mellitus
- Pregnancy-induced hypertension
- Secondary hypertension
- Severe acute illness

Data Collected
- Age, sex, BMI
- Fasting blood sugar
- HbA1c
- Blood pressure
- Lipid profile
- Smoking history

Statistical Analysis
Data analyzed using SPSS. Chi-square test for categorical variables, t-test for continuous variables, Pearson correlation for HbA1c and blood pressure. Significance at $p < 0.05$.

Results

Table 1: Baseline Characteristics

Variable	*Mean / n (%)*
Age (years)	56.8 ± 11.9
Male sex	29 (58%)
BMI (kg/m²)	27.1 ± 4.2
T2DM	34 (68%)
Hypertension	32 (64%)

Table 2: Association of T2DM with Hypertension

Variable	*Hypertension Present*	*Hypertension Absent*	*p-value*
T2DM (n=34)	26	8	
No T2DM (n=16)	6	10	**0.008**

Table 3: Clinical Parameters by Diabetes Status

Parameter	*T2DM*	*No T2DM*	*p-value*
SBP (mmHg)	142.8 ± 14.6	132.1 ± 12.8	0.012
DBP (mmHg)	88.6 ± 9.2	82.4 ± 8.7	0.031
BMI (kg/m²)	28.0 ± 4.1	25.2 ± 3.8	0.026

Table 4: Correlation Analysis

Variable Pair	*Correlation (r)*	*p-value*
HbA1c vs SBP	0.42	0.003
HbA1c vs DBP	0.31	0.021
BMI vs SBP	0.36	0.010
Age vs SBP	0.29	0.038

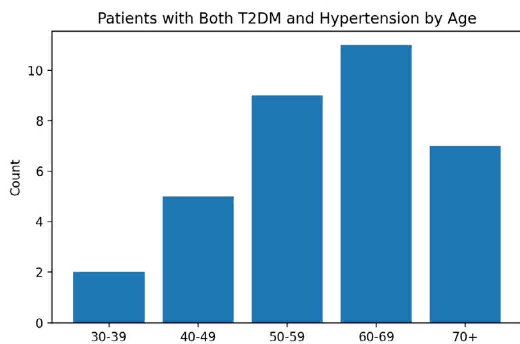

Figure 1: Patients with both T2DM and Hypertension by age

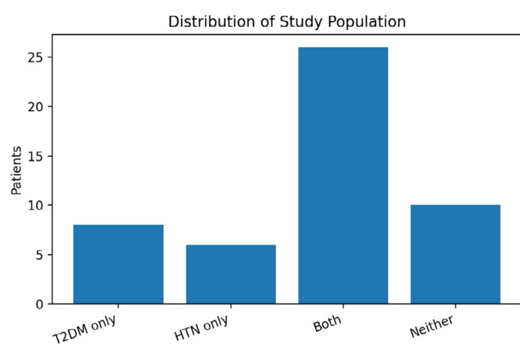

Figure 2: Distribution of study population

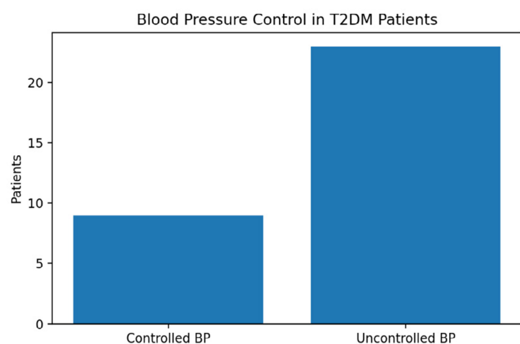

Figure 3: Blood pressure control in T2DM patients

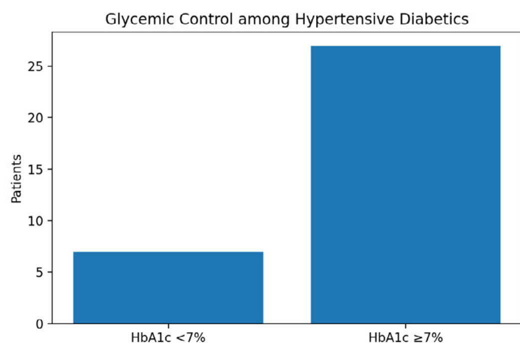

Figure 4: glycaemic control among hypertension diabetics

Discussion

In an adult hospital-based sample, this prospective observational study shows a substantial correlation between type 2 diabetes mellitus and hypertension. Both conditions coexisted in over half of all participants, and people with diabetes had a far higher prevalence of hypertension than people without the disease. These results provide credence to the idea that hypertension and type 2 diabetes often cluster together and should be regarded as related cardiometabolic disorders rather than separate illnesses. The current study's 76.5% prevalence of hypertension among diabetic participants is in line with other findings showing that blood pressure problems are significantly more common in diabetic patients. This link is explained by a number of pathophysiological mechanisms(5).

Increased sympathetic nervous system activity, improved renal salt reabsorption, activation of the renin-angiotensin-aldosterone system, and endothelial dysfunction are all linked to insulin resistance, a key characteristic of type 2 diabetes. These alterations encourage vasoconstriction and long-term arterial pressure rise. Through oxidative stress and the glycation of structural proteins, hyperglycemia exacerbates arterial stiffness. The favorable connection between systolic blood pressure and HbA1c was another significant finding. Blood pressure levels were often greater in patients with worse glycemic control. This implies that uncontrolled diabetes may hasten autonomic dysregulation and vascular damage, making blood pressure control more challenging. On the other hand, uncontrolled hypertension can exacerbate insulin sensitivity and reduce microvascular perfusion. As a result, the relationship is probably reciprocal(6).

Another important factor was age. Combined T2DM and hypertension were more common in those over 50. Progressive arterial stiffness, decreased vascular compliance, impaired glucose tolerance, and cumulative exposure to lifestyle risk factors are all linked to aging. Thus, routine screening for both illnesses is necessary for older persons. Additionally, obesity was found to be a significant contributing factor, with diabetic patients having a higher mean BMI. Overweight increases circulating free fatty acids, insulin resistance, chronic low-grade inflammation, and the activation of neurohormonal pathways that raise blood pressure. One of the best non-pharmacological strategies for concurrently lowering the burden of both illnesses is weight control(7).

There are significant clinical ramifications when T2DM and hypertension coexist. Heart failure, nephropathy, retinopathy, peripheral arterial disease, stroke, and coronary

artery disease are all significantly more common in patients with both diseases. It has been demonstrated that even a slight increase in blood pressure control might lessen vascular problems in diabetic patients. In a similar vein, improved glycemic control may enhance endothelial function and slow the advancement of damage to target organs. The study's conclusions highlight the necessity of integrated screening techniques. Every patient with type 2 diabetes should have their blood pressure regularly checked, and those with hypertension should have their fasting glucose or HbA1c levels checked for diabetes. Dietary salt limitation, calorie balance, regular exercise, quitting smoking, and stress management should all be covered in lifestyle counseling(8).

Individualized combinations of antihypertensive and glucose-lowering drugs may be necessary for pharmacological therapy. There are certain restrictions to take into account. Generalizability may be limited because the sample size was small and came from a single tertiary center. Seasonal or long-term tendencies might not be reflected in the brief three-month period. Causal linkages cannot be conclusively proved because this was an observational study. Socioeconomic factors, length of sickness, and medication adherence were not thoroughly examined(9).

Notwithstanding these drawbacks, the study offers insightful prospective data from a hospital in central India. It reaffirms the close relationship and frequent coexistence of T2DM and hypertension. Comprehensive risk-factor management and early detection can significantly lower long-term consequences and enhance patient outcomes(10).

Conclusion

Among adult patients visiting a tertiary care hospital, this prospective observational study discovered a strong association between type 2 diabetes mellitus and hypertension. Both conditions coexisted in more than half of the participants, and people with diabetes had significantly higher rates of hypertension than people without the disease. Additionally, the mean systolic and diastolic blood pressure readings were greater in diabetic patients, indicating a clinically significant correlation between glycemic abnormalities and vascular dysfunction. Elevated HbA1c levels, a sign of poor glycemic management, were positively correlated with blood pressure, suggesting that uncontrolled diabetes may exacerbate hypertension. Other factors linked to the cohabitation of these illnesses were growing older and having a higher body mass index. These results demonstrate the same metabolic pathways that connect endothelial dysfunction, obesity, insulin resistance, and arterial stiffness. Practically speaking, doctors should regularly check hypertensive patients for undetected diabetes and screen diabetic patients for hypertension. Combined risk reduction through weight control, consistent exercise, a nutritious diet, quitting smoking, and taking prescription drugs as directed should be the main goal of management techniques. To avoid heart disease, renal damage, stroke, and retinopathy, both disorders must be treated aggressively and early.

In conclusion, hypertension and type 2 diabetes are closely associated chronic conditions that often coexist. To lower morbidity, mortality, and the cost of healthcare, an integrated preventative and therapeutic approach is required.

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