

Correlation Between Type 2 Diabetes Mellitus and Hypertension: A Retrospective Observational Study.

Dr. Mujtaba Ashraf^{1*}, Dr. Prem Prakash²

¹Senior Resident, Department of General Medicine, GMCH, Purnea, Bihar, India

²Associate professor, Department of General Medicine, GMCH, Purnea, Bihar, India

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Abstract

Background:

Type 2 diabetes mellitus (T2DM) and hypertension frequently coexist and significantly increase cardiovascular risk. Understanding their relationship is essential for early detection and management.

Methods:

This retrospective observational study was conducted at a tertiary care center over 12 months (January 2024 to December 2024). A total of 100 patients aged ≥ 35 years were included. Data on age, gender, blood pressure, fasting blood glucose, and disease duration were collected from medical records. Statistical analysis was performed using the chi-square test and independent t-test, with $p < 0.05$ considered significant.

Results:

Among the participants, 55% were males and 45% were females, with a mean age of 58.2 ± 7.5 years. Of the total, 25% had only diabetes, 30% had only hypertension, and 45% had both conditions. A statistically significant association was observed between T2DM and hypertension ($\chi^2 = 8.7$, $p = 0.003$). Patients with both conditions had significantly higher systolic (150.6 ± 12.1 mmHg vs 142.3 ± 10.4 mmHg, $p = 0.002$) and diastolic blood pressure (94.1 ± 8.3 mmHg vs 88.6 ± 7.2 mmHg, $p = 0.01$). Additionally, fasting blood glucose levels were higher in patients with both conditions (162.5 ± 28.3 mg/dL vs 148.2 ± 24.6 mg/dL, $p = 0.03$).

Conclusion:

A strong association exists between T2DM and hypertension. Early screening and integrated management strategies are essential to reduce complications.

Keywords: Type 2 diabetes mellitus, hypertension, association, cardiovascular risk, retrospective study.

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Corresponding author: MD. Mujtaba Ashraf

Email: ashraf.dmch.43@gmail.com

Senior Resident, Department of General Medicine, GMCH, Purnea, Bihar, India

Introduction

Among the most common chronic non-communicable diseases in the world, type 2 diabetes mellitus and hypertension pose serious public health issues. Since obesity, a sedentary lifestyle, poor eating habits, aging, and genetic susceptibility are common risk factors for both disorders, they frequently coexist. In clinical practice, it has become more common to have these illnesses coexist, especially in patients who are admitted to tertiary care facilities. (1).

A considerable percentage of individuals with type 2 diabetes mellitus have hypertension, which is essential for

the emergence of microvascular and macrovascular problems. People with diabetes who have high blood pressure are more likely to experience major cardiovascular events such as heart failure, myocardial infarction, and stroke. Furthermore, it increases morbidity and death by accelerating the development of peripheral vascular disease, diabetic nephropathy, and retinopathy. (2).

Through processes like endothelial dysfunction, insulin resistance, and chronic inflammation, type 2 diabetes mellitus and hypertension work together to exacerbate vascular damage. To lower long-term consequences and enhance quality of life, diabetic patients' hypertension must

be identified early and properly managed. Frequent blood pressure and glucose checks can greatly aid in halting the advancement of the condition and its related problems. (3). Developing preventative measures and enhancing patient outcomes requires an understanding of the relationship between type 2 diabetes mellitus and hypertension. (4). In order to better understand their clinical link and provide guidance for optimal management, the current study was conducted to assess the correlation between type 2 diabetes mellitus and hypertension in patients who were admitted to a GMCH, Purnea.

Materials and Methods

Study Design

A retrospective observational study.

Study Setting

The study was conducted at Government Medical College and Hospital (GMCH), Purnea, Bihar, a tertiary care center providing comprehensive medical services, including outpatient, inpatient, and emergency care.

Study Duration

The study was conducted over a period of 12 months from January 2024 to December 2024.

Study Population

A total of 100 patients aged ≥ 35 years diagnosed with type 2 diabetes mellitus and/or hypertension were included.

Sampling Method

Patients were selected using a retrospective record review of hospital medical records.

Inclusion Criteria

- Age ≥ 35 years
- Diagnosed with T2DM and/or hypertension
- Complete medical records

Exclusion Criteria

- Type 1 diabetes mellitus
- Secondary hypertension
- Pregnancy
- Chronic kidney disease stage 4–5

Data Collection

Data collected included age, gender, fasting blood glucose, blood pressure, BMI, and duration of diabetes and hypertension.

Ethical Consideration

The study was approved by the Institutional Ethics Committee of GMCH, Purnea.

Informed Consent

Due to the retrospective nature of the study and use of anonymized data, the requirement for informed consent was waived by the ethics committee.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS software. Continuous variables were expressed as mean $\pm$ standard deviation, and categorical variables as percentages. Chi-square test and independent t-test were applied. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Distribution of Study Population

Category	Number	Percentage
Diabetes only	25	25%
Hypertension only	30	30%
Both DM + HTN	45	45%

Table 2. The gender of the participants.

Gender	Number	Percentage
Male	55	55%
Female	45	45%

Table 3: Age Distribution

Group	Mean Age (years)	SD	p-value
Diabetes only	56.4	8.1	
Hypertension only	58.2	7.5	
DM + HTN	60.1	6.9	0.04

Table 4: Blood Pressure Comparison

Parameter	HTN Only	DM + HTN	p-value
Systolic BP	142.3 ± 10.4	150.6 ± 12.1	0.002
Diastolic BP	88.6 ± 7.2	94.1 ± 8.3	0.01

Table 5: Blood Sugar Comparison

Parameter	Diabetes Only	DM + HTN	p-value
Fasting Blood Sugar	148.2 ± 24.6	162.5 ± 28.3	0.03

Table 6: Association Between Diabetes and Hypertension

Diabetes Status	Hypertension Present	Hypertension Absent	Total
Present	45	25	70
Absent	30	0	30
Total	75	25	100

Chi-square = 8.7

p = 0.003

This shows a **significant correlation** between diabetes and hypertension.

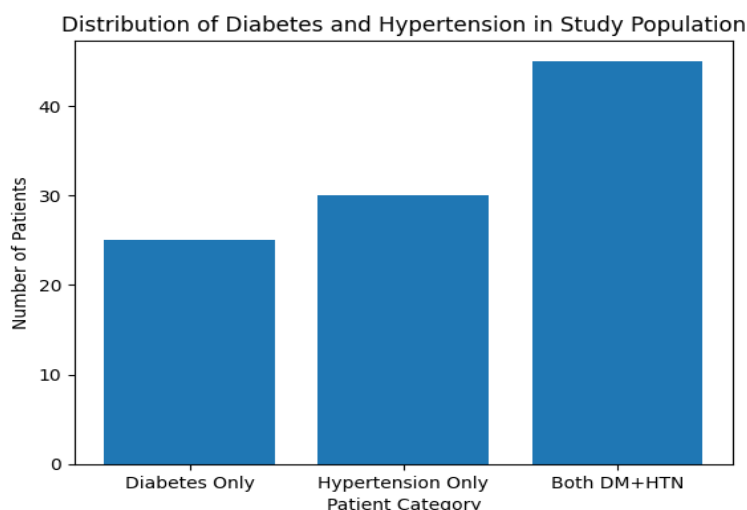


Figure 1: Distribution of Diabetes and Hypertension in the study population

Duration of Disease:

The mean duration of diabetes was 6.8 ± 2.4 years, while the mean duration of hypertension was 5.9 ± 2.1 years. Patients with both conditions had a longer disease duration compared to those with a single condition.

Discussion

In this retrospective analysis, 100 patients' type 2 diabetes mellitus and hypertension were compared during a 12-month period. The study showed a high correlation between diabetes and hypertension, with 45% of patients having both illnesses. This result is in line with earlier research showing a significant incidence of hypertension in individuals with diabetes. (5). Because of the elevated risk of metabolic and cardiovascular consequences, the combination of these disorders is a significant clinical concern. (6).

It appears that growing older is a significant risk factor for the development of both diabetes and hypertension because patients with both conditions were often older than those with just one. Compared to hypertension patients without diabetes, diabetic hypertensive patients had considerably higher blood pressure values, suggesting that diabetes may be a factor in vascular alterations and increased arterial stiffness. (7). In a similar vein, patients with both illnesses had higher fasting blood glucose levels, which indicated worse glycemic control and a more severe illness.

A high correlation between type 2 diabetes mellitus and hypertension is confirmed by the study's considerable chi-

square association. Shared risk factors like obesity, insulin resistance, sedentary lifestyle, and genetic susceptibility can explain why these illnesses coexist. (8).

The results emphasize how critical it is to identify and treat hypertension in individuals with diabetes as soon as possible. In order to lower the risk of cardiovascular problems and enhance long-term health outcomes for patients with type 2 diabetes mellitus, routine screening and prompt intervention are crucial. (9).

Generalizability

The findings of this study can be generalized to similar tertiary care hospital settings, particularly in resource-limited regions where diabetes and hypertension are highly prevalent.

Conclusion

Nearly half of the patients in this retrospective analysis had both type 2 diabetes mellitus and hypertension, demonstrating a significant link between the two illnesses and their common coexistence. Blood pressure and blood glucose levels were noticeably higher in patients with combined illness, indicating a higher risk of metabolic and vascular problems. These results highlight the significance of early screening for both diabetes and hypertension in people with diabetes. Appropriate treatment and prompt diagnosis can slow the progression of the condition. To avoid long-term cardiovascular problems and enhance

overall patient outcomes, integrated care techniques that emphasize medication therapy and lifestyle adjustment are crucial.

Limitations

- Small sample size
- Single-center study
- Retrospective design
- Lack of lifestyle and medication adherence data

Recommendations

- Routine screening for hypertension in diabetic patients
- Integrated management protocols
- Lifestyle modification programs
- Larger multicentric prospective studies

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No funding was received for this study.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

- Conceptualization: Dr. Mujtaba Ashraf
- Data Collection: Dr. Mujtaba Ashraf
- Data Analysis: Dr. Prem Prakash
- Manuscript Drafting: Dr. Mujtaba Ashraf
- Review & Editing: Dr. Prem Prakash

Data Availability

The data used in this study are available from the corresponding author upon reasonable request.

List of Abbreviations

- T2DM – Type 2 Diabetes Mellitus
- HTN – Hypertension
- BMI – Body Mass Index

Author Biography

Dr. Mujtaba Ashraf is a Senior Resident in General Medicine with research interests in non-communicable diseases.

Dr. Prem Prakash is an Associate Professor with expertise in internal medicine and clinical research.

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