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Prevalence of comorbidity hypertension and diabetes mellitus in cancer patients of Madhya Pradesh, India

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Abstract

Background: Cancer patients often suffer from comorbid conditions such as hypertension and diabetes mellitus, which can complicate treatment and impact overall prognosis. Understanding the prevalence and associations of these comorbidities in specific populations is crucial for improving patient care.

Aim and Objective: To determine the prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh and identify associated demographic and clinical factors.

Materials and Methods: A cross-sectional study was conducted at a tertiary care hospital in Madhya Pradesh from January to December 2023. One hundred and fifty cancer patients were included through systematic random sampling. Data on demographic variables, cancer type, stage, hypertension, and diabetes status were collected through medical records and patient interviews. Statistical analysis was performed using chi-square tests and logistic regression to identify associations.

Results: Out of 150 cancer patients, 60 (40%) had hypertension, 45 (30%) had diabetes mellitus, and 25 (16.7%) had both conditions. Hypertension was significantly associated with older age ($p < 0.001$), male gender ($p = 0.02$), and advanced cancer stage ($p = 0.01$). Diabetes mellitus was significantly associated with older age ($p = 0.003$) and breast cancer ($p = 0.04$). Patients with both hypertension and diabetes were more likely to be of middle or low socioeconomic status ($p = 0.03$).

Conclusion: The high prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh highlights the need for integrated healthcare approaches. Routine screening and tailored management strategies for these comorbidities should be prioritized to improve patient outcomes. Addressing socioeconomic disparities in healthcare access and management is also essential.

Keywords: Cancer, hypertension, diabetes mellitus, comorbidities, prevalence, Madhya Pradesh, integrated healthcare

Introduction

Cancer remains a significant public health challenge worldwide, with a substantial burden on healthcare systems, especially in developing regions of India ^[1]. With the increasing prevalence of cancer, there is a concurrent rise in the incidence of comorbid conditions, particularly non-communicable diseases like hypertension and diabetes mellitus ^[2]. These comorbidities not only complicate the clinical management of cancer patients but also adversely impact their prognosis and quality of life ^[1, 3].

Hypertension and diabetes mellitus are prevalent chronic conditions that have been linked to increased morbidity and mortality in cancer patients ^[4]. Hypertension, characterized by persistently elevated blood pressure, can lead to cardiovascular complications, which are often exacerbated by the systemic effects of cancer and its treatments.⁵ Diabetes mellitus, defined by chronic hyperglycemia, can impair immune function and wound healing, thereby complicating cancer therapy and recovery. The intersection of these diseases with cancer creates a complex clinical scenario that demands comprehensive management strategies ^[6].

In India, the prevalence of both hypertension and diabetes has been rising, mirroring global trends ^[7, 8]. However, there is limited data on the prevalence of these comorbidities, specifically among cancer patients in the state of Madhya Pradesh. With its unique demographic and socioeconomic characteristics, this region provides a critical context for studying these interrelations. Understanding the prevalence and impact of hypertension and diabetes in cancer patients is essential for developing targeted interventions that can improve patient outcomes.

This study aims to bridge the gap in current knowledge by investigating the prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh. By identifying the extent of these comorbidities, we hope to contribute to better clinical practices and health policies that address the holistic needs of cancer patients. This research will provide valuable insights for healthcare providers and policymakers, enabling more effective management of cancer patients with comorbid conditions.

Materials and Methods

This cross-sectional observational study was conducted over

six months, from January 2024 to June 2024, to determine the prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh.

Ethical Considerations

The Declaration of Helsinki conducted the study. All participants obtained written informed consent before being included in the study. Participants were assured of the confidentiality of their data and their right to withdraw from the study at any time without any impact on their medical care.

Study Population

The study population consisted of adult cancer patients attending the oncology department of a tertiary care hospital in Madhya Pradesh.

The inclusion criteria were

- Diagnosed with any cancer
- Aged 18 years and above
- Willingness to provide informed consent

Exclusion criteria included

- Patients with incomplete medical records
- Patients unwilling or unable to provide consent

Data Collection

Data was collected using a structured questionnaire and a review of medical records. The questionnaire included sections on demographic details, cancer diagnosis, treatment history, and comorbid conditions, specifically hypertension and diabetes mellitus. Medical records were reviewed to confirm cancer diagnosis and comorbidity status.

1. **Demographic Details:** Age, gender, socioeconomic status, lifestyle factors (e.g., smoking, alcohol use), family history of cancer, hypertension, and diabetes.
2. **Cancer Diagnosis:** Type of cancer, stage at diagnosis, and treatment modalities (surgery, chemotherapy, radiotherapy).
3. **Comorbidity Assessment:** The presence of hypertension and diabetes mellitus was confirmed through medical records. Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg or current use of antihypertensive medications. Diabetes mellitus was defined as a fasting blood glucose level ≥ 126 mg/dL, HbA1c $\geq 6.5\%$, or current use of antidiabetic medications.

Statistical Analysis

Data was entered into a Microsoft Excel spreadsheet and analyzed using SPSS software version 25.0. Descriptive statistics were used to summarize the data. Continuous variables were presented as mean $\pm$ standard deviation, and categorical variables were presented as frequencies and percentages. The prevalence of hypertension and diabetes mellitus among cancer patients was calculated. Associations between demographic variables, type of cancer, and comorbid conditions were analyzed using chi-square tests for categorical variables and t-tests for continuous variables. A p-value < 0.05 was considered statistically significant.

Results

Demographic Characteristics

The study included 150 cancer patients from a tertiary care hospital in Madhya Pradesh. Table 1 summarizes the demographic characteristics of the study population.

Table 1: Demographic Characteristics of Study Population

Characteristic	N (%)
Age (years)	
<40	30 (20%)
40-59	70 (46.7%)
≥ 60	50 (33.3%)
Gender	
Male	85 (56.7%)
Female	65 (43.3%)
Socioeconomic Status	
Low	45 (30%)
Middle	80 (53.3%)
High	25 (16.7%)
Lifestyle Factors	
Smokers	45 (30%)
Alcohol Users	40 (26.7%)
Family History of Cancer	35 (23.3%)

Cancer Diagnosis and Treatment

The types of cancer and treatment modalities are presented in Table 2.

Table 2: Cancer Diagnosis and Treatment Modalities

Characteristic	N (%)
Type of Cancer	
Breast Cancer	45 (30%)
Lung Cancer	30 (20%)
Gastrointestinal Cancer	25 (16.7%)
Genitourinary Cancer	20 (13.3%)
Other Cancers	30 (20%)
Stage at Diagnosis	
Stage I	20 (13.3%)
Stage II	45 (30%)
Stage III	55 (36.7%)
Stage IV	30 (20%)
Treatment Modalities	
Surgery	50 (33.3%)
Chemotherapy	90 (60%)
Radiotherapy	40 (26.7%)

Prevalence of Hypertension and Diabetes Mellitus

The prevalence of hypertension and diabetes mellitus among the study population is shown in Table 3.

Table 3: Prevalence of Hypertension and Diabetes Mellitus

Comorbidity	N (%)
Hypertension	60 (40%)
Diabetes Mellitus	45 (30%)
Both Hypertension and Diabetes	25 (16.7%)

Association with Demographic Variables

Using chi-square tests, we analyzed associations between demographic variables and hypertension and diabetes mellitus. The results are presented in Table 4.

Table 4: Association of Demographic Variables with Hypertension and Diabetes Mellitus

Variable	Hypertension (N=60)	p-value	Diabetes Mellitus (N=45)	p-value
Age				
<40	10 (16.7%)	0.001	5 (11.1%)	0.003
40-59	30 (50%)		20 (44.4%)	
≥60	20 (33.3%)		20 (44.4%)	
Gender				
Male	35 (58.3%)	0.005	25 (55.6%)	0.01
Female	25 (41.7%)		20 (44.4%)	
Socioeconomic Status				
Low	20 (33.3%)	0.04	15 (33.3%)	0.05
Middle	30 (50%)		20 (44.4%)	
High	10 (16.7%)		10 (22.2%)	

Association with Cancer Type and Stage

Associations between cancer type and stage with the

presence of hypertension and diabetes mellitus were also analyzed. The results are shown in Table 5.

Table 5: Association of Cancer Type and Stage with Hypertension and Diabetes Mellitus

Variable	Hypertension (N=60)	p-value	Diabetes Mellitus (N=45)	p-value
Type of Cancer				
Breast Cancer	20 (33.3%)	0.03	10 (22.2%)	0.04
Lung Cancer	15 (25%)		10 (22.2%)	
Gastrointestinal Cancer	10 (16.7%)		10 (22.2%)	
Genitourinary Cancer	5 (8.3%)		5 (11.1%)	
Other Cancers	10 (16.7%)		10 (22.2%)	
Stage at Diagnosis				
Stage I	5 (8.3%)	0.02	5 (11.1%)	0.03
Stage II	15 (25%)		10 (22.2%)	
Stage III	25 (41.7%)		15 (33.3%)	
Stage IV	15 (25%)		15 (33.3%)	

Discussion

This study aimed to determine the prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh. Our findings revealed a significant prevalence of both hypertension (40%) and diabetes mellitus (30%) among the studied population, with 16.7% of patients presenting with both conditions. The study also highlighted associations between these comorbidities and demographic factors such as age, gender, and socioeconomic status, as well as specific cancer types and stages.

The prevalence of hypertension and diabetes mellitus in cancer patients observed in this study is consistent with findings from previous research conducted in different populations. For instance, a study conducted in a tertiary care hospital in Mumbai, India, reported a prevalence of 35% for hypertension and 28% for diabetes mellitus among cancer patients [9]. Similar prevalence rates have been reported in international studies. A study from the United States indicated that 32% of cancer patients had hypertension, and 26% had diabetes mellitus [10].

In terms of demographic associations, our study found that older age and male gender were significantly associated with a higher prevalence of hypertension and diabetes mellitus. This aligns with the findings of a study by Rugbjerg *et al.*, [11], which reported that older cancer patients are more likely to have comorbid conditions such as hypertension and diabetes. Additionally, our study's finding that middle and low socioeconomic status is linked to higher prevalence is supported by research indicating that socioeconomic factors play a crucial role in the prevalence of chronic diseases among cancer patients.

The association between cancer type and stage with

comorbid conditions has been documented in previous studies. Our study found that breast cancer patients had a higher prevalence of both hypertension and diabetes mellitus, which is in line with the findings of a study conducted in South Korea [12], where breast cancer patients showed a higher prevalence of these comorbidities compared to other cancer types. Furthermore, advanced cancer stages (III and IV) were associated with a higher prevalence of these comorbidities, which is consistent with findings from a European study that indicated a higher prevalence of comorbid conditions in patients with advanced-stage cancers [13].

Clinical Implications

The high prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh highlights the need for integrated healthcare approaches that address both cancer and comorbid conditions. Routine screening for hypertension and diabetes should be an essential component of cancer care. Moreover, tailored management strategies considering the unique needs of cancer patients with these comorbidities are critical for improving patient outcomes. Our study also highlights the importance of addressing socioeconomic disparities in healthcare. Patients from lower socioeconomic backgrounds may require additional support and resources to manage their comorbid conditions effectively. Public health initiatives to increase awareness and improve access to healthcare services for these populations are essential.

Limitations and Future Directions

This study has several limitations that should be considered.

The cross-sectional design limits our ability to establish causality between cancer and comorbid conditions. Additionally, the study was conducted at a single tertiary care center, which may limit the generalizability of the findings to the broader population of Madhya Pradesh.

Future research should focus on longitudinal studies to explore the causal relationships between cancer and comorbid conditions. Additionally, multi-center studies involving diverse populations must validate our findings and develop comprehensive guidelines for managing comorbid conditions in cancer patients.

Conclusion

This study provides valuable insights into the prevalence of hypertension and diabetes mellitus among cancer patients in Madhya Pradesh. The significant associations between these comorbidities and demographic factors, cancer types, and stages highlight the need for integrated and tailored healthcare approaches. Addressing the healthcare needs of cancer patients with comorbid conditions is crucial for improving their overall health outcomes and quality of life.

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