

Research Article

Magnitude and Pattern of Distribution of Cancer in a Tertiary Care Center in Jaipur, Rajasthan

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ABSTRACT

Background: Cancer is a major global health concern with a steadily increasing burden in developing countries like India. Regional variations in cancer distribution necessitate localized data to support effective prevention and control strategies. This study aimed to assess the magnitude and pattern of cancer distribution in a tertiary care center in Jaipur, Rajasthan.

Methods: A retrospective, hospital-based observational study was conducted at a tertiary care center from January to December 2024. A total of 530 histopathologically confirmed cancer cases were included. Demographic details, site of cancer, and histopathological patterns were recorded. Data were analyzed using SPSS software, with categorical variables expressed as frequencies and percentages. Associations were assessed using the Chi-square test, considering $p < 0.05$ as statistically significant.

Results: The majority of patients were in the 41-60 years age group (44.9%), followed by those aged >60 years (37.2%), with a slight male predominance (52.3%). Oral cavity cancer was the most common malignancy (21.3%), followed by genitourinary (15.1%) and lung cancers (11.9%). Cervical and gastrointestinal cancers each accounted for 7.0% of cases, while breast cancer constituted 4.3%. Squamous cell carcinoma was the predominant histopathological type (52.1%), followed by adenocarcinoma (22.3%). A significant association was observed between gender and site of cancer ($p < 0.001$), with oral and lung cancers more common in males, and breast cancers more common in females.

Conclusion: The study highlights a substantial burden of cancer with distinct regional patterns, particularly a high prevalence of oral cavity cancers. These findings emphasize the need for targeted screening, tobacco control measures, and region-specific cancer prevention strategies.

Keywords: Cancer Epidemiology, Oral Cancer, Histopathology, Gender Distribution, India, Tertiary Care Center.

INTRODUCTION

Cancer has become one of the most important health challenges worldwide and is a leading cause of illness and death across populations. In recent years, global data have shown a steady increase in both the incidence and mortality of cancer, affecting countries at all levels of development (1,2). This rising trend is mainly linked to aging populations, changing lifestyles, environmental factors, and improved diagnostic facilities that allow more cases to be detected.

In India, the burden of cancer has been increasing gradually and is now a major public health concern. Reports from the National Cancer Registry Programme indicate a continuous rise in cancer cases, reflecting changes in demographic patterns and risk factor exposure (3). Moreover, future

estimates suggest that the number of cancer cases will continue to grow in the coming years, making it essential to generate reliable data for planning effective prevention and treatment strategies (4,6).

The pattern of cancer in India varies widely from one region to another. These differences are influenced by factors such as tobacco use, dietary habits, environmental exposures, socioeconomic conditions, and access to healthcare services (5). For example, cancers of the oral cavity, cervix, lung, and gastrointestinal tract are more common in certain regions, depending on local risk factors and cultural practices.

However, despite the availability of national-level data, there is still a lack of detailed region-specific information, especially from

states like Rajasthan. Hospital-based studies conducted in tertiary care centers are useful in understanding the local distribution of cancer, including its demographic and histopathological patterns. Such data are important for designing targeted screening programs and improving early diagnosis.

Cancer also continues to contribute significantly to mortality and disability, both globally and in India, indicating ongoing gaps in early detection and timely management (7,8). This highlights the need for more localized studies to better understand disease patterns and improve healthcare delivery.

Therefore, the present study was undertaken to assess the magnitude and pattern of distribution of cancer in a tertiary care center in Jaipur, Rajasthan, with the aim of providing region-specific data that can help in better planning of cancer control strategies.

MATERIALS AND METHODS

Study Design and Setting

This study was designed as a retrospective, hospital-based observational study conducted at a tertiary care center, JNU Institute for Medical Sciences and Research Centre (JNUIMSRC), Jaipur, Rajasthan. The institute serves as a major referral center catering to patients from both urban and rural populations of the region.

Study Duration

The study was carried out over a period of one year, from 1st January 2024 to 31st December 2024.

Study Population

All patients diagnosed with cancer and registered at the tertiary care center during the study period were included. A total of 530 confirmed cancer cases were analyzed to determine the magnitude and pattern of cancer distribution.

Inclusion Criteria

- All patients with a confirmed diagnosis of cancer registered between 1st January 2024 and 31st December 2024

- Cases with complete demographic and clinical details
- Histopathologically confirmed malignancies

Exclusion Criteria

- Cases with incomplete or missing records
- Patients with unconfirmed or suspected malignancy
- Duplicate records

Data Collection

Data were collected retrospectively from hospital records, cancer registries, and pathology reports. Information regarding demographic characteristics (age and gender), site of cancer, and histopathological diagnosis was recorded in a structured format. The collected data were verified to ensure accuracy and completeness before analysis.

Study Variables

The following variables were included in the analysis:

- Age (categorized into groups: <20, 21–40, 41–60, >60 years)
- Gender (male/female)
- Site of cancer (breast, lung, cervix, oral cavity, gastrointestinal, genitourinary, others)
- Histopathological type (squamous cell carcinoma, adenocarcinoma, lymphoma, sarcoma, others)

Outcome Measures

The primary outcome was to assess the magnitude of cancer cases and the pattern of distribution based on site and histopathological type. Secondary analysis included the distribution of cancer sites according to gender.

Statistical Analysis

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) software. Categorical variables were expressed as frequencies and percentages. Associations between variables were assessed using the Chi-square test or Fisher's exact test, as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1. Demographic Characteristics of Study Population

Variable	Number	Percentage
Total cases	n = 530	100
Age group (years)		

<20	14	2.6
21–40	81	15.3
41–60	238	44.9
>60	197	37.2
Gender		
Male	277	52.3
Female	253	47.7

Table 2. Distribution of Cancer by Site

Site of Cancer	Number	Percentage
Breast	23	4.3
Lung	63	11.9
Cervix	37	7.0
Oral cavity	113	21.3
Gastrointestinal	37	7.0
Genitourinary	80	15.1
Others	177	33.4
Total	530	100

Table 3. Histopathological Pattern of Cancer

Diagnosis	Number	Percentage
Squamous cell carcinoma	276	52.1
Adenocarcinoma	118	22.3
Lymphoma	42	7.9
Sarcoma	21	4.0
Others	73	13.8
Total	530	100

Table 4. Site Distribution According to Gender

Site	Male (n, %)	Female (n, %)	Total	p-value
Breast	1 (0.4%)	22 (8.7%)	23	<0.001
Lung	52 (18.8%)	11 (4.3%)	63	
Cervix	0 (0%)	37 (14.6%)	37	
Oral cavity	89 (32.1%)	24 (9.5%)	113	
Gastrointestinal	24 (8.7%)	13 (5.1%)	37	
Genitourinary	46 (16.6%)	34 (13.4%)	80	
Others	65 (23.5%)	112 (44.3%)	177	
Total	277 (100%)	253 (100%)	530	

A total of 530 patients were included in the present study. The age distribution showed that the majority of patients belonged to the 41–60 years age group (44.9%), followed by those aged more than 60 years (37.2%). Patients in the 21–40 years age group constituted 15.3%, while only 2.6% were younger than 20 years. With respect to gender distribution, males accounted for 52.3% of cases, while females comprised 47.7%, indicating a slight male predominance in the study population.

Regarding the site of cancer, oral cavity malignancies were the most common, accounting for 21.3% of cases. Genitourinary cancers were the second most frequent

(15.1%), followed by lung cancers (11.9%). Cervical and gastrointestinal cancers each contributed 7.0% of cases, while breast cancer constituted 4.3%. A substantial proportion of cases (33.4%) were grouped under the “others” category, which included less common cancer sites.

In terms of histopathological patterns, squamous cell carcinoma was the predominant type, observed in 52.1% of cases. Adenocarcinoma was the second most common histological subtype (22.3%), followed by lymphoma (7.9%) and sarcoma (4.0%). Other histological variants collectively accounted for 13.8% of cases.

The distribution of cancer sites according to gender revealed a statistically significant association ($p < 0.001$). Breast cancers were predominantly observed in females, with 95.7% of breast cancer. In contrast, lung and oral cavity cancers were more common among males, accounting for 18.8% and 32.1% of male cases, respectively, compared to 4.3% and 9.5% among females. Gastrointestinal and genitourinary cancers were observed in both genders, although slightly more common in males. The "others" category showed a higher proportion among females (44.3%) compared to males (23.5%).

DISCUSSION

The present study provides an overview of the magnitude and pattern of cancer distribution in a tertiary care center in Jaipur, Rajasthan, highlighting important demographic and clinicopathological trends. The findings of this study are consistent with previously reported regional and national data, while also reflecting certain local variations.

In the present study, a higher proportion of cases was observed in the 41–60 years age group, followed by patients above 60 years. This trend is comparable with earlier epidemiological studies, which have shown that cancer incidence increases with age due to cumulative exposure to risk factors and biological aging processes. Additionally, a slight male predominance was noted, which has also been reported in other Indian studies and may be attributed to higher exposure to risk factors such as tobacco use, occupational hazards, and lifestyle-related factors among males (10).

With respect to site distribution, oral cavity cancers were the most common malignancies in the present study. This finding aligns with existing literature indicating a high burden of head and neck cancers in India, particularly due to widespread tobacco chewing and smoking habits (9). Studies from Rajasthan and other regions have similarly reported oral cancers as a leading malignancy, emphasizing the role of preventable risk factors in this region (14). Lung cancer was another common malignancy, predominantly affecting males, which is consistent with global and national patterns linking it to tobacco smoking (9).

Genitourinary cancers and gastrointestinal malignancies also constituted a significant proportion of cases. Previous studies have

highlighted the rising burden of digestive tract cancers in India, influenced by dietary habits, infections, and environmental exposures (11,12). The proportion of gastrointestinal cancers observed in this study is comparable to earlier reports, suggesting a consistent epidemiological pattern across different regions of the country (11,12).

Cervical cancer remained a common malignancy among females, reflecting the continued burden of this preventable cancer in India. Similar findings have been reported in multiple regional studies, where lack of screening and awareness contribute to its high prevalence (10). In contrast, breast cancer constituted a relatively smaller proportion in the present study, which may reflect referral patterns or regional differences in cancer epidemiology.

The histopathological analysis revealed that squamous cell carcinoma was the most common subtype, followed by adenocarcinoma. This predominance of squamous cell carcinoma is in agreement with previous studies, particularly due to the high prevalence of head and neck cancers in the Indian population (13,14). Adenocarcinoma was mainly associated with gastrointestinal and genitourinary malignancies, which is consistent with established pathological patterns (11,12).

The gender-wise distribution of cancer sites showed a statistically significant association, with breast and cervical cancers predominantly affecting females, while oral cavity and lung cancers were more common in males. These findings are consistent with established epidemiological patterns and reflect gender-specific exposure to risk factors (9,10). The higher burden of oral and lung cancers among males can be attributed to higher tobacco consumption, whereas female-specific cancers such as cervix and breast are influenced by reproductive and hormonal factors.

CONCLUSION

The present study highlights the significant burden and distinct pattern of cancer distribution in a tertiary care center in Jaipur, Rajasthan. The majority of cases were observed in the middle-aged and elderly population, with a slight male predominance. Oral cavity cancer emerged as the most common malignancy, followed by

genitourinary and lung cancers, reflecting the influence of region-specific risk factors such as tobacco use and lifestyle practices.

Squamous cell carcinoma was identified as the predominant histopathological type, consistent with the high prevalence of head and neck cancers in the region. The study also demonstrated a significant gender-wise variation in cancer distribution, with female-specific cancers such as breast and cervix predominantly affecting women, while oral and lung cancers were more common among males.

These findings emphasize the need for targeted public health interventions, including tobacco control measures, awareness programs, and early screening strategies, particularly for preventable cancers. Hospital-based data from such studies provide valuable insights into regional cancer patterns and can aid in planning effective cancer control policies and improving early diagnosis and management.

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