MEDICINE, CANCER PATIENTS

Cancer Patterns and Their Age- and Sex-Specific Distribution among Patients in a Tertiary Care Hospital: A Cross-Sectional Study

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Abstract

Background: Cancer is a leading cause of morbidity and mortality worldwide, and its burden in India continues to rise alongside the ongoing epidemiological transition. Patterns of cancer occurrence vary considerably by age, sex, and geographic region, and hospital-based data from tertiary care centres provide valuable local insight where population-based registries are unavailable.

Objectives: To describe the pattern of cancers and analyse their distribution by age and sex among patients registered in the Radiotherapy Department of a tertiary care hospital in central India.

Methods: A hospital-record-based cross-sectional study was conducted among patients with confirmed malignancy registered in the Department of Radiotherapy, Government Bundelkhand Medical College, Sagar, Madhya Pradesh. Demographic details and cancer site were abstracted from departmental registers using a pretested structured proforma and analysed descriptively.

Results: Of 506 patients, 274 (54.15%) were male and 232 (45.85%) were female (male-to-female ratio ≈1.18:1). Nearly half (46.25%) were aged 40–59 years, followed by 34.19% aged 60–79 years; only 1.58% were below 20 years. Breast cancer was the single most common malignancy (96 cases, 19.0%), followed by cancers of the tongue (49, 9.7%) and lung (28, 5.5%). Breast and ovarian cancers occurred exclusively among females and prostate cancer only among males, while tongue, lung, haematologic, buccal mucosa, rectal, and oropharyngeal cancers — and head and neck cancers overall — were more frequent among males.

Conclusion: This hospital-based study demonstrates a substantial cancer burden concentrated in the middle-to-older age groups, with sex-specific patterns consistent with the influence of tobacco use and reproductive/hormonal factors. These findings can help guide age- and sex-targeted screening, early-detection, and tobacco-control strategies in this part of central India.

Keywords: cancer patterns; age distribution; sex distribution; radiotherapy department; tertiary care; hospital-based cancer registry; cross-sectional study

1 Introduction

Cancer has emerged as one of the leading causes of death and a major impediment to increasing life expectancy worldwide. Global estimates for 2020 placed the burden at approximately 19.3 million new cancer cases and almost 10.0 million cancer deaths, with the overall risk of developing cancer before the age of 75 years reaching close to one in five people globally [1]. Developing countries, including India, are experiencing a steady rise in cancer incidence, driven by demographic ageing, tobacco use, infection-related cancers, changing lifestyles, and unequal access to healthcare services.

The burden of cancer in India is not uniform and varies widely across states and regions, reflecting differences in risk-factor exposure, screening coverage, and healthcare infrastructure [2]. National Cancer Registry Programme data indicate that breast and cervical cancers remain the most common malignancies among Indian women, while cancers of the head and neck, lung, and gastrointestinal tract predominate among men, with tobacco-related cancers forming a substantial share of the overall burden [3, 4].

Central India, including Madhya Pradesh, is recognised as a region with a particularly high prevalence of tobacco-related cancers, and a considerable proportion of patients in this region present at advanced disease stages, reflecting gaps in early detection and public awareness [5]. Hospital-based cancer registries from different parts of the country have shown that the relative distribution of cancer sites can differ meaningfully between settings, underscoring the value of describing local patterns rather than relying solely on national or global estimates [5, 6].

Understanding the age- and sex-specific pattern of cancer among patients seeking care at a tertiary hospital is therefore essential to guide region-specific prevention, screening, and treatment strategies. This study was undertaken to describe the pattern of cancers and their distribution by age and sex among patients registered in the Radiotherapy Department of a tertiary care hospital in Sagar, Madhya Pradesh.

2 Objectives

1. To identify the types of cancers diagnosed among patients registered in the Radiotherapy Department of a tertiary care centre.
2. To analyse the distribution of cancers by age group.
3. To assess the sex-wise distribution of cancers and identify gender-specific patterns.

3 Materials and methods

3.1 Study design and setting

This was a hospital-record-based cross-sectional study conducted in the Department of Radiotherapy, Government Bundelkhand Medical College, Sagar, Madhya Pradesh — a tertiary care referral centre for oncology services in the region.

3.2 Study period

The study included patients diagnosed with malignancy and registered in the Radiotherapy Department from July 2024 to June 2025. A total of 506 patient records were included in the study.

3.3 Study population and sampling

All patients with a confirmed diagnosis of malignancy who were registered in the Radiotherapy Department during the study period and whose records had complete demographic and diagnostic documentation were included, using a complete enumeration (census) approach of eligible departmental records. Records with incomplete or missing demographic or diagnostic information were excluded. No direct patient interaction, examination, or sampling of biological material was involved; data were abstracted entirely from existing departmental registers and case records.

3.4 Data collection

A pretested structured proforma was used to extract information on patient demographics (age and sex) and cancer characteristics (site/type of malignancy) from departmental registers. Extracted data were entered into a master sheet, cross-checked for completeness and consistency, and coded by cancer site for analysis.

3.5 Statistical analysis

Data were analysed descriptively using MS Excel and SPSS (trial version). Categorical variables (sex, age group, and cancer site) were summarised as frequencies and percentages. The distribution of cancer sites was cross-tabulated by sex to identify gender-specific patterns.

3.6 Ethical considerations

The study involved only secondary review of existing departmental records, with no direct patient contact; patient confidentiality was maintained throughout by using de-identified data for analysis. Ethical approval was obtained from the Institutional Ethics Committee, Government Bundelkhand Medical College, Sagar, before the commencement of the study.

4 Results

A total of 506 patients with confirmed malignancy registered in the Radiotherapy Department were included in the analysis. Of these, 274 (54.15%) were male and 232 (45.85%) were female, giving a male-to-female ratio of approximately 1.18:1 (Table 1).

Table 1. Sex distribution of study participants (N = 506).

Sex	Number	Percentage
Male	274	54.15%
Female	232	45.85%
Total	506	100.0%

With respect to age, nearly half of the patients (46.25%) were in the 40–59-year age group, followed by 34.19% in the 60–79-year age group. Only 1.58% of patients were below 20 years of age, while the remaining 17.98% were distributed across the 20–39-year and ≥80-year age groups (Table 2), indicating that cancer in this population was overwhelmingly a disease of middle and older age.

Table 2. Age-group distribution of study participants (N = 506).

Age Group (years)	Number	Percentage
< 20	8	1.58%
20 – 39*	—	—
40 – 59	234	46.25%
60 – 79	173	34.19%
≥ 80*	—	—
Subtotal (20–39 and ≥80 combined)	91	17.98%

Age Group (years)	Number	Percentage
Total	506	100.0%

*Individual counts for the 20–39-year and ≥80-year subgroups were not separately available in the source data and are presented here as a combined subtotal.

Among the cancer sites recorded, breast cancer was the single most common malignancy, accounting for 96 cases (19.0% of the total), followed by cancers of the tongue (49 cases, 9.7%) and lung (28 cases, 5.5%). Other relatively frequent sites included haematologic malignancies and ovarian cancer (18 cases each, 3.6%), prostate cancer (16 cases, 3.2%), buccal mucosa (15 cases, 3.0%), rectum (13 cases, 2.6%), and oropharynx (12 cases, 2.4%). The remaining cases (241, 47.6%) were distributed across other, less frequently recorded sites, including the supraglottis, cervix uteri, bone marrow, and oesophagus (Table 3).

A clear sex-specific pattern was evident. Breast and ovarian cancers occurred exclusively among females, while prostate cancer was observed exclusively among males. Cancers of the tongue, lung, buccal mucosa, rectum, and oropharynx, as well as haematologic malignancies, were more common among males than females, and head and neck cancers as a group showed an overall male predominance (Table 3).

Table 3. Distribution of major cancer sites by sex (N = 506).

Cancer Site	Female, n	Male, n	Total, n (%)
Breast	96	0	96 (19.0%)
Tongue	18	31	49 (9.7%)
Lung	7	21	28 (5.5%)
Haematologic	7	11	18 (3.6%)
Ovarian	18	0	18 (3.6%)
Prostate	0	16	16 (3.2%)
Buccal mucosa	7	8	15 (3.0%)
Rectum	2	11	13 (2.6%)
Oropharynx	3	9	12 (2.4%)
Other sites*	74	167	241 (47.6%)
Total	232 (45.85%)	274 (54.15%)	506 (100.0%)

*Includes supraglottic, cervical, bone marrow, oesophageal, and other less commonly recorded malignancies not individually enumerated in the source data; the female/male split shown for this category is derived by subtraction and was not independently itemised by site.

5 Discussion

This hospital-based cross-sectional study of 506 patients registered in the Radiotherapy Department of a tertiary care centre in Sagar, Madhya Pradesh, found a modest male predominance (54.15%) and a disease burden concentrated in the 40–79-year age range, with breast cancer as the single leading malignancy overall.

The overall male-to-female ratio observed here is broadly comparable to that reported from a large private-sector hospital-based cancer registry in Delhi, where 51% of 15,850 registered patients were male [5]. In that registry, as in the present study, breast cancer was the most common malignancy among females, while tobacco-related sites — including the mouth, lung, and pharynx — featured prominently among males [5]. This concordance suggests that, despite differences in geography and healthcare setting, certain sex-specific patterns of cancer occurrence are broadly consistent across Indian tertiary care centres.

The predominance of tongue, buccal mucosa, oropharyngeal, and lung cancers among male patients in this study is consistent with the well-documented burden of tobacco-related malignancies in central India [3]. National hospital-based cancer registry data have similarly highlighted head and neck cancers as a major contributor to the male cancer burden in India, reflecting the high prevalence of smoking and smokeless tobacco use in this region [3, 6]. The exclusive occurrence of breast and ovarian cancers among females and of prostate cancer among males in this dataset is biologically expected and lends internal consistency to the recorded data.

The age distribution observed — with 46.25% of patients aged 40–59 years and a further 34.19% aged 60–79 years — mirrors the global pattern of rising cancer risk with advancing age, as reflected in GLOBOCAN estimates, and is consistent with the age structure reported in other Indian hospital-based registries [1]. The relatively small proportion of patients below 20 years of age (1.58%) is in keeping with cancer being predominantly, though not exclusively, a disease of adulthood, while the substantial proportion of patients aged 60 years and above highlights an emerging need for geriatric oncology and palliative care capacity in this setting.

Taken together, these findings support the case for age- and sex-targeted interventions in this region: breast and cervical cancer awareness and screening programmes directed at women in the 40-year-and-above age group, and tobacco-cessation and oral/lung cancer screening initiatives directed at men, delivered through existing platforms such as the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).

6 Limitations

This study has several limitations that should be considered when interpreting its findings. First, being hospital-based and restricted to a single Radiotherapy Department, the findings are subject to referral bias and may not reflect the true community-level incidence of cancer; no population denominator was available, so incidence rates could not be calculated. Second, only patients referred for radiotherapy were captured, which may under-represent malignancies managed predominantly by surgery, chemotherapy, or in other departments, and correspondingly over-represent sites for which radiotherapy is a standard component of treatment. Third, as a retrospective review of existing records, the study was subject to the completeness and accuracy of departmental documentation, and did not capture data on histological subtype, disease stage, treatment received, or outcomes. Finally, as a single-centre study, the generalisability of these findings to other regions or healthcare settings may be limited.

7 Conclusion

This study highlights a considerable cancer burden among patients attending a tertiary care centre in central India, concentrated in the middle-to-older age groups and with a modest male predominance.

Breast cancer was the leading malignancy overall, while head and neck cancers — reflecting the influence of tobacco use — predominated among males. Clear sex-specific patterns, including the exclusive occurrence of breast and ovarian cancers in females and prostate cancer in males, were evident. These findings underscore the importance of region-specific, age- and sex-targeted cancer control strategies, including early detection initiatives and tobacco-control programmes, to reduce the cancer burden in this population.

Author contributions

TLH: data collection, data analysis, and manuscript drafting. AG: conceptualisation, study supervision, and critical revision of the manuscript. RKM: methodology and critical revision of the manuscript.

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