Original Research Article

An audit and analysis of cancer patients attending radiation oncology department: a tertiary care center experience

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ABSTRACT

Background: Cancer is a major public health problem worldwide and is the second leading cause of death in the developing countries. Among various diseases, cancer has become a big threat to human beings globally. As per Indian population census data, the rate of mortality due to cancer in India was high and alarming with about 8,06,000 existing cases by the end of the last century. In view of these facts, the present article describes the status of various types of cancers in the southern part of Odisha.

Methods: A total of 1123 patients were registered in the department of radiotherapy, maharaja krushna chandra gajapati medical college, Odisha, during the period from January to December 2019 and were included for the retrospective analysis.

Results: Females outnumbered males with a ratio of 1.32. Highest number of the patients belong to the age group of 60-69 years. Major cancer sites in females were cervix, breast followed by head and neck. Leading cancer sites in males were head and neck, stomach, rectum and lungs. Most of the cases presented in advanced stage of disease (78%). Squamous cell carcinoma was the most common histopathology (81%). A significant proportion of patients defaulted after undergoing preliminary investigations (27.4%). Out of the total (1123) population 482 patients received radiation and 760 patients received chemotherapy and 425 received supportive care.

Conclusions: The outcome of this study will significantly help us to understand the cancer burden in southern Odisha and its distribution to define region specific strategies for cancer management.

Keywords: Cancer, Radiotherapy, Burden, Prevalence, Southern Odisha

INTRODUCTION

Cancer is a major cause of morbidity and mortality in developing and developed countries alike.[1] In many low-income and middle-income countries, including India, most of the population does not have access to a well-organized and well-regulated cancer care system. Diagnosis of cancer often leads to catastrophic personal health expenditures.[2] Cancer is the second and fourth leading cause of adult death in urban and rural India, respectively.[3]

Cancer is now the leading cause of increasing expenditure before death in India among other diseases.[4-6] Out of-pocket expenditure is three times higher for private inpatient cancer care in India.[5] Approximately 40% of cancer costs are met through borrowing, sales of assets, and contributions from friends and relatives; these costs exceed 20% of annual per capita household expenditure in 60% of Indian households with a patient with cancer.[7] Estimates show that Indian citizens spent 6.74 billion US dollars in 2012 because of cancer deaths.

The world's population is expected to be 7.5 billion by 2020 and approximations predict that about 15.0 million new cancer cases will be diagnosed; with deaths of about 12.0 million cancer patients.[8] The prevalence of cancer in India is estimated to be around 2.5 million, with about 8, 00,000 new cases and 5,50,000 deaths per annum.[9] According to 1991 Indian census data, about 6,09,000 cancer cases have been detected. This number had drastically increased to 8,06,000 by the end of the last century.[10] The International Agency for Research on Cancer GLOBOCAN project-1 has predicted that India's cancer burden will nearly double in the next 20 years, from slightly over a million new cases in 2012 to more than 1·7 million by 2035. These projections indicate that the absolute number of cancer deaths will also rise from about 6,80,000 to 1.2 million in the same period.[1]

No national registry exists that provides comprehensive cancer incidence or mortality data for India. However, the national cancer registry programme (NCRP, established by the Indian council of medical research in 1981) provides population-based data from a selected network of 28 cancer registries located across the country.[11] Information from 12 registries deemed to provide reliable data was used to estimate the national statistics presented in relevant GLOBOCAN publications.[1,12] However, the resulting estimates have several limitations. They might, for example, be more representative of urban and south Indian populations than of those populations living in the rest of the country. Under-recording of cancer cases and deaths, especially among older people, is another problem that reduces accuracy. Nevertheless, the aggregated numbers reported through globocan are the best available ongoing estimates of the cancer burden in India and are suitable for use as the main basis for priority setting and planning of cancer management across the nation.

In addition to this primary source, the million deaths study-10 is another important data resource. Researchers independently assigned causes to 122,429 deaths in 1·1 million homes in 6671 randomly selected rural and urban areas of India, using a validated verbal autopsy-based method to establish mortality cause. The million deaths study provides additional useful data about the nationwide cancer burden and on regional, state, and rural versus urban variations.

Figures on the distribution of cancer treatment facilities and expertise available were obtained from various sources, including the medical council of india and national board of examinations websites, and publications issued by the atomic energy regulatory board (which licenses and monitors radiotherapy centers in India).[13–15] With regard to population size, data provided via the office of the Registrar General and Census Commissioner of India were used and the most recent (15th) national census was done in two phases in 2011.[16]

India is a vast country with varied cultures and habits. Geographic differences exist in patterns of cancer observed among the different registries (ICMR, 2002). For example, cancer of the gall bladder (GB) has high incidence in the population-based cancer registry (PBCR) of Delhi, especially rural Delhi and Bhopal, while cancer of the nasopharynx has been the one of the consistent leading cancer sites among males in Sikkim (ICMR, 2006) and Mizoram.

Odisha is on the eastern part of India with seven costal districts along the Bay of Bengal. The state has a population of 4.19 cores and a land area of 1,55,707 km^2 which is 4.87% of total area of India and a coastline of 450 km. Most of the inhabitants of Odisha belong to rural areas and the literacy rate is 72.87% which is less than average literacy rate of India (72.98%). There is no cancer registry in the state till now with three government cancer centers. There is an essential need for information regarding site, stage, status, disease extension of cancer at first presentation to develop a comprehensive and effective cancer management policy. The present study was carried out with an aim to describe the magnitude of cancer, stage and prior treatment received before attending the department of radiotherapy.

METHODS

The present study was carried out in the department of radiotherapy, maharaja krushna chandra gajapati medical college, Berhampur, Odisha with effect from January 2019 to December 2019. The study comprised retrospective analysis of patients attending radiotherapy department. All the patients were assessed as per available records on detailed history, complete clinical examination and investigations which included hematological (complete blood count), biochemical (renal and liver function tests), and radiological investigations (x-rays, ultrasound, CT scan and MRI according to the need for staging and patients' affordability) performed before actual treatment start, during treatment and subsequently during follow up. Most of the patients presented with histopathology report. Rest were either referred for histo-pathological diagnosis. Some were referred for review of pathological diagnosis to the department of pathology. Clinical staging and grouping were done according to TNM (UICC-AJCC staging, 7th edition) classification. A total of eleven hundred and twenty-three patients included for the present study; were subjected to analysis regarding their geographical distribution, age of presentation, gender predominance, histopathology, site of disease, stage and status of presentation.

RESULTS

Out of a total registration of 1123 new patients in the department during the period of January 2019 to December 2019, 1034 (92.1%) were natives of the various districts of Odisha. Rest hailed from the bordering districts of Andhra Pradesh. There were 640 females (56.9%) and the female to male ratio was 1.32:1. When

age wise distribution of cancer patients was analyzed it was found that highest number of patients belonged to the age group of 60-69 year which includes 163 (55.3%) and 132 (44.7%) of female and male patients respectively. The distribution of male and female patients according to their age categories has been depicted in (Table 1).

Table 1: Distribution of male and female patients according to their age categories (n=1123).

Age group (in years)	Total (n)	Male N (%)	Female N (%)
10-19	14	7 (50.0)	7 (50.0)
20-29	49	23 (46.9)	26 (53.1)
30-39	138	47 (34.1)	91 (65.9)
40-49	255	103 (40.4)	152 (59.6)
50-59	250	99 (39.6)	151 (60.4)
60-69	295	132 (44.7)	163 (55.3)
70-79	94	51 (54.3)	43 (45.7)
≥80	28	21 (75.0)	7 (25.0)

Various cancer sites in males and females have been enumerated in (Figure 1). Cervix was found to be the leading cancer site in females n=196 (17.5%), followed by breast n=107 (9.5%), head and neck (H and N) n=42 (3.7%), Ovary n=36 (3.2%), stomach n=28 (2.4%). H and N cancers formed the main bulk of disease in case of males n=93 (8.3%) followed by stomach n=59 (5.3%), rectum n=30 (2.6%), lung n=20 (1.7%), penile n=15 (1.3%).
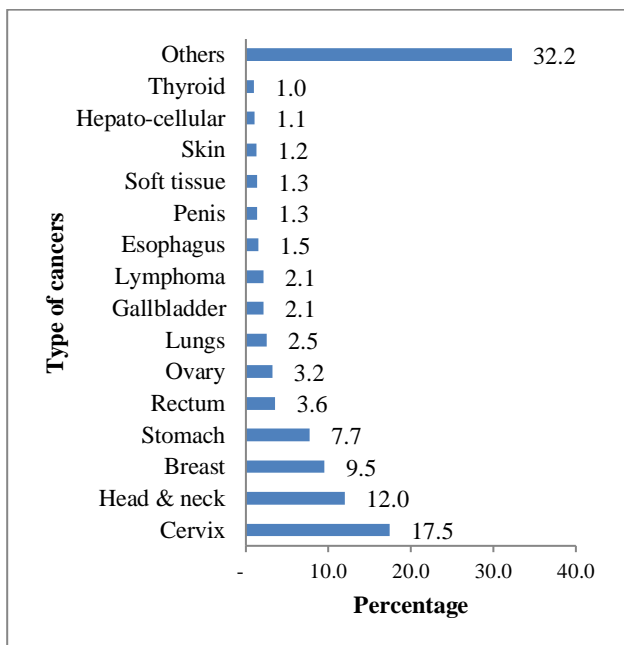

Figure 1: Distribution of cases on the basis of cancer sites (n=1123).

Stage was known for 505 (44.9%) patients only. Most of the patients presented with advanced stage of disease with stage III and IV accounting for 394 patients (78%).
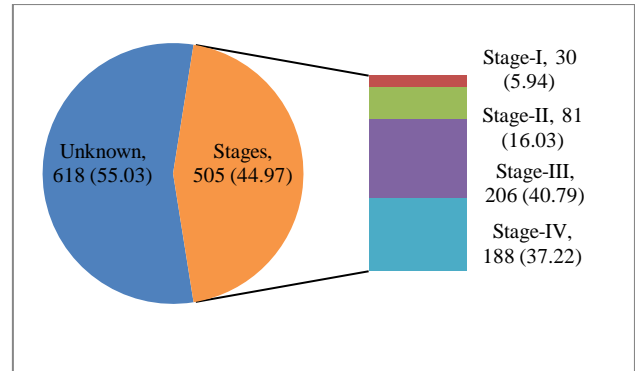

Figure 2: Stage wise distribution of cancer patients.

Histo-pathological diagnosis was available for 1626 (81.1%) patients. Carcinomas were most common cancer variety (66.5%) and sarcoma cases were around 7.9%. Squamous cell carcinoma (SCC) was the most common subtype 32.2% (n=362) followed by adenocarcinoma 25.2% (n=284).
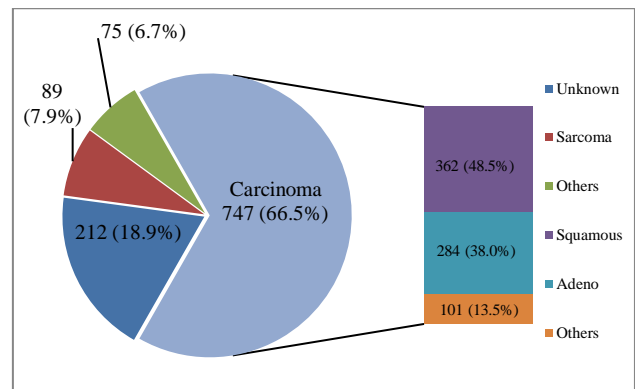

Figure 3: Histopathological distribution of patients attending radiotherapy department.

Table 2: Distribution of patients according to various treatment modalities.

Treatment modalities	Number of patients	Percentage (%)
RT	301	16.95775
CT+RT	181	10.19718
CT	560	31.5493
Supportive treatment	425	23.94366
Lost after initial investigations	308	17.35211

Most of the cases n=628 (72%) at presentation were fresh cases, they had not received any prior treatment elsewhere. Rest patients had received some form of anti-cancer therapy; either surgery, chemotherapy, radiotherapy or a combination of them at other departments or outside set up before they came to seek opinion in our department. Majority of the patients were planned for external beam radiotherapy either with a

curative or palliative intent. Chemo-radiotherapy was planned for patients with advanced disease. Significant number of patients (n=308) 27.4% defaulted after undergoing preliminary investigations and 482 of the rest patients were planned for radiation including 198 cases of concurrent chemo-radiation, 460 were planned for chemotherapy, 425 patients were under supportive treatment (Table 2).

DISCUSSION

A total of 1123 patients were registered in the department of radiotherapy, MKCG medical college during the period of January 2019 to December 2019.

Most of the patients were from different districts of Odisha with highest number of patients (79.6%) belonged to the home district and only 7.9% were from the bordering districts of Andhra pradesh. Females out-numbered males (F:M=1.32:1). This is in conformity with the results of registered cases in Bangalore, Mumbai, Chennai and Barshi; rural and expanded where females predominate in the number of incident cases as per the population-based cancer registries (PBCR, 2009-2011) and data from Indian council of medical research (ICMR). A recent report by Hussein et al reporting the patterns and trends of cancer in Odisha reported a higher proportion of cases in females.[17]

Highest number of cancer patients belonged to the age group of 60 to 69 year in both male and female cancer patients in this study and in a broad sense cancer risk is more during the 5-7th decades of life. Cancer incidences in rural Delhi report the age adjusted incidence rates for all cancer sites to be 55.2 per 100,000 for males and 47.7 per 100,000 for females.[18] According to SEER statistics, maximum incidence occurs from 5-8th decade, this is because life expectancy is more in developed countries.

Cancer of the cervix was the leading cancer (30.6%) in the females followed by breast (16.7%), H and N (6.5%), ovary (5.6%), and stomach (4.3%). Among male's carcinoma of the H and N region formed the main bulk of cancers (19.2%) followed by stomach, rectum, lungs, penile malignancies. Most of the patients in this part of country were of low socio-economic status, un-educated and lack of health awareness. The females are mostly illiterate, with early age of marriage, high parity and poor personal hygiene with lots of blind believes and social taboos. More prevalence of HIV and AIDS in this part of country may contribute towards higher number of carcinoma cervix cases. The data from the globocan-2018 reveal breast cancer to be the most common cancer in females followed by cervix in India. According to PBCR (2009-2011) data, cervix uteri continue to remain the leading site of cancer in both Barshi Rural registry (29.8%) and in Barshi expanded (33.6%) registry as well followed by breast and ovary. Manoharan et al. and Mehrotra et al. have reported cervix to be the leading malignancy in females in Allahabad and rural Delhi

which show that cervical cancers continue to predominate in this part of the country in contrast to reported registries from other parts of the nation.[18-19] Data from a rural district in South India.[20] also reveal cervical malignancy to be the leading cancer site in females. A look into the western world unveil breast (29%) to be the leading cancer site in females followed by lung and bronchus and colorectum. The liver and intrahepatic malignancies are on the rise in the fairer sex.[21]

Addiction to tobacco chewing (paan, gutka, khaini) and smoking is very common among the population in this region which may be the cause of higher incidence of H and N cancers in both sexes. They form the major bulk of cancers in males (19.2%) in our study. Manoharan et al and Mehrotra et al have reported oral cavity cancers to be the ruling cancer site in males in Allahabad and rural Delhi whereas lung continues to be the leading cancer site in almost all other registries.[18-19] Hypopharyngeal and nasopharyngeal cancers do feature consistently in the list of top ten cancers of the north eastern region. Barshi rural and expanded registry, which predominantly has a rural population base, also shows cancer of the mouth to be the leading cancer. More use of pickles and dry salty fish by the people in this costal part of the country might contributed towards more cancer stomach cases, being the 2nd common malignancy among male population. Data from the western world unwrap prostate to be the leading site followed by lung and colorectum.

Stage was known for only 44.9% of cases, for the rest information regarding stage was not available; these patients had received primary treatment elsewhere and the records of treatment details were either not available or patient had not been staged before therapeutic intervention. Most of the cases presented in advanced stage of disease, with stage III and IV accounting for about 78% of cases. Analysis of 2167 H and N cases from a regional cancer centre done in Delhi revealed about 80% of cases presenting with advanced stage of disease and about 10% cases were unstaged.[22] Reason for late presentation could be attributed to illiteracy and lack of awareness about the dreaded nature of the disease. Patients concealed their disease for a considerable period, especially females due to shyness. Financial constraints and transportation difficulties made it difficult for poor patients to travel distant places to seek medical advice at an early stage; the symptoms of advanced disease, forced them to pursue it later. Some cancers might not have produced discernible symptoms forcing consultation at the early stage. Local medical practitioners failed to arrive at the diagnosis for those presenting with early disease. Lack of workable clinical knowledge in the field of oncology and modern diagnostic tools of the practitioners in the vicinity led to improper diagnosis and delay in the proper management of cases.

About 81.1% of cases had cytology or histology-based diagnosis; of which 66.5% were carcinoma. Squamous cell carcinoma (SCC) was the most common histological

subtype (48.5%) followed by adeno carcinoma (38%). Data from the HBCRs (2004-2006) unveil that the proportion of microscopic confirmation was 90% in both sexes in all HBCRs, except in Chennai where it was 83.2% in males and 88.3% in females. Clinico-pathological features of gynecological malignancies reported from a tertiary care hospital in eastern India disclosed that majority of the patients (61.0%) had SCC, followed by adenocarcinoma (30.1%).[23]

Most of the cases (628%) at first presentation were fresh cases and 315 (36.51%) patients had received some form of therapy elsewhere before they came for treatment at our centre. On comparison with the data from HBCRs (2004-2006) it was found across all registries in both the sexes that about 10-30% of cases had received prior treatment before their first presentation at the reporting institution.

Majority of the patients were planned for external beam radiotherapy either with a curative or palliative intent or for chemo-radiotherapy as they presented with advanced stage of disease. Thus, radiotherapy either as a single modality or in combination with chemotherapy was the most common modality of treatment used. Above findings are in conformity with HBCRs (2004-2006); most of the patients had been treated with single modality treatment which ranged from 60% in most registries in males to about 80% in Dibrugarh registry. Radiotherapy was the predominant modality employed being 74.1% in Dibrugarh registry among males; to about 20-30% in both sexes in Bangalore and Thiruvananthapuram registry. Chemotherapy used as a single modality for treatment of malignancy has gained popularity over the years across all registries and contributes to about 20% as a therapeutic or palliative intervention. Analysis of 2167 H and N cancer cases in a study showed major cancer-directed treatment decisions were for radiotherapy followed by surgery and radiotherapy, and chemo-irradiation in 68.2%, 16.9% and 9.1%, respectively.[22]

Out of all cases (27.4%) defaulted after undergoing preliminary investigations. Mohanti et al in his analysis of H and N cancer cases reported 56% compliance to treatment at his centre. Our study thus shows similar pattern of patient percentage taking prescribed treatment and similar figures of withdrawal after first visit to the hospital.[22]

CONCLUSION

One of the key factors for better management of cancer is early detection and diagnosis of the deadly disease. In a developing country like India we need extensive cancer education and awareness programmes mainly in rural population. Early detection centers and primary health care by experienced healthcare providers with timely referral in remote areas are very much essential. Some cancers are associated with particular habits or lifestyle, hence proper counseling regarding the preventive aspect of cancer in the most vulnerable people is demand of the present time. Government initiatives for more research in the field of cancer vaccination, free treatment aids to poor people and inclusion of available vaccines in the routine immunization may help to decrease the disease burden in near future.

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