

# Epidemiology of cancer in young in central India: An analysis of rural cancer hospital data

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## Abstract

**Background:** Cancers in teenage and young adults (TYAs), though an increasing cause of mortality in our country, have been scarcely studied. The lack of studies of TYAs can significantly affect the outcomes of the youth in the prime of their lives. **Aims:** The aim of this study was to study the type of cancers in the TYA at a rural cancer center in central India. **Design and Methods:** A prospective study in the department of medical oncology, from the period of January 2013 till March 2016, was done. Data regarding socioepidemiological factors were collected for new cancer patients between the age group of 15–30 years in semi-structured questionnaire and from the hospital records. Cancers were classified according to the Birch classification. The cases were analyzed according to the epidemiological profile, classification of cancer, and age-wise distribution using descriptive analysis. **Results:** In this study, out of 5221 cancer patients, TYAs accounted for 327 (6.26%) with 189 males and 138 females (M:F= 1.37:1). The maximum cases were seen in 25–30 years' age group. Carcinoma was the most common malignancy (54.74%) with an increase from 19.56% in the 15–19 years' age group to 64.82% in the 25–30-year-old patients. **Conclusion:** The present study gives a glimpse of the TYA cancers in the central India. More than half of the young cancer patients suffer from carcinomas with about half of these being head and neck cancers.

**Key words:** Carcinoma, epidemiology, India, teenage and young adults

## Introduction

Adolescence is a period of transition from childhood to early adulthood. The age of 15–30 years is taken as the teenage and young adult (TYA). The TYAs have about 8 times higher incidence of cancer as well as a different cancer profile from the patients younger than 15 years.<sup>[1]</sup> The number of TYA cancer patients is 12,009, constituting about 10.2% of the total cancer patient population.<sup>[2]</sup>

The TYA patients have been an abandoned population by far in the literature, and though the data in the western world have been increasing, studies in our country regarding this subset of patients have been scarce. This is thus an initial effort to bring light to the types of cancer in the TYA patients from a rural cancer center in central India.

## Methods

The present study was carried out at Sri Aurobindo Medical College and P. G Institute, located at the outskirts of Indore district of Madhya Pradesh. It is a training center for a number of districts, both rural and urban located in Madhya Pradesh, Rajasthan, and parts of Maharashtra and Uttar Pradesh. It is a super specialty medical college with comprehensive oncology care, serving almost all sections of the society, but majority of the patient population are from the poor- to low-middle class background. The institute has an institutional cancer registry of the patients attending the department.

The present study was a prospective study of new patients with confirmed diagnosis of cancer between the age group of 15–30 years from the period of January 2013 to March 2016. A semi-structured questionnaire was created and filled by conversation on presentation in OPD or on telephonic conversation either with the patient or attendant. Data regarding the age, sex, marital status, education, address, income, and members in the family were collected.

The diagnosis was classified based on the Birch classification.<sup>[3]</sup> The TYA patients were subdivided into three age groups of

15–19 years, 20–24 years, and 25–30 years. Data were then recorded into a computerized database through Microsoft Excel. Descriptive statistics were used to analyze the data.

## Results and Observations

The total number of new patients presenting to the oncology department from January 2013 to March 2016 was 5221. Of these, the total number of new TYA patients during the study period was 327 (6.26%) with 189 males and 138 females (M:F= 1.37:1). The mean age of the patients was 25 years. The percentage of new TYA patients per year was 6.67% in 2013, 5.95% in 2014, 5.9% in 2015, and 7.35% in 2016.

In our set of patient population, 46.86% were unemployed and 11.59% were agriculturalist. Rural patients were 69.41% compared to 30.59% from urban areas. Majority of the patients had a monthly per capita income of <1800 rupees accounting for 48.79%, followed by a monthly per capita income between rupees 1800 and 5000 with 26.57% of the patient population. The majority of the patient population was educated up to secondary education constituting 36.23%. There were 12.08% uneducated and 23.67% having up to primary education. In our study population, 63.28% of the patients were married.

**Table 1: The distribution of patients based on the Birch classification**

Birch class	Number of patients (%)
Leukemia	27 (8.25)
Lymphoma	27 (8.25)
CNS tumors	40 (12.23)
Bone tumors	13 (3.97)
Soft-tissue sarcomas	15 (4.59)
Germ cell tumors	8 (2.45)
Melanoma/skin carcinoma	2 (0.61)
Carcinoma	179 (54.74)
Miscellaneous	6 (1.83)
Unclassified	10 (3.06)

CNS=Central nervous system

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**Table 2: Age-wise distribution of patients based on the Birch classification**

Birch class	Age 15-19 ( <i>n</i> =46), <i>n</i> (%)	Age 20-24 ( <i>n</i> =82), <i>n</i> (%)	Age 25-3 ( <i>n</i> =199), <i>n</i> (%)
Leukemia	6 (13.04)	8 (9.7)	13 (6.5)
Lymphoma	6 (13.04)	7 (8.5)	14 (7.03)
CNS tumors	9 (19.56)	7 (8.5)	24 (12.06)
Bone tumors	5 (10.86)	7 (8.5)	1 (0.5)
Soft-tissue sarcomas	4 (8.6)	4 (4.8)	7 (3.5)
Germ cell tumors	1 (2.17)	2 (2.4)	5 (2.5)
Melanoma/skin carcinoma	0	1 (1.21)	1 (0.5)
Carcinoma	9 (19.56)	41 (50)	129 (64.82)
Miscellaneous	1 (2.17)	1 (1.21)	4 (2.01)
Unclassified	5 (10.86)	4 (4.87)	1 (0.5)

CNS=Central nervous system

**Table 3: Comparison of data of the present study with other studies**

Birch class	Singh <i>et al.</i> <sup>[4]</sup>	Arora <i>et al.</i> <sup>[6]</sup>	Present
Hematological	67 (23.3)	1410 (28.9)	54 (16.5)
CNS	22 (7.6)	491 (10.1)	40 (12.23)
Bone tumors	28 (9.7)	382 (7.8)	13 (3.97)
Soft-tissue sarcoma	19 (6.6)	223 (4.6)	15 (4.59)
Germ cell tumors	21 (7.3)	126 (2.6)	8 (2.45)
Melanoma	2 (0.7)	11 (0.2)	1 (0.61)
Carcinoma	117 (40.7)	2076 (42.7)	180 (54.74)
Miscellaneous specified	9 (3.1)	-	6 (1.83)
Unspecified	2 (0.7)	145 (2.9)	10 (3.06)
Total	287	4864	327

CNS=Central nervous system

The total patients were classified based on the Birch classification.<sup>[3]</sup> There were 54.74% carcinomas of which 27.22% were head and cancer patients with males affected 5 times more than females (69 males, 13 females). There were 35 (10.7%) patients with breast carcinoma and 27 (8.26%) patients with gastrointestinal cancer. Leukemia and lymphomas were 8.25% each, and central nervous system (CNS) tumors were 12.06%. The number of patients in the carcinoma group constituted more than half of the total patient population [Table 1].

We also divided the entire cohort of patients into three subsets of age (15–19 years, 20–24 years, and 25–30 years) and study the individual cancer types. The number of patients in the age groups was different, and the percentage of the type of cancer also varied proportionately.

Within the age group of 15–19 years, CNS tumors and carcinomas were the highest proportion of cancers. In the age group of 20–24 years, carcinomas dramatically increased to 50% of all the patients within the age group constituting more than the number of leukemias, lymphomas, CNS tumors, and bone tumors combined which were the next most frequent cancers. In the age group of 25–30 years, about 65% of the cancers were carcinomas [Table 2].

## Discussion

In our study, we found a high percentage of carcinomas in the TYA patients, with a steep increase from 19.56% in the age group of 15–19 years to 50% in the age group of 20–24 years. The total percentage of patients with carcinoma was 54.74%. The incidence of carcinomas in the TYAs in other literature was 40.7% in data from Singh *et al.* from two hospitals' data from Delhi (patients aged between 15 and 29 years),<sup>[4]</sup> while

in a study by Kalyani *et al.*, about 55% of carcinomas with 24.24% of mouth cancers were reported (patients aged between 15 and 44 years).<sup>[5]</sup> This reported incidence seems to be higher in our study, but the patient population differs. In the study from Delhi, 15% of the patient population were not Indian nationals and had a higher urban patient population as compared to our study, where about 70% of the patient population were from rural background. While in the study from Kalyani *et al.*, the patient population was aged 15–44 years with higher incidence in the elderly subsets, thus drifting the percentage of carcinomas similar to our study. Furthermore, in our study, TYA patients composed of 6.26% of the total patient population, which was slightly higher than reported in other reports from India.

The high frequency of carcinomas in our patients could be because of the presence of medical college with referral for surgical and radiation oncology services from the surrounding districts. The high incidence of carcinomas with majority due being the head and neck cancers, especially in the males, could be reflective of the usage of tobacco at an early age in these rural boys.

In the present study, there were 16.5% of patients with hematological cancers with leukemia and lymphomas constituting 8.25% each. A decrease in the incidence percentage is seen as the age group increases for both leukemia and lymphoma. This finding was similar to the other studies. A slightly higher percentage of CNS tumors is also seen in our study and is possibly on account of referral bias.

We also compared our data with the data from Arora *et al.* and Randeep *et al.* of patterns of cancer in TYAs in India [Table 3]. When we compare our data from the Western literature as reported in the Practitioners Reporting Group report, breast cancer, lymphoma, germ cell tumors, thyroid carcinoma, sarcoma (bone and soft tissue), cervical carcinoma, leukemia, colorectal carcinoma, and CNS tumors accounted for 86% of the cancers in patients aged 15–39 years.<sup>[1,6]</sup> This type of cancer profile is drastically different from that seen in our study. The study by Arora *et al.* also highlights similar differences between the two patient populations.<sup>[7]</sup>

To the best of our knowledge, the present study is the first study from central India providing an insight toward the incidence, demographic profile, and types of cancer according to the Birch classification in the TYA patients. The study shows a high percentage of cancer in young patients with potential years of life ahead. Our study faces certain limitations with

some amount of a referral bias in the patient population and a limited sample size. Larger prospective studies are needed to draw conclusions.

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#### Conflicts of interest

There are no conflicts of interest.

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