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Adolescents and young adults: A study of distribution of cancer at ages 15–39 years in a tertiary care hospital from North India: Epidemiological considerations

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Abstract

Purpose: This study aimed to analyze cancer pattern among adolescents and young adults (AYA) in a tertiary care center in North India. **Materials and Methods:** A retrospective study from January 2011 to December 2014 was undertaken on AYA cancer patients (aged 15–39 years). **Results:** Totally 1077 cases of AYA cancers were identified for analyzing the frequency and pattern of cancer distribution. The most common cancer was head and neck (32%) followed by breast (14.2%). The distribution pattern was observed to be varying in different age groups with lymphoma, leukemia, bone tumors, and sarcomas in adolescents while carcinomas being more frequent in young adults. **Conclusion:** Cancer distribution patterns are distinct among AYA in terms of epidemiology and biology.

Key words: Adolescents, carcinoma, epidemiology, sarcoma, young adults

Introduction

Youth representation has been noted as 41.5% of the total population of India in 2011 and is still increasing.[1] Thus, adolescents and young adults (AYAs) form an important component of active population in any country and have a significant impact on health-care strategy. Cancer pattern in AYA[2] is different from those in pediatric age group and older adults. When diagnosed, AYAs suffer from adverse psychological effects as most of their potential years of life have to be spent with effects of cancer and its treatment.[3] Moreover, the outcome of cancer treatment in these patients lags far behind when compared to that in children and older adults.[4] This epidemiological study helps to know the incidence, age, gender, site distribution, and the probable risk factors responsible for cancers.

Materials and Methods

A 4-year retrospective study from January 2011 to December 2014 was undertaken in the Department of Radiotherapy and Clinical Oncology, Safdarjung Hospital, New Delhi. Patients between the ages of 15 and 39 years with histopathological-proven malignancy were studied for their demographic and clinicopathological data to find the occurrence and distribution of cancer according to gender, type, site, and histology.

Results

The study period included 1077 AYAs, representing 15.2% (1077/7084) of all cancers, out of which 56.6% (610) were males and 43.4% (467) were females [Figure 1]. Table 1 and Figure 2a show the distribution of cancer in these patients.

Head and neck (32.03%) and breast (14.2%) were found to be the most common cancers followed by central nervous system (CNS) tumors (10.6%), cervical cancer (9%), gastrointestinal cancer (7.7%), bone tumors (4.6%), and soft tissue sarcoma (4.6%). The most common site involved in head and neck cancer was buccal mucosa (97) followed by oral tongue (85), larynx (28), and base of tongue (25) – constituting two-third cases of head and neck malignancy in young adults.

The gender-wise distribution of cancers was also studied in these patients [Figure 2b]. In males, the most common cancer seen was head and neck cancer (47.9%), followed by CNS tumors (13.1%) while in females, breast cancer was identified as the most common malignancy with an incidence of 32% followed by carcinoma cervix (20.8%).

The distribution of cancers by 5-year age intervals (age range of 15–19 years; 20–24 years; 25–29 years; 30–34 years; and 35–39 years) was also noted [Figure 3a and b]. The most common cancer identified in adolescents (15–19 years) was lymphoma and leukemia (27.8%) followed by CNS tumors (15.6%). In the age group of 20–24 years, head and neck cancer (21.5%) was dominant, followed by CNS tumors (13.1%) and bone tumors (13.1%); in the patients in the age group of 25–29 years, head and neck malignancy accounted for 27.3% followed by CNS tumors (18.8%). Among patients in the age range of 30–34 years, the distribution of cancers included head and neck cancer (40.7%), breast cancer (17.9%), and carcinoma cervix (10%). The distribution pattern in the age group of 35–39 years was head and neck cancer (37.9%), breast cancer (20%), and carcinoma cervix (13.8%).

Discussion

There is very little knowledge about the epidemiological, biological, genetic, and therapeutic factors that affect the outcomes and quality of life in adolescent and young patients diagnosed with cancer.[5] One of the leading causes of mortality among young patients between 15 and 40 years of age in the US is cancer.[6] Thus, cancer among AYA patients is one of the emerging problems in the field of oncology[7] which cannot be overlooked.

The literature is quite scarce in the context of Indian patients diagnosed with cancer in the age group of 15–39 years. Thus, this study was carried out to look for the distribution of cancer among AYA patients in our institute which is one of the largest

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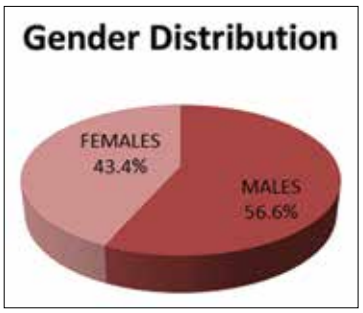

Figure 1: Totally 1077 adolescents and young adult patients were diagnosed with malignancy in between 2011 and 2014, 57.6% were males and 43.4% were females

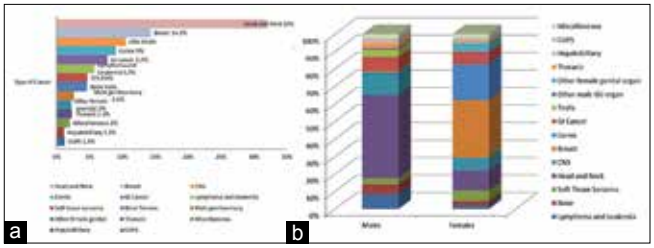

Figure 2: (a) Distribution of cancer among adolescents and young patients (age group of 15–39 years). (b) Gender-wise distribution of cancer among adolescents and young adult patients

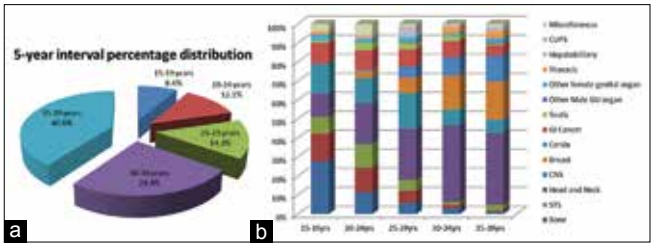

Figure 3: (a) Distribution of adolescents and young adult patients by 5-year age interval. (b) Distribution of cancer by 5-year age interval

tertiary care centers in North India. The patient statistics of Radiotherapy and Clinical Oncology Department is a reflection of data drawn from various other departments of the hospital attending multidisciplinary joint cancer clinics.

From January 2011 to December 2014, 15.2% of AYA patients were diagnosed with cancer and treated at our department. The overall cancer cases in the age group of 15–29 years registered in five urban cancer registries in India were 5.8% during 2001–2003.[8] Correspondingly in the US, cancer in young adults (age group of 15–39 years) represents 6% of all cancers.[1]

In this study, the frequency of cancer was shown to be higher in males than in females in adolescents, but frequency increased with increasing age, with females being affected more than males in the age group of 35–39 years, the observation which corresponds to the similar finding in the Indian[8] and the US studies.[1]

The present study showed a rising trend in the number of cases from 15 to 19 years' age group onward, while the maximum number of cases was registered in the age group of 35–39 years. This corroborates with a similar observation by Kalyani *et al*.[9] The most common cancers found in AYA patients comprising more than 85% of all cancers included head and neck, breast, and CNS tumors, similar to the common cancers found in this age group in the US population.[1] In addition, head and neck malignancy (32%) which was the most frequent cancer seen in this study was far more common in the US AYA patients. A similar observation has been documented

Table 1: Distribution of cancer among adolescent and young adult patients (15-39 years)

Type of cancer	Total	Males	Females
Head and neck	345	292	53
Buccal mucosa	97	94	3
Oral tongue	85	67	18
Base of tongue	25	22	3
Tonsil	16	14	2
Larynx	28	25	3
Nasopharynx	17	15	2
Parotid	18	8	10
Others	59	47	12
Breast	153	4	149
CNS	114	80	34
Astrocytoma	60	46	14
Oligodendroglioma	21	14	7
Ependymoma	13	7	6
Meningioma	7	4	3
Medulloblastoma	2	2	0
Pituitary adenoma	5	2	3
Craniopharyngioma	2	2	0
Gliosarcoma	1	1	0
Germinoma	1	1	0
Hemangiopericytoma	1	1	0
Cervix	97	0	97
Other female genital	24	0	24
Endometrium	4	0	4
Ovary	17	0	17
Vagina	2	0	2
Vulva	1	0	0
GI cancer	83	50	33
Stomach	4	3	1
Colon	11	7	4
Rectum	60	36	24
Anal canal	8	4	4
Leukemia	23	21	2
Lymphoma	39	31	8
Hodgkin's lymphoma	14	10	4
NHL	25	21	4
Bone tumors	49	35	14
Ewing's sarcoma/PNET	27	19	8
Osteosarcoma	12	10	2
Osteochondroma	2	1	1
Giant cell tumor	8	5	3
Soft tissue sarcoma	50	22	28
Malignant mesenchymal tumor	14	6	8
Synovial sarcoma	11	4	7
Fibrosarcoma	6	4	2
Dermatofibrosarcoma protuberans	6	4	2
Rhabdomyosarcoma	2	2	0
Leiomyosarcoma	2	1	1
Alveolar soft tissue sarcoma	1	0	1
Not specified	8	1	7
Male genitourinary	28	28	0
Testis	22	22	0
Penis	2	2	0
Urinary bladder	2	2	0
Kidney	2	2	0
Thoracic cancer	25	17	8
Lung	18	12	6
Esophagus	7	5	2

Contd...

Table 1: Contd...

Type of cancer	Total	Males	Females
Hepatobiliary	12	5	7
Gall bladder	10	5	5
HCC	1	0	1
Pancreas	1	0	1
CUPS	13	12	1
Miscellaneous	22	13	9
Total	1077	610	467

CNS=Central nervous system, PNET=Primitive neuroectodermal tumor, HCC=Hepatocellular carcinoma, NHL=Non-Hodgkin's lymphoma, GI=Gastrointestinal, CUPS=Cancer of unknown primary site

from the developing countries by Kalyani *et al*.[9] This may be attributed to the rising trend of tobacco chewing and smoking among young Indians. According to the Global Adult Tobacco Survey 2009–2010, 27.4% of males and 8.3% of females in the age group of 15–24 years use tobacco in any form in India.[10]

In the US, the most common cancer seen in young population was breast cancer.[1] It was the second most frequent cancer in Indian AYA patients and most common malignancy in females (32%) in our study, the finding resonates with the observation reported by Arora *et al*.[8]

Conclusion

AYAs (15–39 years) are considered a distinct age group with epidemiological, biological, and genetic factors different from pediatric and geriatric patients. This leads to challenges in understanding the cancer biology and pattern in such patients, hampering the improvement in treatment-related outcomes. This study has been done to assess the cancer pattern in AYA patients. The varying pattern of cancer distribution was seen in this study with lymphoma, leukemia, bone tumors, and sarcomas being more common in adolescents while carcinomas being more frequent in 20–39-year-old patients. Further studies are needed to look for the possible etiology, associated risk factors, and survival outcomes in this group of patients.

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Conflicts of interest

There are no conflicts of interest.

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