



CANCER IN ADOLESCENTS AND YOUNG ADULTS: A SINGLE ONCOLOGY CENTER EXPERIENCE FROM SOUTH INDIA

Oncology

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ABSTRACT

Introduction: Cancer in adolescents and young adults (AYAs) is defined by the National Cancer Institute as cancer occurring among those aged 15 to 39 years. Cancer pattern in AYA is different from other age groups in multiple aspects like distribution of cancer types, outcome and survivorship. **Aims & Objective:** To estimate the incidence, age, gender, site distribution, and the probable risk factors and outcome of cancer in AYA age group. **Material And Methods:** AYA cancer patients diagnosed and treated at department of medical oncology, Tirunelveli medical college & Hospital, Tirunelveli, Tamil Nadu from January 2020 to December 2022 were included in the study. Clinical presentation and outcome at 2 years of follow up we recorded by reviewing the medical records. **Results:** The study included 367 AYAs cancer cases, representing 10.5% (367/3498) of all cancers. Overall, most common cancers across all ages and across both sexes were breast cancer (20.7%), GI cancer (15.53), head and neck cancer including thyroid cancer (11.99%), lymphoma (N=7.9%), germ cell tumour (7.36%) and soft tissue sarcoma (5.18%). In males, the most common cancer seen was gastrointestinal (GI) cancer (18.66%), followed by head and neck cancer (14.61%), germ cell tumour (13.48%) and lymphoma (10.11%) while in females, breast cancer was the most common cancer (38.62%) followed by genitourinary (GU) carcinoma (12.17%), GI carcinoma (9.5%) and head and neck carcinoma (8.46%). The incidence cancer was found to be slightly higher in females (51.5%) than in males (48.5%) and it increased with increasing age. The most common cancer identified in adolescents (15–19 years) was lymphoma followed by leukemia and bone tumour while the distribution pattern in the age group of 35–39 years was breast cancer (20%) followed by GI cancer and head and neck cancer. At 2 years of follow-up, 29.7% (N=109) patients lost to follow up while in 36.5% (N=134) patients completed treatment and in remission currently, 13.35% (N=49) died of disease and 20.43% (N=75) were receiving further line of treatment. **Conclusion:** The incidence and demographic distribution in the AYA cancer patient population varies among different cancer centers within India. Knowing the prevalence of cancer and its subtypes among AYA can help us provide the specific interventions and proficiencies that address them.

KEYWORDS

Adolescents and young adults (AYAs), carcinoma, Birch classification.

INTRODUCTION

National Cancer Institute (NCI) has defined cancer in adolescents and young adults (AYAs) as cancer occurring among those aged 15 to 39 years.¹ As per the 15th population census of India, Youth represented about 41.5% of the total population of India in 2011 which is further increasing.² Thus, AYAs form an important component of active population of the country and have a significant impact on health-care planning and implementation. AYA population is poised between children and adults and often has been called the “lost tribe”.³ Historically the incidence of cancer in AYA is lesser than that in the older adults however the population pyramid of developing countries is predominantly young. Also the cancer pattern in AYA is different from those in pediatric age group and older adults in multiple aspects like distribution of cancer types, intrinsic and extrinsic risk factors, tumour biology and prognosis and survivorship.⁴ In Compared to older patients with cancer, AYAs have a higher risk of long-term and late effects of cancer and its treatment like infertility, sexual dysfunction, cardiovascular disease and future risk of secondary cancers.^{5,6} Moreover, AYAs suffer from more adverse psychosocial effects as most of their productive years of life have to be spent with effects of cancer and its treatment.⁷ Due to multiple socio-cultural factors, lack of cost-effective early detection methods, and the rarity of some cancers at this age, the diagnosis of cancer in this age group often get delayed.^{8,9} Also, the outcome of cancer and their treatment in these population lags far behind when compared to that in children and older adults.¹⁰ For these reasons, cancer in AYA merits attention.

AIMS & OBJECTIVE:

To estimate the incidence, age, gender, site distribution, and the probable risk factors and outcome of cancer in AYA age group.

MATERIALS AND METHODS:

This is a retrospective study done over a period of three year from January 2020 to December 2022. The study was undertaken in the Department of medical Oncology, Regional cancer centre, Tirunelveli medical college & Hospital, Tirunelveli, Tamil Nadu. Patients with histopathologically proven malignancy in the age group of 15-39 years registered and treated during the 3 years period were recorded to know the pattern and distribution of cancer according to gender, type, site, and histology. Any patient registered but not received any treatment under medical oncology dept. TVMCH were excluded. Data on

diagnosis were categorized by site and morphology according to the Birch classification.¹¹

RESULTS

The study period included 367 AYAs cancer cases, representing 10.5% (N=367/3498) of all cancers registered and treated during the 3 years period. Among them, 48.5% (N=178) were males and 51.5% (N=189) were females [Figure 1].

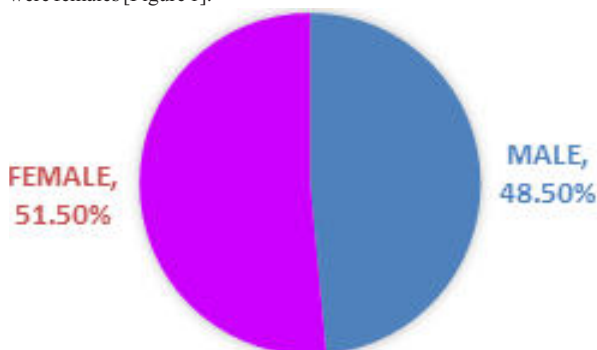


Figure 1: Genderwise incidence for AYA cancer cases.

As per Birch classification¹¹, overall carcinoma was the most common group of cancer (N=235, 60.03%), followed by lymphomas (N=29; 7.9%), germ cell tumours (N=27, 7.36%), soft tissue sarcoma (N=19; 5.18%), leukemias (N=18; 4.0%), bone tumours (N=15; 4.08%) and CNS tumours (N=14; 3.8%).

Table 1: Distribution Of Cancer In AYA As Per Birch Classification¹¹

GROUPS	SUBGROUP	Total	Male	Female
Group 1 – Leukemia		18	11	7
	1.1. Acute lymphoid Leukemia (ALL)	2	1	1
	1.2. Acute myeloid Leukemia (AML)	3	2	1
	1.3. Chronic myeloid leukemia (CML)	12	7	5

	1.4. Other and unspecified leukemia (Other Leukemia)	1	1	0
Group 2 – lymphomas		29	18	11
	2.1. Non-Hodgkin's lymphoma (NHL)	16	9	7
	2.2. Hodgkin's disease (HD)	13	8	5
Group 3 - CNS tumours		14	9	5
	3.1. Astrocytoma	9	7	2
	3.2. Other gliomas	3	1	2
	3.3. Ependymoma	1	1	0
	3.4. Medulloblastoma and other primitive neuroectodermal tumours	1	0	1
Group 4 – Bone tumours		15	10	5
	4.1. Osteosarcoma	4	3	1
	4.2. Chondrosarcoma	1	0	1
	4.3. Ewing's tumour	10	7	3
	4.4. Other bone tumours			
Group 5 – Soft tissue sarcomas (STS)		19	13	6
	5.1. Fibromatous neoplasms (Fibrosarcoma)	2	1	1
	5.2. Rhabdomyosarcoma	9	7	2
	5.3. Other soft tissue sarcomas	8	5	3
Group 6 – Germ cell tumours		27	24	3
	6.1. Gonadal germ cell and trophoblastic neoplasms	23	21	2
	6.2. Germ cell and trophoblastic neoplasms of non-gonadal sites	4	3	1
Group 7 – Melanoma and skin carcinoma		3	1	2
	7.1. Melanoma	1	-	1
	7.2. Skin carcinoma	2	1	1
Group 8 – Carcinomas (except of skin)		235	113	147
	8.1. Carcinoma of Thyroid	3	1	2
	8.2. Other carcinoma of Head and neck	41	25	16
	8.3. Carcinoma of trachea, bronchus, lung and pleura	25	14	11
	8.4. Carcinoma of Breast	76	3	73
	8.5. Carcinoma of Genito-urinary (GU) tract	28	5	23
	8.6. Carcinoma of Gastro-intestinal (GI) tract	53	35	18
	8.7. Carcinomas of other and ill-defined sites not elsewhere classified (NEC)	9	5	4
Group 9 – Miscellaneous specified neoplasms NEC		4	3	1
Group 10 – Unspecified malignant neoplasms.		3	1	2

Most common cancers across all ages and across both sexes were breast cancer (20.7%), GI cancer (15.53), head and neck cancer including thyroid cancer (11.99%), lymphoma (7.9%), germ cell tumour (7.35%) and soft tissue sarcoma (5.17%). [Table 1].

In carcinoma group, most common cancer was carcinoma of Breast (N= 76, 32.34%) followed by carcinoma of GI tract (N= 53, 22.55%), head and neck carcinoma including thyroid carcinoma (N=44; 18.72%) and carcinoma of GU tract (N=28, 11.91%) (Table 1).

The most common site involved in GI malignancies was colorectal carcinoma (N=25) followed by esophageal (N=14) and gastric (N=9) cancer. The most common site involved in head and neck cancer other than thyroid cancer was buccal mucosa (N=19) followed by hypopharyngeal carcinoma (N=11), carcinoma of larynx (N=7). The most common carcinoma of GU tract was cervical carcinoma (N=13) followed by ovarian carcinoma (N=9) and renal cell carcinoma (N=3).

The gender-wise distribution of cancers was also studied in these patients [Figure 3]. In males, the most common cancer was GI carcinoma (N=35) followed by head and neck carcinoma including thyroid cancer (N=26), germ cell tumours (N=24), lymphoma (N=18) and soft tissue sarcoma (N=13) while in females, breast cancer was the most common malignancy (N=73) followed by GU (N=23), GI carcinoma (N=18), head and neck cancer (N=16) and lymphoma (N=11).

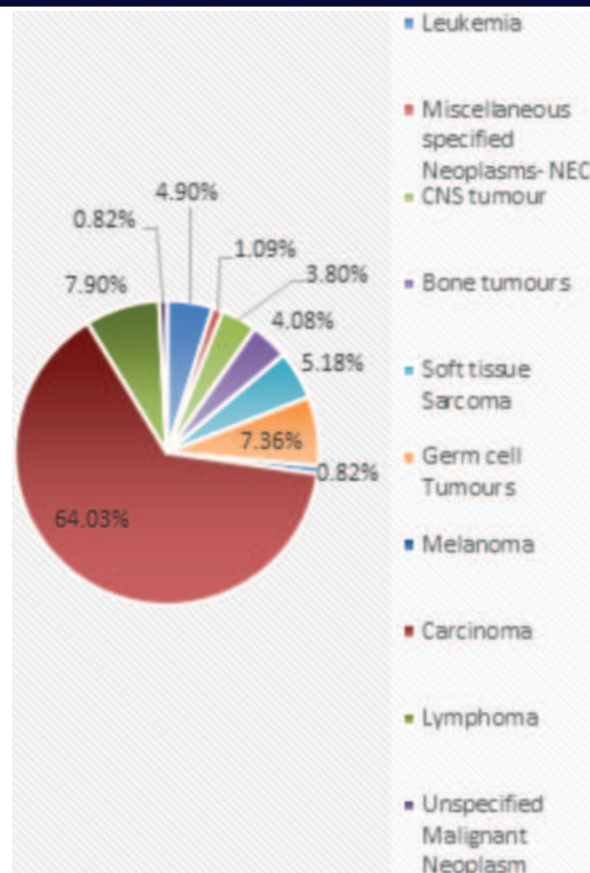


Figure 2: Distribution of cancer among AYA patients as per Birch classification.

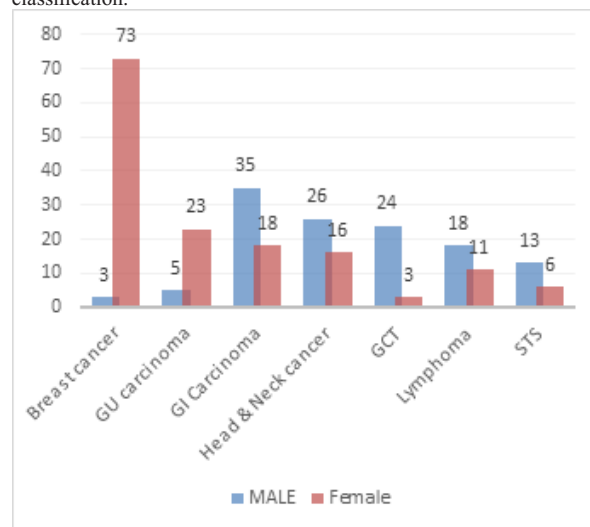


Figure 3: Gender wise distribution of cancer in AYA

The distribution of cancers by 5-years age interval was also noted. Young adult patients (35-39 years) were the most common (N=119; 32.42%) followed by 30-34 years age group patients (N=101, 27.52%). Remaining age group patients 15-19 years, 20-24 years, 25-29 years constitutes 15.26% (N=56), 13.35% (N=49), 11.44 % (N=42) of the study population. The most common cancer identified in adolescents (15-19 years) was lymphoma followed by leukemia and bone tumour. In the age group of 20-24 years, germ cell tumour was dominant, followed by bone tumour and soft tissue sarcoma; in the patients in the age group of 25-29 years, head and neck cancers were predominant (27.3%) followed by CNS tumours and lymphoma. Among patients in the age group of 30-34 years, the head and neck cancer (40.7%) were most common followed by breast cancer and GI cancer. The distribution pattern in the age group of 35-39 years was breast cancer (20%) followed by GI cancer and head and neck cancer (37.9%).

At the last follow-up 29.7% (N=109) patients lost to follow up while in 36.5% (N=134) patients completed treatment and in remission currently, 13.35% (N=49) died of disease and 20.43% (N=75) were receiving further line of treatment.

DISCUSSION:

Due to limited literature in AYA, there is very little known about the epidemiological, biological, genetic, and therapeutic factors affecting the outcomes and quality of life in AYA patients diagnosed with cancer.¹² In the US, one of the leading causes of mortality among young patients between 15 and 40 years of age is cancer.¹³ Thus, cancer among AYA patients is one of the emerging problems in the field of oncology which need dedicated care.¹⁴ In the context of Indian patients particularly from this part of the country the literature is quite scarce for cancer diagnosed in the age group of 15–39 years. Thus, we have carried out this retrospective study to estimate the distribution of cancer among AYA patients in our institute. We found that AYA patients constituted 10.5% of all cancer patients registered and treated at our department over the entire study period of three years. This incidence is close to the finding by Darling et al.¹⁵ and Kakkar et al.¹⁶ However, based on Surveillance, Epidemiology, and End Results (SEER) estimates of new cancer cases in 2024 in the USA, 4.2% cancers will occur among those aged 15–39.¹⁷ In this study the overall frequency of cancer was found to be slightly higher in females than in males and frequency increased with increasing age which is contrary to the finding by Singh, et al.¹⁸ from North India and Padhye et al.¹⁹ from Tata Memorial Hospital (TMH), Mumbai. They found that cancer in AYA was common in male than in female. This contrary may be related to the inclusion of patients in the age group of 15–29 years age-group by Singh, et al.¹⁸ and age-group 15–24 years by Padhye et al.¹⁹ However our genderwise distribution of cancer cases were similar to the finding of Kalyani et al.²⁰ and Kakkar et al.¹⁶ who included patients in the age group of 15–44 years. The present study also found that the maximum incidence of cancer cases was in the age group of young adults i.e. 35–39 years which is similar to finding from the National Cancer Registry Programme 2012–2016.²¹ Although carcinoma of breast, cancer of GI and head and neck comprised more than 85% of all cancers in AYA age group in the US population but our study found that these three cancers sites comprised 46.31% of AYA cancer.² A similar observation has been documented by Kalyani et al.²⁰ and Darling et al.¹⁵ All these may be attributed to the rising trend of tobacco uses in all forms (chewing and smoking) among AYA. As per 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.²² Our study found that breast cancer is the overall most common malignancy in AYA (20.71%) which is similar to the findings by Darling et al.¹⁵ and Singh et al.¹⁶

CONCLUSION:

AYAs (15–39 years) are considered to be a distinct age group with distinct epidemiological, biological, and genetic elements which isn't the same as pediatric and geriatric patients. The challenges in understanding of the cancer biology and pattern of cancer in these patients hamper the improvement in treatment-related outcomes in this age group of patients. The present study was carried out to assess the cancer pattern in AYA patients. The varying pattern of cancer distribution was seen in this study with lymphoma, leukemia, bone tumours being more common in adolescents (15–24 years) while carcinomas (Breast, GI and head and neck carcinoma) being more frequent in young adults (35–39 years) and others cancer like germ cell tumours, soft tissue sarcoma and brain tumours are predominant in the 20–29 years. Further studies are needed to look for the possible etiology, associated risk factors, and survival outcomes in this group of patients.

Limitations:

Limitations of the study are its comparatively small sample size, retrospective nature of data collection, and lack of survival analysis. There is quite inconsistency in defining the age criteria for AYA in older studies which may be contributed to the substantive variations in the results from other studies. The differences in the socioeconomic status, awareness of disease, educational status, culture, and access and affordability of healthcare may certainly contribute to variations in the observations.

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Conflicts of interest There are no conflicts of interest.

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