# SPECTRUM OF MALIGNANT TUMOURS IN ADOLESCENCE AND YOUNG ADULTS: AN ANALYSIS OF 1873 CASES

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## ABSTRACT

***Objective***: To determine the epidemiology and clinicopathological pattern of malignant tuours in the adolescence and young adults (AYAs) age groups.
***Study Design***: Cross sectional study.
***Place and Duration***: The study was based on analysis of ten years data of tumor registry (2009-2018), at the Armed Forces Institute of Pathology, Rawalpindi, Pakistan.
***Methodology***: All histologically diagnosed malignant tumors registered (in the age group of 10-24 years) with the tumor registry of AFIP, Rawalpindi were retrieved. The basic epidemiological data of the cases was collected from the request forms and data was analysed for the site of involvement, age distribution and histological types of tumors.
***Results***: During the ten year study period (2009-2018), a total of 1873 malignant tumours were found in adolescence and adult age group. The malignant tumours in this age group were 4.95% of all malignant tumors. Lymph node malignancies (lymphomas) were the commonest, accounting for 19.4% in males and 13.2% in females. These were followed by bone and soft tissue tumours in males whereas in females after bone tumours, ovarian tumours made their appearance at third place.
***Conclusion***: Lymphomas, bone & soft tissue tumors followed by ovarian in females and testicular tumours in male, were the main bulk of tumours in adolescence and young adults. Malignant tumors were 1.5 times more common in males than females.

**Keywords**: Epidemiology, Lymphoma, Malignancies, Soft tissue tumours.



## INTRODUCTION

According to World Health Organization (WHO), the adolescence period is between 10-19 years and young adults are in the age range of 15-24 years[1]. Whereas according to US Surveillance Epidemiology and End Results (SEER) program the adolescence and young adults are grouped between 15 and 29[2,3]. Cancer is regarded as a disease of elder age group. Main tumours diagnosed are breast in female and prostate in males. There is very little literature about malignancies in adolescents and young adults. Specific pattern in pediatric age group is well documented but this population between children and adults has been called the "lost tribe"[2]. In AYAs one finds a different distribution of types of malignancies. In AYAs one may find peak incidence of lymphoma (HL) and germ cell tumors. The relative improvement in the survival rate in AYAs has not like what is achieved in pediatric age tumours[4]. As little is known about the pattern of malignancies in this age group therefore this study was carried out to find out the clinicopathological and epidemiological pattern of tumours of adolescence and young adults in our set up.

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## METHODOLOGY

The cross sectional study was carried out at the Histopathology department, Armed Forces Institute of Pathology (AFIP), Rawalpindi, which is a tertiary care referral laboratory receiving samples from Military Hospitals and as well as civil, public and private-sector hospitals from

upper Punjab, Khyber Pakhtunkhwa and the adjacent Rawalpindi-Islamabad region. A total of 1873, with the criteria being malignant tumors of adolescence and young adult group (10-24 years) registered in tumor registry were analysed. The study period extended from 2009-2018. Each malignant tumor diagnosed was assigned an International Classification of Diseases-in Oncology (ICD-O) code, published by the International Agency for Research on Cancer (IARC). The malignant tumors were calculated for each year, for gender distribution, age groups of adolescence and young adult group etc. The data was analysed by using SPSS version 20.

## RESULTS

Out of total 37793 malignant tumors diagnosed and registered with tumor registry (from 2009-2018), 1873 (4.95%) were in adolescence and young adult age group. Males were 1131 (60.4%) and rest 742 (39.6%) were female, with M:F ratio of 1.5: 1 In this age group Lymphomas followed by bone tumours were the most common tumors, in both genders. Lymphomas were 19.4% in males and 13.2% in females (table-I). Diffuse large B cell lymphoma, Burkitt lymphoma and Lymphoblastic lymphoma were the main Non Hodgkin lymphomas (NHL). Cases of Hodgkin disease (HD) were also found. Cervical lymph nodes were involved in majority of the cases (table-II). Other common tumors were of bone, soft tissue, ovarian tumours (in females) and testicular tumours in males. Main histological types of some common tumours was given in table-II. Fifty cases of breast carcinoma (all in females) were also seen in this young age group, and invasive ductal carcinoma was predominant histological type. Among the gastrointestinal tract the colorectal carcinoma was found as commonest malignancy and was among the top ten in females. The individual malignant tumours of all other organs was given in table-III.

**Table-I: Ten common tumours in both genders in adolescents and young adults age group.**

| Types of tumours in Males (n=1131) | Number (%) | Types of tumours in Females (n=742) | Number (%) |
|---|---|---|---|
| Lymph nodes (Lymphoma HD, NHL) | 219 (19.4) | Lymph nodes (Lymphoma HD, NHL) | 98 (13.2) |
| Bones & Joints | 186 (16.4) | Bones & Joints | 92 (12.4) |
| Soft tissue | 99 (8.8) | Ovary | 60 (8.1) |
| Brain | 92 (8.1) | Soft tissue | 59 (7.9) |
| Testis | 65 (5.7) | Breast | 50 (6.7) |
| Skin | 35 (3.1) | Thyroid | 40 (5.4) |
| Mediastinal | 31 (2.7) | Brain | 35 (4.7) |
| Eye | 26 (2.3) | Colorectal | 34 (4.6) |
| Kidney | 21 (1.9) | Skin | 34 (4.6) |
| Liver | 18 (1.6) | Eye | 20 (2.7) |

## DISCUSSION

Different areas of the world report different frequency of tumours in adolescence and young adults. In contrast to the present study where these tumours were about 5% frequent, in an Indian study the reported incidence was 3.8%.5, but other Indian studies also report as 5.8% and 5.2% frequent[6,7]. Other series report 2.3% in Korea[8], and 2% in SEER monograph[9]. Males were more frequently involved in present series and same is observed in almost all the other studies[5,6,7,10]. Lymphomas were the most frequent tumors in both gender as is found in pediatric age malignancies[11]. In present study diffuse large B cell type of lymphoma was found to be more frequent and same is feature in adults also[12]. Other national studies and those from developing countries show lymphoma and leukemia in this group, to be the most frequent[6,7,9,13]. The ratio of NHL to HD was 1.7: 1 In present series, but in a study of France Hodgkin disease was found to be more frequent both in males and females[14]. It is said that immunosuppressive effect of repeated bacterial and viral infections may be contributory to the development of non Hodgkin's lymphoma in developing countries[15]. The importance of this

factor requires to be scrutinized further. In some European and Australian studies melanoma is reported as top most malignancy in AYAs. In present series skin malignancies were in the top ten but mainly it was squamous and basal cell carcinoma and no case of melanoma was found[16,17]. Bone and soft tissue tumors in this age group were also quite frequent in present series as was observed previously[11]. A study recently published from Bangladesh has also shown that, during 2011–2014, among adolescents, malignant bone tumours, germ cell and gonadal tumours and epithelial tumours were the three most common cancer types[18]. The predominant type of bone tumours was osteosarcoma and synovial sarcoma in soft tissue, same has been observed in other studies[5,10]. As is expected, in this age group

**Table-II: Showing histological types of common tumours in adolescents and young adults age group.**

| Histological Types of Some Common Tumours in Both Genders | | | | |
|---|---|---|---|---|
| **Site** | **Males** | **Female** | **Histological types** | |
| Lymph nodes | 219 | 98 | Non Hodgkin Lymphoma | 200 |
| | | | Hodgkin Lymphoma | 117 |
| Bones | 186 | 92 | Osteosarcoma | 104 |
| | | | Ewing Sarcoma | 54 |
| | | | Chondrosacoma | 05 |
| | | | Others* | 115 |
| Ovary | - | 60 | Germ cell tumours | 25 |
| | | | Serous adenocarcinoma | 12 |
| | | | Mucinous adenocarcinoma | 08 |
| | | | Granulosa cell tumours | 10 |
| | | | Others | 05 |
| Testis | 65 | - | Germ cell tumours | 40 |
| | | | Sarcomas | 10 |
| | | | Granulosa cell tumours | 05 |
| | | | Others | 10 |
| Breast | - | 50 | Invasive ductal carcinoma | 35 |
| | | | Invasive lobular carcinoma | 10 |
| | | | Others | 05 |

**Table-III: Individual tumours at other different sites in adolescents and young adults age group both males (n=1131) & Females (n=742).**

| Site | Males | Females |
|---|---|---|
| Tongue, Floor of mouth & Palate | 12 | 6 |
| Mouth/Oral cavity NOS | 5 | 4 |
| Salivary Glands | 5 | 6 |
| Tonsils | 2 | 1 |
| Nasopharynx | 14 | 5 |
| Hypopharynx | 4 | 4 |
| Oesophagus | 11 | 2 |
| Stomach | 9 | 11 |
| Small intestine | 7 | 6 |
| Colorectal | 14 | 34 |
| Anus & anal canal | 9 | 1 |
| Liver | 18 | 10 |
| Gall bladder | 1 | 1 |
| Pancreas | 2 | 2 |
| Nasal cavity & Sinuses | 15 | 3 |
| Larynx | 4 | 0 |
| Trachea, Bronchus and lungs | 19 | 5 |
| Heart, mediastinum, pleura | 31 | 10 |
| Bones, joints & articular cartilage | 186 | 92 |
| Bone marrow | 10 | 3 |
| Spleen | 2 | 1 |
| Skin | 35 | 34 |
| Peritoneum & retroperitoneum | 16 | 15 |
| Soft tissue | 99 | 59 |
| Breast | 1 | 50 |
| Kidney | 21 | 15 |
| Urinary bladder | 15 | 5 |
| Eye & adnexa | 26 | 20 |
| Brain | 92 | 35 |
| Spinal cord & other parts of CNS | 4 | 1 |
| Thyroid gland | 13 | 41 |
| Adrenal | 2 | 0 |
| Other ill-defined sites | 79 | 39 |
| Lymph node (HD & NHL) | 219 | 98 |
| Lymph node (metastatic) | 41 | 24 |
| Unknown | 22 | 11 |
| Specific to males & Females | Prostate=10<br>Testis=65 | Vagina=3<br>Cervix=2<br>Endometrium=3<br>Myometrium=6<br>Ovary=60<br>FGT (NOS)=5 |

quite a number of cases of ovarian and testicular tumours were seen. Mostly it was germ cell tumours. This observation is there in most of the developed as well as developing countries[5,6,9,10,13]. The malignant tumours of breast were 5th most common in females of AYAs. Malignant tumours of the breast are mostly seen after the age of 40 in most of the European studies, but in this study such tumours made their appearance in female quite in an early age. This finding was highlighted in some previous analysis as well. Overall peak incidence of malignant tumours is about a decade earlier and same is true for tumours of the breast which are the most frequent tumour in our female population[12,19].

Some of the limitations are, institution based tumour registry retrospective data, and lack of follow up. The difference between present study and others may be due to defining criteria of AYA population. We used criteria defined by WHO. The etiological factors were also not assessed. The contributory factors may be that are already mentioned earlier, like viruses, chronic infections, radiation, and genetic and environmental factors and for epithelial malignancies such as tobacco use, alcohol consumption, and dietary factors along with racial and ethnic differences are also responsible[20]. Quite a number of cases were registered as of unknown and unspecified sites and a number of cases were registered as other ill defined sites (table-III). In a same pattern cases were also registered as lymph node NOS, mouth oral cavity NOS, other salivary glands, pharyngeal sites NOS, GIT NOS, Male/ Female GT NOS etc.

## CONCLUSION

In the end we can conclude from the present study that this age group has a specific pattern of malignant tumours with lymphoproliferative disorders on top. The demographic distribution in the AYA cancer patient population varies. For better understanding of genetic and other etiological factors and to improve prognosis, International collaborative research should be done.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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