Valley International Journals
Open Access Journal
International Journal Of Medical Science And Clinical Inventions
Volume 2 issue 04 2015 page no. 872-878 ISSN: 2348-991X
Available Online At: http://valleyinternational.net/index.php/our-jou/ijmsci

Trends In Pediatric Neoplasms Around Western Uttar Pradesh- A Study

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Running Title: Trends in Pediatric Neoplasm

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ABSTRACT:

Aim: The present study analyses the histological spectrum of tumors in pediatric age group in and around Aligarh with review of literature.

Material and Methods: The study group included patients from 0-12 years of age attending the outpatient and inpatient departments of pediatrics, surgery, orthopedic surgery at Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University, Aligarh, who presented with the tumor or with the tumor associated sign and symptoms.

Results: The study included 252 cases of pediatric tumors. Soft tissue tumors (35.7%) accounted for maximum number of cases, followed by bone and cartilage tumors (11.1%), leukemia (9.5 %), brain tumors (8.7%), round cell tumors including Ewing's sarcoma, retinoblastoma and neuroblastoma (8%), genital tumors (7.1%), lymphomas (6%), renal tumors (5.6%) and gastrointestinal tumors (1.2%), while the miscellaneous category constituted (7.1%).

Conclusions: Rare cases of pediatric tumors can be difficult to diagnose as they may present differently from adults. So there is a need to remain vigilant about the diagnosis in pediatric patients which contribute to the medical literature.

Key words: Pediatric tumors, Distribution, Incidence.

INTRODUCTION

Although the quality of information from most of the developing countries might be considered, in relative terms, of limited quality; it often remains the only source of information available on the profile of cancer and as such provides valuable information. The total incidence of childhood cancer varies rather little amongst different regions of the world, with cumulative risk to age 15, nearly always in the range 1.0 -2.5 per thousand.[1] Environmental, cultural, racial and genetic factors have been attributed to the variation in the prevalence of the malignant tumors.

In developed countries the prevalence of childhood cancer is low (2%),[2,3] while in third world countries it ranges from 4.4% to 12.6%. [4,5] The data from the developing countries may not depict the real picture and actual number may be higher than this figure, as majority of the

population of third world countries lives in rural areas, where the medical facilities may not be appropriate. Poor substandard or non-availability of diagnostic facilities, small number of oncology centers and lack of comprehensive national tumor registry may contribute to the under reporting of the cases of malignant tumors. India has a population of about 1 billion and children form about 39% of this bulk.[6] The childhood malignancies are rare as compared to adults and incidence rates of 1: 600 in every 330 children have been reported.[7]

The spectrum of disease in childhood malignancies is very broad and so are histopathological findings.[8] A variety of benign and malignant tumors occur in infants and children and present diagnostic challenges. Most of the pediatric tumors are curable and hence an early accurate diagnosis is mandatory, as it ensures that appropriate therapy is given in a timely fashion. The major childhood tumors affect haematopoetic system, genito-urinary system, central nervous system and to lesser extent soft tissues; the major childhood malignancies being leukemias, neuroblastoma, wilm's tumor, brain cancer, rhabdomyosarcoma, lymphomas, retinoblastoma, and bone cancers.

The cause of most cancers remains unknown. A minority of cancers are known to be hereditary (inherited), for example some retinoblastomas, and wilm's tumors. In rare cases the family may have a history of cancers (Li-Fraumeni syndrome). However most childhood cancers have no obvious hereditary cause.[9] Worldwide, the annual number of new cases of childhood cancer exceeds 200,000 and more than 80% of these are from the developing world.[10] Our work included a comprehensive retrospective and prospective study of both and benign malignant tumors occurring in children of 0-12 years of age and typing of childhood tumors.

MATERIAL AND METHODS

The study group included patients from 0-12 years of age attending the outpatient and inpatient departments of pediatrics, surgery, orthopedic surgery at Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University, Aligarh, who presented with the tumor or with the tumor associated sign and symptoms, hematological and histopathological examinations were carried out in the department of pathology. The material for this study was obtained from following sources: Histopathological sections of cases of pediatric tumors were stained with H & E stains while bone marrow aspirate and peripheral blood smears were visualized by leishman staining. Special staining (Reticulin & Van Gieson stain) and immunostaining were done as per requirement.

RESULTS

The study included 252 confirmed cases of pediatric tumors aged 0 to 12 years attending the out patients and in patients departments of pediatrics, surgery and orthopedic surgery at Jawaharlal Nehru Medical College.

Out of the total cases, 132 (52.4%) tumors were benign while malignant tumors accounted for 120 (47.6%). Soft tissue tumors was the most common,90 cases (35.7%), followed by Bone and cartilage tumors, 28 cases(11.1%), leukemia, 24 cases (9.5 %), brain tumors, 22 cases (8.7%), round cell tumors including Ewing's sarcoma, retinoblastoma and neuroblastoma, 20 cases (8%), genital tumors, 18 cases (7.1%), lymphomas, 15 cases (6%), renal tumors, 14 cases (5.6%), gastrointestinal tumors, 2 cases (1.2%), while the miscellaneous category constituted 18 (7.1%).Table 1.

The age of the cases varied from 5 months to 12 years (mean age 9.9 years). Maximum

number of cases, 175 (69%) were seen in 7-12 years of age. The commonest tumor in 0-6 years age group was renal tumors,10 cases and retinoblastoma, 9 cases. Almost all of the bone tumors were seen in 7-12 years of age group.

Overall incidence of childhood neoplasm was found to be slightly higher in males as compared to females (M:F = 1.4:1). Maximum number of cases in male were of leukemias, 24 cases followed by bone & cartilaginous tumors, 22 cases while equal distribution among male and females were seen in astrocytoma, ependymoma, vascular tumors and ewing's sarcoma. Tumors found exclusively in males were nasal angiofibroma, nasopharyngeal carcinoma, plasmacytoma, nerve sheath tumors and gastrointestinal tumors. Tumors exclusively seen in females were neuroblastoma: small cells with hyperchromatic nuclei, scant cytoplasm and areas showing pseudorosettes formation with immunoreactivity for S-100 ((Figures 1 & 2), pleomorphic adenoma, chondrosarcoma with tumor cells showing abundant clear/ground glass cytoplasm and well defined borders (Figure 3) and fibroadenoma breast.

Tumors found to be uncommon to pediatric age group were adenocarcinoma rectum, dermatofibrosarcoma protuberance, giant cell tumor bone (osteoclastoma), plasmacytoma, chondrosarcoma, nasopharyngeal carcinoma, squamous cell carcinoma and basal cell carcinoma.

DISCUSSION

A galaxy of benign and malignant tumors occur in infants and children and in few cases may present diagnostic challenges. Pediatric tumors differ markedly from adult tumors in their nature, distribution and prognosis. Incidence of pediatric tumors is on the rise during the last few decades. The pattern of childhood tumors showed wide variation among different sex and age groups.

We observed a total of 252 tumors in pediatric age group over a period of six and a half years, of which 132 (52.4 %) were benign tumors and 120 (47.6%) were malignant. Pediatric malignancies at our center comprised of 5.2% of all malignant cases reported while data obtained from the National Cancer Registry Program Reports and the Cancer Incidence in 5 Continents publications noted 1.6 to 4.8% of all cancer in India were constituted by children below 15 years age groups.[11] In developed countries, it was found to be 2% while 4.4% to 12.6% was seen in third world countries.[8]

Childhood tumors are mainly embryonal in type and arise in the lymphoreticular tissue, CNS, connective tissue and viscera whereas epithelial tumors are rare.[9] Classifying cancer by anatomical site is satisfactory for cancers in adults but not in children, as it does not reveal the exact frequency of one type of cancer.[10] In our study, an increased frequency with age was seen in leukemias which was discordant to the observations by Sandler and Ross,1997.[12]

A male to female ratio of 1.4: 1 was observed in the present study, while1.2:1 was seen by Stiller CA, 2007.[7] A marked male preponderance (M:F::3:1) was observed in cases of leukemia which was similar to those observed by Ross JA et al, 1994.[13]

Leukemia accounted for 9.5% of all cases and 20% of all malignant cases in the present study, thus being the commonest malignancy in the childhood. This observation was concordant to the earlier studies by Arora et al, 2009 and Barr et al, 2006.[3,5]

Brain tumors accounted for 8.7% of the total tumor cases and 15% of all malignancies and was the second most common tumor in our study,

a finding consistent with Arora et al, 2009[3] who reported reported brain tumors to be 22-25% of pediatric neoplasms while Ross JA et al, 1994 reported a lower incidence of only 3.7%.[13]

Lymphomas were the third most common malignant tumors comprising 12.5% of the total malignancies. This finding was similar to that observed by Hudson, 1996.[14]

Wilm's tumor was the only renal tumors of children observed in the present study. Joshi, 2000[15] reported that wilm's tumor was the commonest renal tumor of childhood, a finding consistent to our observation.

Genital tumors accounted for 7.1% of all childhood tumors, and 5% of all malignancies, with mean age 9.5 years. Germ cell tumors were the only tumor encountered in our study, with a M : F ratio of 1 :1, a finding varied from the study of Marina,1996[16] who reported female preponderance.

Bone tumors accounted for 11% of all tumors and 8% of all malignancies. The most common benign tumors observed were osteochondroma 10/28 cases, with mean age 9.5 years, a finding consistent with the reports of Spjut and Ayala, 1983.[17] Osteosarcoma accounted for 28.6% of all bone tumor cases, the only malignant bone tumors observed in our study. Ewing's sarcoma accounted for 5% of all malignant tumors, a finding comparable to the observation Spjut and Ayala, 1983.[17]

Retinoblastoma comprised of 9% of all tumors studied in our study and 10% of all malignancies observed. Choudhry and Lokeshwar, 1999[6] reported it to be most common intraocular childhood tumor. Neuroblastoma comprised of 1.7% of all malignant tumors in our study, whereas Santana, 1996 reported 8-10% cases.[18]

CONCLUSION

There is a rising global trend in the incidence of pediatric tumors with a histopathological diversity of childhood neoplasms and the present study provides the first profile of the spectrum of pediatric tumors. In children, these cases can be difficult to diagnose as they may present differently from adults and there is a need to remain vigilant about the diagnosis in pediatric patients.

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LEGENDS TO FIGURES

Figure 1: Olfactory Neuroblastoma: Small cells with hyperchromatic nuclei, scant cytoplasm, areas showing attempt to pseudorosettes formation (H& E, 40X).

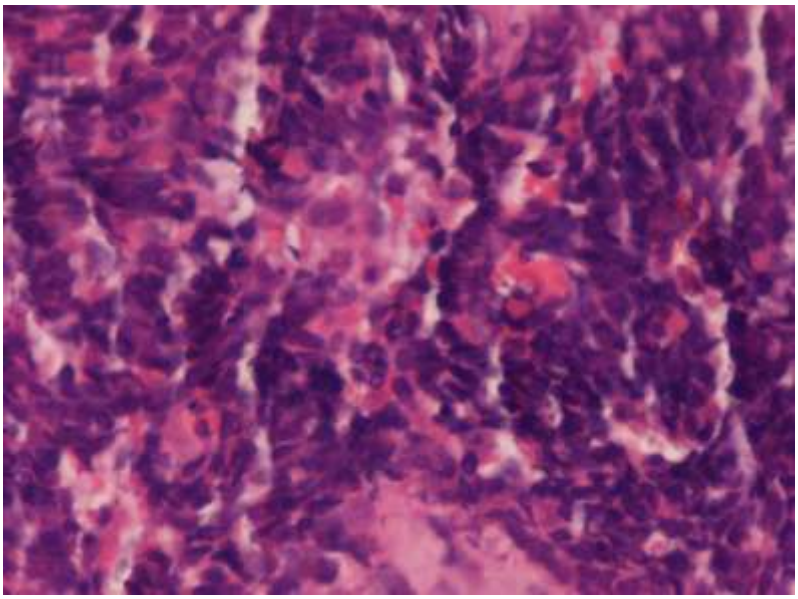

Figure 2: Olfactory Neuroblastoma: Showing immunoreactivity for S-100 protein. (S-100, 40 X)

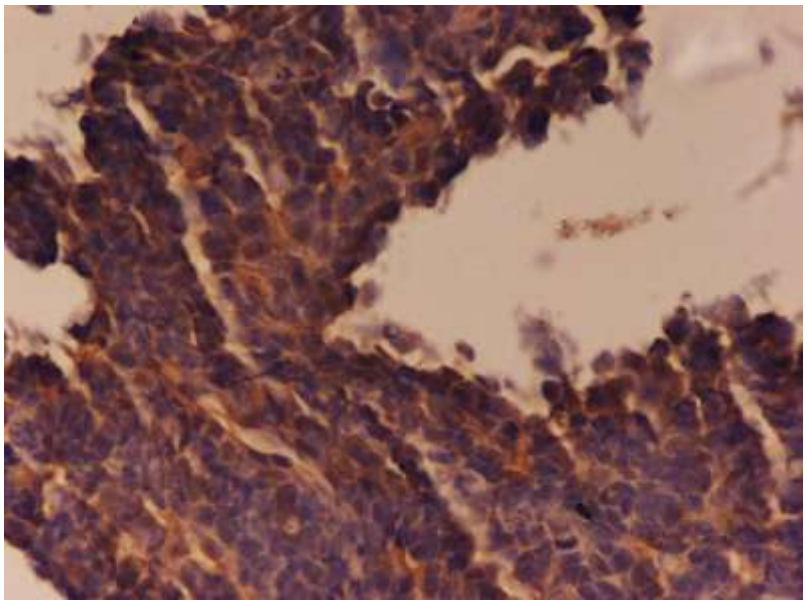

Figure 3: Chondrosarcoma (Clear Cell Variant): Tumor cells showing abundant clear/ground glass cytoplasm and well defined borders (H & E, 40X).

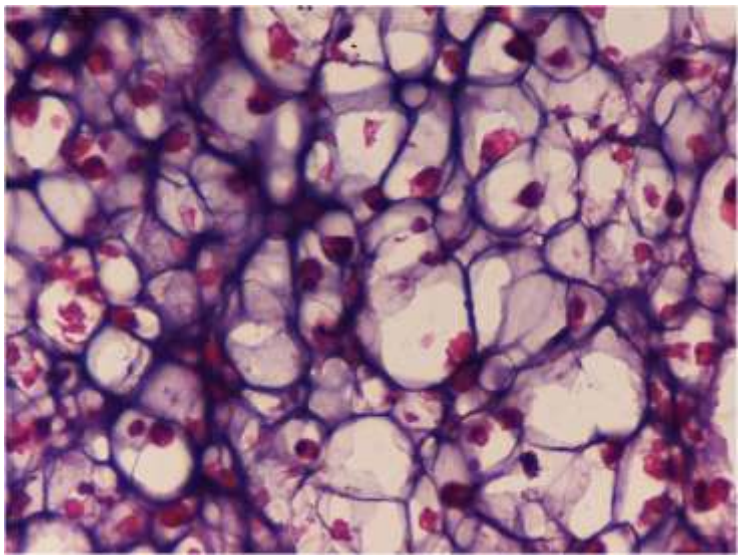

Table I. DISTRIBUTION OF TOTAL CASES

S. No.	Lesion	No of cases	Percentage
1	Leukemia	24	9.5 %
2	Brain tumors	22	8.7%
3	Lymphoma	15	6.0%
4	Renal tumor (Wilm's)	14	5.6%
5	Genital tumors	18	7.1%
6	Gastrointestinal tumors	03	1.2%
7	Soft tissue tumors	90	35.7%
8	Bone and cartilage tumors	28	11.1%
9	Round cell tumors	20	8.0%
10	Miscellaneous tumors	18	7.1%
	TOTAL	**252**	**100%**