

RESEARCH COMMUNICATION

Pattern of Childhood Malignancies: Study of 922 Cases at Armed Forces Institute of Pathology (AFIP), Rawalpindi, Pakistan

Shahid Jamal*, Nadira Mamoon, Sajid Mushtaq, Muhammad Luqman

Abstract

Objective: To determine the pattern of childhood cancer in northern Pakistan. **Design:** A descriptive study. **Place and Duration:** January 1992 to December 2001 at the Armed Forces Institute of Pathology, Rawalpindi, Pakistan. **Materials and Methods:** All histologically diagnosed malignant childhood tumours registered with the tumour registry of our institute were retrieved from the case files. Basic epidemiological data regarding each case were collected from the request forms and analysed for the site of involvement, age distribution and histological types of tumour. **Results:** During the ten year study period a total of 922 childhood malignancies, constituting 4.3% of all malignant tumours, were seen. Haematological malignancies (lymphomas and leukaemias) were the commonest, accounting for 50.4% in males and 37.7% in females. The haematological malignancies were followed by tumours of bone (6.3%), CNS (6.3%), and eye (4.84%) in males and soft tissue tumours as 5th common in females. Skin, renal and colorectal tumours were also in the ten commonest in both sexes and so were ovarian tumours in females. **Conclusions:** Lymphomas and leukaemias are the main bulk of childhood cancer. Malignant tumours were twice more common in males than females in this series.

Key Words: Childhood cancer - frequency - histology

Asian Pacific J Cancer Prev, 7, 420-422

Introduction

Cancer of children is rare (14.1 cases per 100,000 children) and leukaemia and cancer of the central nervous system account for more than half of cases (Parkin et al 1992). In developing countries, paediatric malignancies account for 4.1 to 12.6% of all malignant tumours (Abdullah et al 1996). The pattern of childhood tumours is different as compared to the adults, in different geographical areas and ethnic groups, with some known and mostly unknown causative factors (Powell et al 1994). In developing countries lymphoma and leukaemia are the most frequent and this has also been reported in different studies of Pakistan (Bhurgri, 2001; Ahmad et al., 1991; Zaidi & Jaffery, 1977). Leukaemia is also reported to be the commonest malignancy in some European studies (Zuccolo et al., 2004; Desandes et al., 2004), but lymphoma is not as common. The signs and symptoms depend on the location of malignancy, abdominal tumours often presenting with pain, vomiting, constipation or intestinal obstruction. Lymphoma usually presents with lymphadenopathy, cervical lymph nodes being the most frequently involved (Ahmed et al., 1993). The behaviour of these tumours, of course depends upon the histological type and degree of differentiation (Shah et al., 2000). Childhood cancer may mimic many other diseases as well, so the diagnosis may be delayed leading to late diagnosis and poor

outcome (Hamre et al 2000). The purpose of the present analysis was to determine the pattern of childhood malignancies in our population and to compare it with other national and international studies.

Materials and Methods

The Armed Forces Institute of Pathology, Rawalpindi receives specimens from various military hospitals all over Pakistan and civil institutions mainly from parts of northern Pakistan. All histologically diagnosed malignant childhood tumours are registered. The present study included all childhood malignant tumours, diagnosed from January 1992 to December 2001, a total of 922 cases. Basic epidemiological data regarding each was collected and specimens were received in 10% formal saline. Gross examination of surgical specimens was performed and recorded. Adequate representative tissue sections from the lesions were taken as described (Rosai, 2004). The material was processed under standardized conditions for paraffin embedding. The sections were stained with haematoxylin and eosin (H&E). Special stains and immunohistochemical stains were used where and when required. Each tumour was assigned an ICD-O code (Fritz et al., 2002), published by the International Agency for Research on Cancer (IARC). Chi-Square test was used for statistical analysis and p-value

*Army Medical College, 71-C Lane-8 Askari-VII, Adiala Road, Rawalpindi, Pakistan *For Correspondence: E-mail, sjarjawj@yahoo.com*

was calculated against observed frequency and expected frequency of different parameters, after adjusting the annual growth rate, increase in population and total number of tumours registered in this series.

Results

Out of total 21,168 malignant tumours diagnosed during the study period, 922 (4.4%) cases were seen in the pediatric age group (< 15 years), 616 (66.8%) in males and 306 (33.2%) were females, with a sex ratio of 2:1. Among males, the most common malignancies were lymphoma and leukemia followed by bone, and CNS tumors (Figure 1). In females, a similar pattern was observed for haematological malignancies but bone tumours were more common than CNS lesions. Germ cell tumours of the ovary were also in the top ten common tumours (Figure 2). Cervical lymph nodes (77%) in lymphoma cases were involved in majority, both in males and females. Diffuse large cell type lymphoma was the most frequent on histology. Primary bone tumours were on third place in both genders. These were mostly seen

Table. Patterns of Tumours in Different Age Groups

	Males	%	Females	%
0-4 Year age group (n=215)				
1	Leukaemia	23.1	Leukaemia	19.8
2	Lymph node	15.7	Lymph node	14.8
3.	Eye	14.2	Eye	12.3
4.	Kidney	7.5	Kidney	7.4
5	CNS	4.5	CNS	6.2
5-9 Year age group (n=351)				
1	Lymph node	31.5	Leukaemia	29.1
2	Leukaemia	25.7	Lymph node	20.9
3	CNS	6.2	CNS	10.0
4	Bone	5.0	Bone	5.5
5	Eye	4.6	Ovary	4.5
10-14 Year age group (n=356)				
1	Lymph node	32.0	Leukaemia	21.7
2	Leukaemia	23.20	Bone	16.5
3	CNS	7.5	Lymph node	13.9
4	Bone	7.5	Soft tissue	12.2
5	Soft tissue	4.6	Ovary	8.7

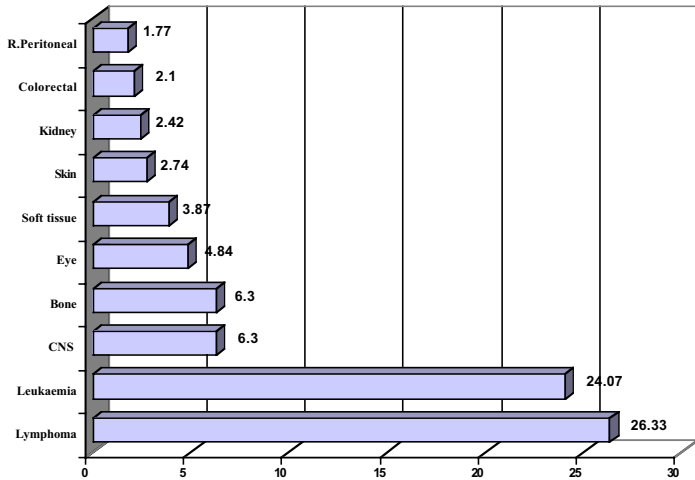


Figure 1. The Ten Commonest Malignant Tumours in the Paediatric Age Group in Males (% data)

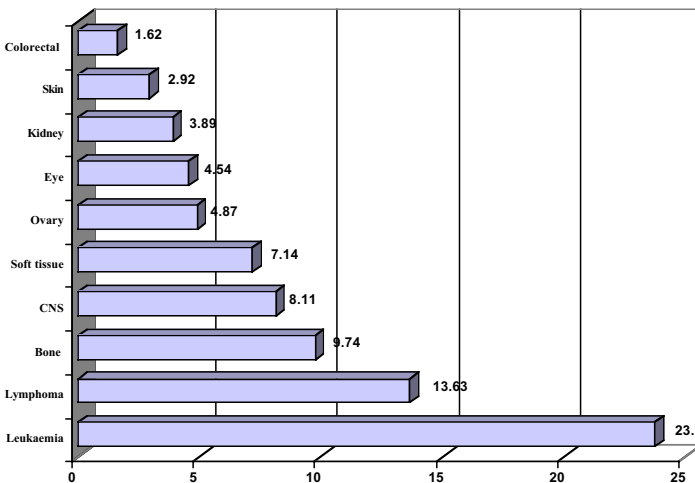


Figure 2. The Ten Commonest Malignant Tumours in the Paediatric Age Group in Females (% data)

in children of >10 years of age (50%). Long bones of lower limb (51%) were frequently affected. Brain tumours were 4th common and 51% cases were seen in 10-14 years age group. In males, frontal lobe was involved in >70% cases, whereas in females it was parietal lobe. Three cases in males and 4 in females were involving spinal cord as well.

Soft tissue sarcomas were also seen, particularly in the 10-14 years age group. Rhabdomyosarcoma was the predominant histological type. Soft tissue of lower limbs and pelvis was involved in majority of the cases (47%). Eye tumours (4.7%) and renal tumours (3.15%) were also seen in both sexes. In female children, cases of ovarian malignancy (4.87%) were also registered.

Further breakdown of tumours in different pediatric age groups was done. The analysis of five commonest tumours in these different age groups is given in the Table. Lymphoma and leukaemia remained on the top in all age groups with bone, CNS and soft tissue tumours coming up in 5-9 and 10-14 years age groups.

Comparison with the previous analysis of the same set up for any increased registration of childhood tumours was also done. After adjusting the increase in population, population growth rate, and total number of tumours registered now, it was found that there was no increase in the registration for childhood tumours.

Discussion

Variable incidence of childhood tumours is found in different areas of the world. In developed countries only about 2% of the cancers occur in children (Parkin et al., 1992; Desandes et al., 2004) but in developing countries these tumours constitute 4.1-12.6% of all malignancies (Abdullah et al.,1996; Memon et al., 1992; Shums-uz-Zaman, 1990; Anonymous, 1997). In the present study also, we observed that the paediatric malignant tumours were

4.4% of all tumours. In majority of the series males are reported to be more frequently affected than females and this was also observed in the present study (Bhurgri, 2001; Reyes, 1997; Hanif, 2004).

Lymphoma and leukaemia were the most frequent in all age groups of childhood malignancies, both in males and females. Other national studies and those from developing countries show lymph node malignancies in children to be the most frequent (Abdullah et al., 1996; Ahmad et al., 1991; Zaidi and Jaffery, 1977; Haneef and Ashraf, 1980). In sub-Saharan Africa, frequency of lymphoma is high in children due to a high incidence of Burkitt lymphoma, whereas in our set up it is the diffuse large B cell type of lymphoma which is more frequent (Stewart and Kleihues, 2003). Burkitt lymphoma is less frequent, and even, the small number found, show the presentation of non endemic type Burkitt lymphoma, involving abdominal organs and gonads rather than classical presentation of Jaw (Ahmed et al., 1993). Long term immunosuppression due to repeated bacterial and viral infections may lead to a higher risk of developing non-Hodgkin's lymphoma (Baris & Zahm 2000). How much this factor is operative in our set up, requires to be thoroughly investigated. Bone and CNS tumours in this age group, particularly in those aged 10-14 years were also quite frequent in our series, following lymphoma and leukaemia. Majority of children with these malignancies were in 5-9 and 10-14 years age groups as was also reported by Bhurgri, (2001). As already reported, we also found that germ cell tumours were more frequently affecting ovaries (1.63%) as compared to testis (0.98%) (Bhurgri, 2001). Less than 4 years age group showed predictable pattern in both sexes. Lymphoma and leukemia were the main tumours in this age group. Blastoma group of tumours, of eye (retinoblastoma), kidney (nephroblastoma) and neuroblastoma, were the next commonest and same is reported in earlier observations (Bhurgri 2001, Hanif 2004; Haneef & Ashraf 1980; Ahmad et al 1990).

In the end we can conclude from the present study that malignant childhood tumours are more frequent in our set up than reported in the developed countries and lymphoma and leukaemia constitute almost half of these tumours. The rest of the pattern is predictable. Extensive collaborative studies are required to find out any causative agent of lymphoma.

References

- Abdullah A, Alnasser RM, Al Sudairy HS (1996). Pediatric cancer: The King Faisal Specialist Hospital and Research Center experience. *Ann Saudi Med*, **16**, 530-3.
- Ahmad M, Khan AH, Mansoor A. The pattern of malignant tumours in Northern Pakistan (monograph). Rawalpindi. AFIP Publication, 1990.
- Ahmad M, Khan AH, Mansoor A (1991). The pattern of malignant tumours in northern Pakistan. *J Pak Med Assoc*, **41**, 270-74.
- Ahmed M, Khan AH, Mansoor A (1993). Non-Hodgkin's lymphoma: perspective in Pakistan (monograph). 1st ed, AFIP publication, Rawalpindi.
- Anonymous (1997). Pakistan Medical Research Council cancer study group. Frequency of malignant tumours in seven centres of Pakistan. *J Pak Med Assoc*, **27**, 335-8.
- Baris D, Zahm SH (2000). Epidemiology of lymphoma. *Curr Opin Oncol*, **12**, 383-94.
- Bhurgri Y (2001). Epidemiology of cancers in Karachi 1995-1999 (monograph) Karachi, Pharmacia & Upjohn.
- Desandes E, Clavel J, Berger C et al (2004). Cancer incidence among children in France, 1990-1999. *Pediatr Blood Cancer*, **43**, 749-57.
- Fritz A, Percy C, Jack A, Schanmugaratnam K, et al (2002). International Classification of Diseases for Oncology, 3rd ed. World Health Organization. Geneva: Butler and Tanner.
- Hamre MR, William J, Chuba P, et al (2000). Early deaths in childhood cancers. *Med Pediatr Oncol*, **34**, 343-7.
- Haneef SM, Ashraf M (1980). Childhood malignant diseases at Lahore. *Pak Pediatr J*, **4**, 170-8.
- Hanif G (2004). Intra-abdominal tumours in children. *J Coll Physicians Surg Pak*, **14**, 478-80.
- Kamsa-ard S, Wiangnon S, Kamsa-ard S, et al (2006). Trends in incidence of childhood leukemia, Khon Kaen, Thailand, 1985-2002. *Asian Pac J Cancer Prev*, **7**, 75-8.
- Memon MH, Memon I, Memon RA (1992). The changing pattern of malignant diseases in Sind Province. *Pak J Pathol*, **3**, 17-20.
- Parkin DM, Muir CS, Whelan S, et al (1992). Cancer incidence in Five continents, Vol VI. IARC Scientific publication No 120. World Health Organization, Lyon, IARC.
- Powell JE, Parkers SE, Cameron AH, Mann JR (1994). Is the risk of cancer increased in Asians living in UK? *Arch Dis Child*, **71**, 398-403.
- Reyes PN (1977). Clinical profile of intra-abdominal tumours in Filipino infants and children. *Philip J Surg Spec*, **34**, 107-12.
- Rosai J (2004). Gross techniques in surgical pathology. In: Ackerman's Surgical Pathology. 9th ed. Singapore, Year book Inc.
- Shah SH, Pervez S, Hassan SH (2000). Frequency of malignant solid tumours in children. *J Pak Med Assoc*, **50**, 85-8.
- Shams-uz-Zaman SMA (1990). Incidence of pediatric malignancies in the INMOL series of cancer patients. *Pak Pediatr J*, **14**, 1-10.
- Stewart BW, Kleihues P. Eds (2003). World Cancer Report. IARC, Lyon .
- Zaidi SMH, Jaffery NA (1977). Childhood tumours in Karachi. *J Pak Med Assoc*, **27**, 346-48.
- Zuccolo L, Pastore G, Maule M et al (2006). Time trends and prognostic factors for survival from childhood cancer: a report from the Childhood Cancer Registry of Piedmont (Italy). *Eur J Pediatr*, **165**, 240-9.