

PROFILE OF PEDIATRIC MALIGNANCY: A THREE YEAR STUDY

Bhalodia Jignasa N¹, Patel Mandakini M²

¹Associate Professor, Department of Pathology, G.M.E.R.S. Medical College, Sola, Ahmedabad, Gujarat ²Additional Professor, Department of Pathology, Govt. Medical College & New Civil Hospital, Surat, Gujarat.

Correspondence:

Dr. Bhalodia Jignasa N.

B-37, Marutinandan Vihar Bunglows, Nr. Aarohi villa, S.P. Ring road, Bopal, Ahmedabad - 380058.

E-mail : jignasanb@yahoo.co.in

Mobile: 9925594684

ABSTRACT

The objective of this study was to find out the profile of childhood cancers in South Gujarat region, during November 2002 to October 2005. Between November 2002 to October 2005 data was analyzed for the malignancies occurring in the age group 0-14 years. Data was categorized according to incidence of pediatric malignancies in different age groups, sex and types of tumors. All the children below 15 years with confirmed diagnosis of cancer by means of histological or cytological examinations were included in this study. Total 2150 patients were diagnosed as having malignancies in our hospital out of which 43 were pediatric tumors. Overall incidence of pediatric tumor was 2%. The peak incidence of pediatric tumors (44.18%) was found in children below five year of age. Males were affected more than females. Among hematological malignancies most common was acute lymphoblastic leukemia. The pattern of childhood tumors shows wide variation among the age groups. Acute lymphoblastic leukemia, lymphoma and CNS tumors are most common tumors in this age group.

Key words: Pediatric malignancy, cancer profile, incidence, south Gujarat region

INTRODUCTION

Incidence of pediatric tumors is on rise all over the world.¹ Malignant neoplasms are rare in children, yet it is an important cause of childhood mortality in many of the economically developed nations of the world.^{2,3} Malignancy is the second most common cause of childhood death in developed world, accounting for 10%-12.3% of all childhood deaths.^{1,2} It is second major cause of childhood mortality after accidents in U.S.A.^{4,5} In developing countries like India childhood mortality is still due to malnutrition and infections, but pediatric tumors are also rising in number.¹

Childhood cancers are unique in the sense that they arise from embryonal cells, respond to treatment rapidly and the survival has improved dramatically over the last two decades due to aggressive combine modality management.² Because of the major advances in

diagnosis, multi-modality therapy, development of rational use of combination chemotherapy and improved supportive care, the cure rate in childhood cancer has increased tremendously and over 60% of all childhood cancers are now curable.⁶ Seven out of ten children with cancer in the resource-rich countries are cured, with a five-year survival for certain cancers for example, Hodgkin's disease and retinoblastoma, now 95%.⁷

Good- quality population level statistics on the occurrence of cancer at young age have been more difficult to obtain than in adults.⁸ Serious under reporting, even in western countries, has been documented.⁸ Appropriate management of pediatric tumors requires complete epidemiological data of pediatric tumors in different geographical areas. As hospital registries are the only available source of information for assessing the disease pattern in

community,¹ so we conducted this study to find out the profile of childhood cancer in South Gujarat region.

MATERIALS AND METHODS

We used three years hospital records in this retrospective study from November 2002 to October 2005. All children with cancer, aged 0-14 years diagnosed by means of histological and cytological examination during that period were included in the study. Patients from South Gujarat region attend this Government hospital for better care and cure.

The system of classification by site was devised primarily for cancers in adults are less useful for studying the types of childhood tumors that can arise at diverse sites. National Cancer Institute, US has classified childhood cancers according to SEER (Surveillance, Epidemiology and End Results) programme data, which is a modification of ICCC (International childhood cancer classification).⁹ We classified our tumors according to this criteria.

The profile of childhood cancer was studied focusing on the prevalence of tumors according to age, sex and type of tumors.

RESULTS

In our hospital during period of three years 2150 patients were diagnosed as having malignancies

out of which 43 cases were of pediatric age group. The pediatric malignant tumor comprises 2% of all malignancies. Males are affected (58.14%) than females (41.86%) with male to female ratio of 1.38:1.

Tumors were arranged according to their incidence in 0-4 years (44.18%), 5-9 years (25.58%) and 10-14 years (30.24%). The incidence of tumor varied among different age groups. The highest incidence was seen in 0-4 years of age group and lowest incidence is seen in 5-9 years of age group.

It was observed that hematological malignancies were more common (60.47%) than the non-hematological malignancies (39.53%). Acute lymphoblastic leukemia is most common hematological malignancy. It account for 39.53% of total malignancies, 65.38% of total hematological malignancies and 89.47% of acute leukemia. Peak incidence of acute leukemia occurs in 0-6 years of age group. Among hematological malignancies acute lymphoblastic leukemia is followed by Hodgkins disease (13.90%), acute myeloid leukemia (4.65%) and non-Hodgkins lymphoma (2.32%). Most common non- hematological malignancy is Wilm's tumor (9.30%) followed by sympathetic nervous system tumors (neuroblastomas and ganglioneuroblastomas) (6.97%).

Table 1: Incidence of pediatric malignancies according to sex in our study and other studies

Gender	Gurney et al ¹¹	Yeole et al ¹⁰	Vineeta Joshi et al ¹²	Present study
Male	54.10%	61.20%	-	58.14%
Female	45.90%	38.80%	-	41.86%
M:F ratio	1.17:1	1.57:1	1.58:1	1.38:1

DISCUSSION

In our study pediatric tumors constituted 2% of all malignancies. It is lower than other studies (3.4%) in Rathie et al.¹, (4.5%) in Kusumakumary et al.² and (3.3%) in Yeole et al.¹⁰. But according to Arora et al.⁷ incidence of cancer in India is 1.6-4.8%, so our finding falls in this range. Our incidence is lower than England (0.5%)⁷ and (0.8%) in U.S.A.⁸. This is related to population structure (33% of the population in India is less than 15 years of age compared to 18% in England). Children form a larger part of the population in a developing country where the life expectancy is lower than in the developed world.⁸ The international comparison of cancer

frequency and incidence are potentially biased by variability in diagnosis, classification and differential access to medical care and incomplete registration.²

Following table shows incidence of pediatric malignancies according to sex in present study and other studies.

In all three studies the incidence of malignancies is higher in male than in female. Male and female ratio in present study is 1.38:1 which is almost comparable with both Yeole et al¹⁰ and Vineeta Joshi et al¹² studies. The ratio is slightly higher than Gurney et al study¹¹, which was conducted in USA. Male predominance is a salient feature of the childhood tumors. Sex ratio varies with site. The male excess is particularly

seen in neoplasms of lymphoid origin e.g. ALL, NHL and HD which represent over two third of all tumors. Environmental factors like exposure to carcinogens at work or smoking habits may be contributing to excess of cancers in adult males but such an explanation cannot account for the excess of cases seen in male children. Genetic difference in immune function may be responsible for the increased incidence of lymphoid tumors in males. The female excess seen in germ cell tumors may be due to earlier development of ovarian tumors than testicular tumors, but no convincing explanation is given for increased incidence of sacrococcygeal teratomas in girls.²

Male preponderance in our country could be also as a result of our cultural factors wherein boys get more attention and are brought to hospital more often for management.¹⁰ The following table shows comparison of prevalence of childhood malignancy according to age in different studies.

It shows that the incidence is more in 0-4 years of age group. The majority of acute lymphoblastic leukemia and embryonal tumors (neuroblastoma, hepatoblastoma, nephroblastoma, retinoblastoma, rhabdomyosarcoma and medulloblastoma) occurs in children less than five years of age. Peak age of acute lymphoid leukemia occurs at 2 years of age.^{10, 11} In present study total cases of acute lymphoblastic leukemia is 17. Out of that 70.58% cases were from child below 5 years of age group, so highest incidence of malignancy was in age group of 0-5 years age group.

Table 2: Prevalence of childhood malignancies according to age in present study and Yeole, et al¹⁰ study and Jabeen et al⁸ study

Age in years	Yeole et al. ¹⁰	Jabeen et al. ⁸	Present study
0-4	36%	30.9%	44.18%
5-9	32%	31.4%	25.58%
10-14	32%	37.7%	30.24%

Table 3: Relative frequencies (%) of different pediatric malignancies in 2 developed countries, India and few canters from India.

Tumor	U.S.A. ¹²	UK ¹²	India ¹	Mumbai ¹⁰	Delhi ⁶	Gujarat ¹²	Kerala ²	Present study
Leukemia	30.1	20.4	32	32.8	28.8	39.9	30.0	44.18
Lymphoma	12.3	8.7	14.08	12.65	11.5	15.25	10	16.27
CNS Tumors	19.1	16.6	18.21	17.6	21.0	8.3	19.3	6.97
Neuroblastoma	8.1	7.5	4.21	-	4.1	4.47	5.1	6.97
Wilm's tumor	6.5	5.4	4.94	5.25	3.3	4.86	5.4	9.30
Bone tumors	4.8	4.8	7.66	3.85	3.3	7.34	5.4	2.32
Soft tissue tumors	6.3	8.5	5.49	4.3	3.8	1.15	6.6	2.32
Other	10.1	16	18.35	19	11.8	9.52	13.8	11.67

Leukemias are the commonest form of childhood malignancies and together with lymphoma, constitute 35-55% of all malignancies in different regions. In present study, lymphoma and leukemia together constitute 60.45% of malignancies. Among leukemias, most common are acute leukemias, 75-80% being ALL and 20-25% ANLL.¹⁰ In present study ALL constitute 89% of total leukemias and ANLL is 11% of leukemias. CNS tumors constitute about 18-20% of malignant neoplasms in pediatric age group. In present study, incidence of pediatric CNS tumor is 6.97%, which is almost comparable with Parikh BJ et al study which is carried out at GCRI, Ahmedbad, Gujarat.¹² But incidence is lower in our study than other studies done out of

Gujarat. Incidence of Wilm's tumor is slightly higher (9.30%) than that of other studies.

Incidence of neuroblastoma, bone tumors, soft tissue tumors and other malignancies is comparable with different studies. Pediatric solid tumors show wide incidence variation among the age groups. Frequency of Wilm's tumor, Yolk sac tumor and PNET is high in 0-4 years of age group. In children of 5-9 years CNS tumors and neuroblastoma is common. Hodgkins disease is more in children more than 10 years. It is a known fact that certain childhood malignancies are more prevalent in younger children under 5 years, while others mostly occur in an older age group.¹³

CONCLUSION

Pediatric tumors are a special entity with different genetic, environmental factors playing a role in their etiology. The growth potential and response to treatment is also different from those of adult tumors. Children in developing nation are increasingly affected by malignancy in addition to rampant malnutrition and infection, but dedicated registry maintenance of pediatric tumors is lacking. As many of common childhood malignancies are curable there is need to have a dedicated pediatric cancer registry for assessing the magnitude of problem in our country as pediatric tumors show wide variation across centers.

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