Malignant solid tumors of childhood

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Objective

To evaluate the frequency of malignant solid tumors in a pediatric age group (<15 years) at a tertiary care hospital in Lahore, Pakistan.
Background

• In many parts of the world malignancies are among the leading cause of childhood death (Akhiwu, Igbe, Aligbe, 2009).

• There is a wide variation in the incidence of childhood tumors world wide and the incidence of childhood tumors is increasing in the developing countries (Akinde, Abdukareem, Daramola, Anunobi, & Banjo, 2009).
• Solid tumors make up about 30% of all pediatric cancers. (Kline & Sevier, 2003)

• This study was carried out to see the frequency of malignant solid tumors in our set up.
Methods

• This is a retrospective study of 328 cases which were diagnosed in the section of histopathology at the Children’s Hospital and the Institute of Child health Lahore.

• Histopathological records of all cases of solid malignant tumors of children under 15 years of age were included in this study in a five year period.
Methods cont..

• Tumors were diagnosed on routine Haematoxylin and Eosin staining; undifferentiated tumors were evaluated immunohistochemically by using a panel of antibodies.

• The tumors were analyzed according to age, sex and histopathological diagnosis; the relative frequencies were then determined.
Results

• Of the 328 cases of pediatric solid tumors 195 (59.45%) were male and 133 (40.55%) were females.
• Male : Female ratio was 1.5 : 1.0
• The number of children in
  0 to 4 years age were 120 (36.5 %)
  4- 9 years were 143 (43.7%),
  9-15 years were  65 ( 19.8 %)
# Frequency of solid tumors

<table>
<thead>
<tr>
<th>Tumor</th>
<th>No</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphoma</td>
<td>104</td>
<td>31.3%</td>
</tr>
<tr>
<td>Brain tumors</td>
<td>72</td>
<td>22.0%</td>
</tr>
<tr>
<td>Renal tumors</td>
<td>30</td>
<td>9.2%</td>
</tr>
<tr>
<td>Soft tissue tumors</td>
<td>28</td>
<td>8.6%</td>
</tr>
<tr>
<td>Germ cell tumors</td>
<td>26</td>
<td>7.9%</td>
</tr>
<tr>
<td>Bone tumors</td>
<td>21</td>
<td>6.4%</td>
</tr>
<tr>
<td>Retinoblastoma</td>
<td>16</td>
<td>4.8%</td>
</tr>
<tr>
<td>Hepatic tumors</td>
<td>12</td>
<td>3.8%</td>
</tr>
<tr>
<td>Neuroblastoma</td>
<td>11</td>
<td>3.1%</td>
</tr>
<tr>
<td>Thyroid tumors</td>
<td>8</td>
<td>2.5%</td>
</tr>
<tr>
<td>undetermined</td>
<td>15</td>
<td>4.5%</td>
</tr>
</tbody>
</table>
# Lymphomas

**Total cases=104**

<table>
<thead>
<tr>
<th>Types</th>
<th>No of Cases</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Hodgkin Ds</td>
<td>64</td>
<td>61.5</td>
</tr>
<tr>
<td>II NHL</td>
<td>40</td>
<td>38.5</td>
</tr>
<tr>
<td>i Burkitt’s</td>
<td>24</td>
<td>23.1</td>
</tr>
<tr>
<td>ii Lymphoblastic</td>
<td>16</td>
<td>15.4</td>
</tr>
</tbody>
</table>

![Pie chart showing distribution of lymphoma types](chart.png)
Age/ Sex Distribution of Lymphoma
Total no. of cases 104

![Age Distribution Chart]

- **Female**: 8 cases
- **Male**: 25 cases
- **Total**: 64 cases
- **Other Ages**: 10 cases

**Notes:**
- Age ranges: 2 to 15 years
- Sample size: 104 cases
- Category: Lymphoma

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[Age Distribution Chart Image]
## Brain Tumors

**Total No. of cases = 72**

<table>
<thead>
<tr>
<th>Types</th>
<th>No. of cases</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>I GLIOMAS</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>i. Astrocytomas</td>
<td>48</td>
<td>66.6</td>
</tr>
<tr>
<td>ii. Oligoastrocytomas</td>
<td>12</td>
<td>16.7</td>
</tr>
<tr>
<td>II MEDULLOBLASTOMA</td>
<td>12</td>
<td>16.7</td>
</tr>
</tbody>
</table>

- **Astrocytomas**
- **Oligoastrocytomas**
- **Medulloblastoma**
Age/ Sex Distribution of Brain Tumors

Total no. of cases 72

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>5--</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>10--</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>25</td>
</tr>
</tbody>
</table>

- Female
- Male
### Renal Tumors

No. of cases 30

<table>
<thead>
<tr>
<th>Type of renal tumors</th>
<th>No. of cases</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilm’s tumor</td>
<td>26</td>
<td>86.66%</td>
</tr>
<tr>
<td>CCSK</td>
<td>2</td>
<td>6.66%</td>
</tr>
<tr>
<td>Mesoblastic nephroma</td>
<td>2</td>
<td>6.66%</td>
</tr>
</tbody>
</table>
Age/ Sex Distribution Renal Tumors
Total no. of cases 28

No of cases

Age in Years

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>3--</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7--</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

*Female* *Male*
Soft tissue Sarcomas

No. of cases -28

<table>
<thead>
<tr>
<th>Types</th>
<th>No. of cases</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhabdomyosarcomas</td>
<td>20</td>
<td>71.44</td>
</tr>
<tr>
<td>Infantile Congenital Fibrosarcoma</td>
<td>8</td>
<td>28.56</td>
</tr>
</tbody>
</table>

Rhabdomyosarcoma

congenital fibrosarcoma
Age/ Sex Distribution of Soft Tissue Sarcoma
Total no. of cases 28

No of cases

Age in Years

No of cases

Age in Years

Female

Male

2

3--

5

7--

9

10

13

15

0

2

4

6

8

10

12

14

16

18
# Germ cell tumors

No. of cases-26

<table>
<thead>
<tr>
<th>Types</th>
<th>No. of Cases</th>
<th>%Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>I  Mixed GCT</td>
<td>13</td>
<td>50%</td>
</tr>
<tr>
<td>II Pure GCT</td>
<td>13</td>
<td>50%</td>
</tr>
<tr>
<td>i. Immature Teratoma</td>
<td>6</td>
<td>23.04%</td>
</tr>
<tr>
<td>ii Yolk sac Tumour</td>
<td>4</td>
<td>15.44%</td>
</tr>
<tr>
<td>iii. Dysgerminoma</td>
<td>3</td>
<td>11.52%</td>
</tr>
</tbody>
</table>

[Pie chart showing the distribution of types of germ cell tumors.]
Age/ Sex Distribution of Germ Cell Tumours

No. of cases 26

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>12</td>
<td>4</td>
</tr>
</tbody>
</table>

- Female: 13 cases
- Male: 9 cases
## Bone tumors

Total no of cases  21

<table>
<thead>
<tr>
<th>Type of tumors</th>
<th>No</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Osteogenic Sarcoma</td>
<td>13</td>
<td>62%</td>
</tr>
<tr>
<td>2 Ewings Sarcoma</td>
<td>8</td>
<td>38%</td>
</tr>
</tbody>
</table>

![Pie chart showing distribution of bone tumors]
Age/Sex Distribution Bone Tumors

- 5 to 10 yrs: 2 male, 3 female
- 10 to 15 yrs: 16 male, 6 female
Retinoblastoma

Total no. of cases 16
male - 9    female - 7

Age/ Sex Distribution Retinoblastoma

![Bar chart showing age and sex distribution of Retinoblastoma cases.](chart.png)
Hepatoblastoma

Age/Sex Distribution Hepatoblastoma

No. of cases 12
Male - 4  female-8
Age/ Sex Distribution Neuroblastoma

Total no. of cases 11

Male  7  Female  4
Papillary Carcinoma of thyroid

Total no of cases 8  (Females 6 & Males 2)
Discussion

• In this study Lymphoma (31.3%) was the most common tumor seen in children, with a higher frequency of Hodgkin’s lymphoma, which correlates with other studies from Pakistan.

• CNS tumors (22.0%) was the second most common tumor in this series and this also correlates with other national studies.
Continued

• Studies carried out nationally at AFIP, Rawalpindi & AKUH, Karachi revealed, Lymphomas being the most common followed by CNS and bone tumors (Jamal, Mamoon, Mushtaq, & Luqman, 2006)(Shah, Pervez, & Hassan, 2000).
Differences were noted in comparison to some international studies.

- Hodgkin’s lymphoma was more common in our study in contradiction to reports from West where Non Hodgkin’s Lymphoma is more common (Shiels MS, Engels EA, Linet MS, et al.2013).
Continued

• Study by the International Agency for Research on Cancer revealed that in children aged 0–14 years the most common cancers were leukemia followed by CNS tumors and lymphomas (Foucher E., Colombet M., Ries L. et al 2017).

• In a study conducted in Syria tumors of mesenchymal origin were the commonest (60.8%) while epithelial tumors including germ cell accounted for(39.2%) cases.(Samaila, 2009)
• In a study on Nigerian children the commonest malignant tumour diagnosed was rhabdomyosarcoma accounting for 31% of the cases. (Tanko, Echejoh, Manasseh, 2009)

• In another study in Nigeria, Burkitt's lymphoma was reported as the most common malignant tumor followed by nephroblastoma and soft tissue sarcoma. (Ekanem, Asindi, Ekwere, Ikpatt, & Khalil, 1992)
Continued

• These differences could be due to geographic variation; which might be affected by age, economic status, or rural/urban classification. (Zahnd et al., 2017)

• Exposures to carcinogenic chemicals e.g., air pollution, smoke, food, or drinking water or radiation also play a role.  
  (Carpenter & Bushkin-Bedient, 2013)

• Viral infections.

• Genetic variation in certain populations (e.g., prevalence of cancer predisposition genes) might contribute in cancer incidence. (Li, Thompson, Miller, Pollack, & Stewart, 2008)
Conclusion

• Solid tumors are one of the most frequently encountered malignancies of childhood.

• Certain differences were noted between tumors of our study and those reported from other parts of the world.

• At national level our results are similar to other studies, lymphoma being the most frequent pediatric tumor.
Thank you!
Bibliographical references


Bibliographical references cont:


• Meredith S. Shiels, Eric A. Engels, Martha S. Linet, Christina A. Clarke, Jianmin Li, H. Irene Hall, Patricia Hartge and Lindsay M. Morton

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