FREQUENCY AND PATTERN OF PRIMARY PEDIATRIC BRAIN TUMOURS: A RETROSPECTIVE STUDY IN NEUROSURGERY UNIT, LADY READING HOSPITAL PESHAWAR, PAKISTAN

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ABSTRACT

OBJECTIVE: To determine the frequency and pattern of primary brain tumors of infancy and childhood in hospitalized patients at neurosurgery department Lady Reading Hospital, Peshawar.

METHODS: This descriptive cross sectional study was conducted from January 2013 to December 2013 at neurosurgery department Lady Reading Hospital, Peshawar, Pakistan. Pediatric patients under 14 years with primary brain tumor were included. Data was then collected on a predesigned proforma from the hospital charts, radiographic and histopathological reports and was analyzed for age, gender and tumor morphology.

RESULTS: Out of 66 patients of primary brain tumour during the study period, 31 cases (46.96%) were supratentorial and 35 cases (53.04%) were infratentorial. Most commonly affected age group was 5-9 years and 10-14 years. Both male and female were equally affected with male to female ratio of 1:1. Twenty one cases (31.81%) were glioma, 17 cases (25.76%) were craniopharyngioma, 12 cases (18.18%) were medulloblastoma, 9 cases (13.65%) were ependymoma, 4 cases (6.06%) were choroid plexus papiloma and 3 cases (4.55%) were meningioma. Out of 21 cases of glioma, 11 cases (52.38%) were pilocytic astrocytoma, 7 cases (33.33%) were glioblastoma multiformis (GBM) and 3 cases (14.29%) were brainstem low grade astrocytoma.

CONCLUSION: Most of the pediatric primary brain tumours are infratentorial. Glioma is the most common primary brain tumour in children followed by craniopharyngioma, medulloblastoma and ependymoma. The commonest age groups of presentation were 5-9 years and 10-14 years with equal male to female ratio.

KEY WORDS: Glioma (MeSH), Astrocytoma (MeSH), Craniopharyngiomas ((Non-MeSH),), Medulloblastoma (Non-MeSH), Ependymoma (MeSH), Meningioma (MeSH), Papilloma Choroid Plexus (Non-MeSH).

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INTRODUCTION

The term "brain tumor" refers to a collection of neoplasms, each with its own biology, prognosis and treatment; these tumors are better identified as "intracranial neoplasms"; since some do not arise from brain tissue (e.g., meningiomas and lymphomas). However, for most intracranial tumors, the clinical presentation, diagnostic approach, and initial treatment are similar. Intracranial tumors in children, once thought to be rare, have been discovered more frequently since the introduction of sophisticated diagnostic tools viz. Computed Tomography (CT) and Magnetic Resonance Imaging (MRI).[1]

Childhood neoplasms are the second most common cause of death after trauma, the commonest cause beyond the neonatal age group.[2] Tumors of the nervous system are the second most common childhood tumor after leukemia,[3] constituting approximately 35% of all childhood malignancies and remain the leading cause of cancer-related deaths in children.[4] Childhood central nervous system (CNS) tumors differ significantly from adult brain tumors in reference to their sites of origin, clinical presentation, tendency to disseminate early, histological features and their biological behavior whereas in adults the predominant CNS tumor types are metastases, glial neoplasms and meningiomas. In children, besides gliomas, other major tumor types including primitive embryonal neoplasms are also common. In recent times, an enhanced understanding of these biological differences between adult and childhood CNS neoplasms has led to investigations in distinct molecular and genetic pathways and therapeutic approaches for each tumor type. However, for the necessary research required in the field of pediatric brain tumors, a thorough knowledge of the worldwide incidence and distribution of the various neoplasms is essential. There are several reports regarding the epidemiology of CNS tumors in children in the Western literature.[3,5] However, due to scarcity of reliable data collection and monetary resources, information on the demographic profiles

of these tumors is scant in the developing world, where due to a large population load the burden of such tumors is high.

Similarly in Pakistan, research work regarding epidemiology of primary brain tumor in children is limited and we need to know the load of the disease so that appropriate measures could be taken and we would be able to move our resources towards this neglected side of neurosurgical diseases. This study was planned to determine the frequency and pattern of primary brain tumors of infancy and childhood in hospitalized patients at neurosurgery department Lady Reading Hospital Peshawar.

METHODS

A descriptive cross sectional study was conducted in neurosurgery unit Lady Reading Hospital, Peshawar from January 2013 to December 2013. The study was conducted after taking approval from hospital research and ethical committee. All cases of primary brain tumor up to the age of 14 years which have been surgically treated were included and cases of primary brain tumor above the age of 14 years, recurrent tumors, metastatic brain tumors and those managed conservatively, were excluded from the study. The patients were divided into 3 categories on the basis of age i.e. 0-4, 5-9 and 10-14. The frequency of different type of tumors in these three categories was then analyzed for gender as well. Data was collected by examining the medical records of the patients, radiology and histopathology and was analyzed using Statistical Package for Social Sciences (SPSS) software version 18. Data was then shown in the form of different charts, graphs and tables.

RESULTS

In this retrospective study of one year duration we included about 66 cases of primary brain tumor in pediatric age.

About 31 cases (46.96%) were supratentorial and 35 cases (53.04%) were infratentorial. Most commonly affected age group was 5-9 years and 10-14 years. Both male and female were equally affected with male to female ratio of 1:1. Out of 66 patient about 21 cases (31.81%) were glioma, 17 cases (25.76%) were craniopharyngioma and 12 cases (18.18%) were medulloblastoma (Table I). Out of 21 cases of glioma, 11 cases (52.38%) were pilocytic astrocytoma, 7 cases (33.33%) were glioblastoma multiformis (GBM) and 3 cases (14.29%) were brainstem low grade astrocytoma.

We also evaluated individual tumour's distribution for age and gender. Astrocytoma was more common in age group 10-14 years (57.143%) and was slightly more common in female (52.38%). Craniopharyngioma in about 52.94% of cases was in the age group of 10-14 years and was more common in female (64.71%). 66.67% of medulloblastoma was in the age group of 5-9 years and was more common in male (58.33%). Ependymoma was more common in the age group of 0-4 years (55.56%) and were females. Choroid plexus papiloma was common in age groups of 0-4 years and 5-9 years (50% each) and 100% were female. Meningioma was 66.67% in the age group of 10-14 years and 66.67% of cases were female.

TABLE I: FREQUENCY DISTRIBUTION OF PEDIATRIC BRAIN TUMOURS

Type of Tumour	Frequency (n=66)	Percentage
Glioma	21	31.81 %
Craniopharyngioma	17	25.76 %
Medulloblastoma	12	18.18 %
Ependymoma	09	13.64 %
Choroid plexus papiloma	04	6.06 %
Meningioma	03	4.55 %

TABLE NO. II: COMPARISON OF FREQUENCY DISTRIBUTION OF PEDIATRIC BRAIN TUMOURS

Study	Total No.	Medullo-blastoma	Astrocy-toma	Ependymo-ma	Craniophar-yngioma	Ch.Plex-us pap.	Meningio-ma	Cerebel. as-trocytoma
Mosso et al 1992[7]	293	19.11%	27.3%	4.78%	—	—	—	—
Khan et al 1983[8]	30	46.7%	40%	13.3%	—	—	—	—
Pollock et al.[9]		21%	35%	7%	—	—	—	15%
Packer et al 2001[10]		18.1%	41.1%	10.4%	4.4%	—	1.2%	—
Zaman 1990[11]	20	40%	—	10%	—	—	—	40%
Nazir et al.1995[12]	20	—	65%	5%	—	—	—	—
Our study	66	18.18%	31.18%	13.65%	25.76%	6.06%	4.55%	

DISCUSSION

Brain tumors are the most common solid tumors that affect children of all ages, ethnicities and races albeit with variations. Due to lack of complete registration of pediatric brain tumors, the exact burden of such diseases goes unnoticed and is underestimated in the developing countries like Pakistan. The current study was designed to segregate pediatric brain tumors from adult tumors and to determine the frequency of these tumors. This study is essential for ascertaining the required healthcare infrastructure in the management of these diseases and for assessing geographical differences in their molecular and genetic profiles.

We compared our study with national and international studies. In our study infratentorial tumors were most common (53.04%) while supratentorial tumors were 46.96%. According to Naseem ahmad et al the infratentorial tumors were most common and were 66.7% while supratentorial tumors were 33.3%.[6] Both are compatible in the sense that in both studies infratentorial tumors are the most common tumors. In our study the most commonly affected age group is 5-9 years which is comparable to naseem ahmad et al.[6] The most common tumour in pediatric age in our study was found to be astrocytoma and is about 31.18%. Astrocytoma in Mosso et al, is 27.3%,[7] Khan et al, is 40%,[8] Pollock et al, 35%,[9] and Packer et al, 41.1%.[10] These are all comparable with our study.

The second most common tumour in our study is Craniopharyngioma which is 25.76% where as it is 4.4% in Packer et al.[10] The exact cause for this large difference is not known but one possible cause may be that we are not only dealing with the tumor burden of Khyber Pakhtunkhwa but also a large number of cases are also treated in the same hospital. The third common tumor in our study is medulloblastoma which is 18.18% and it is 18.1% in Packer et al,[10], 19.11% in Mosso et al,[7] and 21% in Pollock et al.[9] Our study is comparable with these studies as well. Ependymoma in our study is 13.65% which is comparable with Zaman et al,[11], Khan et al,[8] and Nazir et al.[12] in which it is 10%, 13.13% and 5% respectively. Meningioma is 4.55% in our study whereas it is 1.2% in packer et al.[10] We can summarize the comparison of frequency distribution of pediatric brain tumours from various studies in Table II.

CONCLUSION

Most of the pediatric primary brain tumors are infratentorial. Glioma is the most common primary brain tumor in children under the age of 14 years. It is followed by craniopharyngioma, medulloblastoma and ependymoma. The commonest age groups of presentation were 5-9 years and 10-14 years with equal male to female ratio.

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CONFLICT OF INTEREST

Authors declared no conflict of interest

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

MA: Acquisition of data, critical revision, supervision, final approval of the version to be published

WU: Concept & study design, acquisition analysis and interpretation of data, drafting the manuscript, final approval of the version to be published

BJ, IA & NH: Acquisition of data, Drafting the manuscript, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.