ORIGINAL ARTICLE

Histologic Spectrum of Brain Tumors at Children Hospital and Institute of Child Health, Lahore

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ABSTRACT

There is a difference in geographical distribution, clinical aspects, effect of therapy and prognosis in brain tumors occurring in infancy and childhood as compared to brain tumors of adults. This study is based on histologic spectrum of tumorsof brain under 14 years of age. A total of 155 brain tumors were diagnosed during the study period of eight years from Jan 2010 to 31st Dec 2017. Out of which 52 (33.54%) were Supratentorialand 103 (66.45%) were Infratentorial in location. Medulloblastoma was the most common in this age group seen in 62 patients (40%). The second most common tumor was Pilocytic astrocytoma diagnosed in 37 patients (23.87%) followed by choroid plexus papilloma 14 cases (9.03%), Ependymoma 13 cases (8.38%), Craniopharyngioma 08 cases (5.16%), and Glioblastoma 6(3.87%) . Other tumors include high grade gliomasNOS,Hemangioblastoma and Oligodendroglioma with 2 cases each(1.29%), while a single case (0.64%) of Meningioma, Hemangioma, Subependymalgiant cell tumor, Astroblastoma, Pleomorphic Xanthoastrocytoma, Choroid plexus carcinoma, Immature teratoma,Langerhans cell histiocytosis and Non-Hodgkin lymphoma was diagnosed in this period. On conclusion,the commonest tumor was medulloblastoma and infratentorial tumors were more common than supratentorial among pediatric age group.

Keywords: Pediatric Brain tumors, Medulloblastoma, Pilocytic astrocytoma, Choroid plexus Papilloma,Ependymoma.

INTRODUCTION

CNS tumors are quite common in all agegroups. Biologically, childhood tumors are differentfrom tumors of adults. Brain tumors ofinfancy and childhood vary from adults regarding theirbehavior,site, prognosis and clinical outcome[1]. In children primary malignant brain tumors are the leading cause of cancer death and the second most frequent type of pediatric cancer after leukemia[2]. Peak incidence of brain tumors occurs belowfive years of age, which decreases in gradual manner till the age of 20 years. The age distribution varies withthe tumor type[3]. Primary brain tumors are mostlysituated in the posterior cranial fossa in children andapproximately 70% of brain tumours in childhood are infratentorial[4]. Majority of childhood brain tumors are of following 4 categories: astrocytoma, medullo-blastoma, ependymoma and craniopharyngioma which constitute 88% of total brain tumors in children[5].

There has been a high mortality associated with brain tumors. However, early detection hasled to improvement in the outcome of the patients. It is not possible to calculate incidence or prevalence in hospital based study, but this knowledge can be used to observe the patterns of brain tumors in children in our region. This can be compared with similarstudies as described in Far Eastern and Western countries. Morphology remains the mainstay of diagnosis of brain tumors, but relevant clinical history and imaging findings are very important in reaching the correct diagnosis. Immunohistochemistry also has a significant role in establishing final diagnosis[7].

The objective of the study was to determine the distribution and histologic spectrum of primary braintumors in children below fourteen years ofage admitted in ChildrensHospital,Lahore.

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MATERIALS AND METHODS

A retrospective,observational study was conducted at the Histopathology Department, CH&ICH, Lahore to determine the histologic spectrum of pediatric brain tumors below 14 years of age, diagnosed withinlast eight years from 1st January, 2010 to 31st December, 2017.The specimens included in the study were fixedin 10% buffered formalin, followed by routine processing, paraffin embedding, sectioning with microtome and finally stained with haematoxylin and eosin.Immunohistochemistry was performedwhere necessary.

Other than tumor site and type, demographics such as gender and age were recorded. To determine the age wise frequency of tumors 5 age-group were made so that better idea can be inferred: Group 1 (0-2 years); group 2 (3-5 years); group 3 (6-8 years); group 4 (9-11 years) and group 5 (12-14 years).Tumors were subtyped according to WHO Classification for brain tumors.

RESULTS

During 8 years of study period, a total of 155 brain tumors were diagnosed. Two categories were made according to site:Supratentorial location seen in 52cases(33.54%) and Infratentorial seen 103(66.45%) as shown in Fig 1. The age range in the study was from 2 months to 14 years. Out of the total sample included , 95(61.29%) were males and 60(38.70%) were females with male to female ratio of 1.58:1. There is male gender predominance in all histological types of brain tumors.

Five groups were made according to ages of the patients (Table 1). The mean age of patients was found to be 6.18 years (± 0.21) with age range of 0.20-14 years. Majority of the patients (33%) in this study belongedtoage group 2 and the least were from age group 5(6.89%).

Medulloblastoma was the most commonly occurring brain tumor accounting for 40% (62 cases) (Fig.2).This

tumor was mainly present in age group 2. The second most common tumor was Pilocytic astrocytoma mainly seen in group 3 and group 2 diagnosed in 37patients (23.87%) (Fig.3). Choroid plexus papilomawas next in frequency and there were 14 cases (9.03%) This was followed by ependymoma 13 cases (8.38%) and craniopharyngioma 8 cases (5.16%). Glioblastoma was diagnosed in 6 patients (3.87%) only. There were 2 cases each of hemangioblastoma and oligodendroglioma. In two cases we were unable to further subtype the tumor and a diagnosis of high grade glioma was rendereddepending upon high cellularity and increased mitotic activity. A single case (0.64%) ofMeningioma,Hemangioma, Subependymal giant cell tumor, Astroblastoma, Pleomorphic Xanthoastro-cytoma, Choroid plexus carcinoma,Immatureteratoma, Langerhans cell histiocytosis and Non-Hodgkins lymphoma was diagnosed in this period (Table 2).

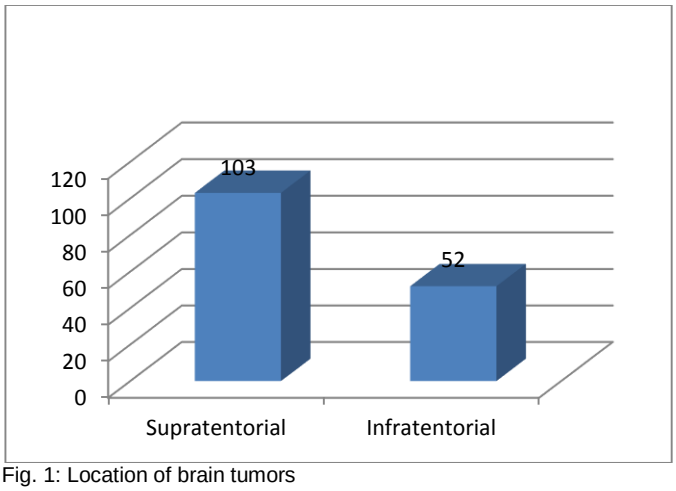

Fig. 1: Location of brain tumors

Table 1: Distribution Of Pediatric Brain tumors According To Age

	G1	G2	G3	G4	G5
Histological type	**0-2 yrs**	**3 to 5yrs**	**6-8yrs**	**9-11yrs**	**12-14yrs**
Medulloblastoma	11	23	9	11	8
Pilocytic astrocytoma	2	11	17	7	
Choroid plexus papilloma	4	8	2		
Ependymoma	1	4	3	5	
Craniopharyngioma		2	4	2	
Glioblastoma		1	2	3	
High Grade Gliomas		1	1		
Oligodendroglioma		1	1		
Hemangioblastoma					2
Astroblastoma		1			
Subependymal giant cell tumor			1		
Pleomorphic Xanthoastrocytoma			1		
Choroid plexus carcinoma				1	
Non HodgkinsLymphoma			1		
Immature Teratoma	1				
Langerhans Cell histiocytosis			1		
Hemangioma	1				
Meningioma		1			
Total	20	53	43	29	10

Table 2: Histological types of Brain Tumors in Pediatric age group

Histological type	**n**
Medulloblastoma	62(40%)
Pilocytic Astrocytoma	37(23.87%)
Choroid plexus papilloma	14)9.03%)
Ependymoma	13(8.38%)
Craniopharyngioma	08(5.16%)
Glioblastoma	06(3.87%)
Hemangioblastoma	02(1.29%)
Oligodendroglioma	02(1.29%)
High Grade Glioma	02(1.29%)
Subependymal giant cell tumor	01(0.64%)
Meningioma	01(0.64%)
Astroblastoma	01(0.64%)
Pleomorphic Xanthoastrocytoma	01(0.64%)
Non Hodgkins Lymphoma	01(0.64%)
Choroid Plexus Carcinoma	01(0.64%)
Langerhans cell Histiocytosis	01(0.64%)
Immature Teratoma	01(0.64%)
Hemangioma	01(0.64%)

DISCUSSION

Brain tumors in chidren are the most common solid tumors worldwide after leukemia[1]. In Pakistan like other developing countries, there isa lack of system for registration of all newly diagnosed cases with local cancer registries. As a result, the exact tumor load is not known and is under reported. Hospital-based studies, therefore, form the basis for assessing the tumor burden. According to WHO 2016 classification, CNS tumors have been divided into six categories- tumors of neuroepithelial tissue, tumors of cranial and paraspinal nerves, tumors of meningothelial cells, tumors of hematopoietic system, tumors of sellar region and metastatic tumors. Gliomas are tumors of neuroepithelial tissue and are sub-classified as astrocytoma, oligodendroglioma and ependymoma depending on the cells of origin. They are the commonest CNS tumors globally accounting for approximately 70% of cases, with glioblastoma being the commonest subtype in adults[8].

This study was conducted to determine the histologic subtypes of brain tumors in the last eight years from January 2010 to December 2017 among children under 14 years of age presenting at Children Hospital and Institute of Childhood , Lahore. Our study revealed that brain tumors are more common in males with male to female ratio of 1.58:1 which is similar to studies done previously[9,10,11,12,13].

This study revealed maximum number of the patients in age group 3-5 years which is nearly similar with a previous study done by Velema and Percy[14]. However, in contrast Ahmed et al. (2007) observed most cases in slightly older age group of 5-9 years[11] .

We found 6.18 years as a mean age for tumor incidence while Ahmed et al., (2007) and Mehrzin et al., (2006) reported mean age of 8.8 and 8.7 years respectively which is higher than the present study[11,15].

As in other studies conducted nationally and internationally, we found that the frequency of infratentorial tumors (66.45%) was higher than the supratentorial tumors (33.54%)[9,10,11,16,17].

Medulloblastoma constitute 40% of all tumors and was the most frequent histologic subtype in this study which is comparable to study of Nasir et al.,(2010), Ahmed et al., (2007) and Young et al., (2000) where it was also the leading tumor subtype[9,11,4].

It is also evident from published data that medulloblastoma is the commonest pediatric brain tumor. On contrary, astrocytoma was reported as the most common brain tumor in children by Zakrzewski et al., (2003) and Memon et al., (2007) whereas we found it to be the second most prevalent histologic subtype in our study[18,12]. In contrast to present study, Mehrazine et al., (2006), Rehman et al., (2009) and Khan et al., (2009) observed meningioma, neuroma and gliomas to be the most frequent pediatric tumors subtypes in their studies respectively[15,13,17]. However, in adult population glioblastoma is the most common primary brain tumour[19].

Another interesting finding was that Choroid plexus papilloma was the third most common tumor (9%) in our study whereas they constitute only 3-4% of all brain tumors in children[20].

Most of the previous studies showed almost equal percentage of ependymoma as in this study (8.38%)[11,12,18]. However, a few studies reported relatively lesser percentage of ependymoma[15,17].

CONCLUSION

Medulloblastomaand Pilocytic astrocytoma are the two most common brain tumors. Medulloblastoma is slightly more common in younger age group in contrast toPilocytic astrocytoma. In young age, infratentorial tumors are more common than supratentoriatumors.The major limitation of this study is that it is a single institution study and hence may not reflect the national statistics.To determine the incidence and subtypes of brain tumorsof children in Pakistan more population based studies should be done.

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