Original Research Article

Spectrum of Infratentorial Paediatric CNS tumors in a tertiary care hospital

Aluri A.P.[1], Teegala R.[2], Sappidi C.L.[3], Thota A.[4], Chilukuri S.[5]

[1]Dr. Anjana Priyanka Aluri, Assistant Professor, Department of Pathology, [2]Dr. Ramesh Teegala, Professor, Department of Neurosurgery, [3]Dr. Chaitanya Latha Sappidi, Postgraduate Student, Department of Pathology, [4]Dr. Asha Thota, Professor & HOD, Department of Pathology, [5]Dr. Swathi Chilukuri, Assistant Professor, Department of Pathology, all authors are affiliated with Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh, India.

Corresponding Author: Dr. Swathi Chilukuri, Assistant Professor, Department of Pathology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh, India. Mail id: saiswathi25@gmail.com

Abstract

Introduction: Due to lack of national wide registry of paediatric brain tumor cases in India, it is difficult to estimate the prevalence and its burden for the nation hence, hospital-based cancer registries will provide the information on the prevalence of tumor cases in a given region. **Objective:** The aim of this study is to analyze the incidence of various types of infratentorial paediatric tumors who underwent excision of the tumors from January 2008 to January 2018 in the Department of Neurosurgery, ASRAM, a tertiary care hospital located at Eluru, Andhra Pradesh state in India. **Results:** Infratentorial tumors are more common in the paediatric population below the age of 10 years and medulloblastomas being the commonest tumor among them. There is no much difference in the gender distribution in the incidence of Infratentorial tumors in our study. **Conclusion:** Our results are similar to other hospital-based data regarding to incidences and histological spectrum of infratentorial tumors. Our study strongly recommends that hospital based registries will provide the magnitude and distribution of cancers in a given region.

Keywords: Infratentorial, Paediatric brain tumors, CNS tumors

Introduction

The primary brain tumors account for less than 2% of all human cancers but causes disproportionate burden of cancer-related morbidity and mortality [1]. They are the most common solid tumors of childhood and after leukemia, are the leading causes of death in children. According to the literature, the histological distribution of paediatric CNS tumors differs from that of adults. Adult cases are predominantly glial type, meningiomas and metastatic in nature, whereas in children, besides gliomas, primitive embryonal neoplasms are also common [2]. Variations in the histological spectrum of Paediatric and adult CNS tumors are due to its origin, clinical presentation and biological behavior [3].

Infratentorial brain tumors, which are more predominant in paediatric CNS tumors account for nearly 70% of primary brain tumours, involving cerebellum, midbrain, pons, and medulla [4]. Data available regarding to incidences and prevalence of brain tumors were mostly from developed countries [5] which are maintaining nationwide cancer registries, but not from developing countries like India. There are few studies conducted in India on the prevalence of brain tumors like Tata Memorial Hospital (TMH), Mumbai, and All India Institute of Medical Sciences, Delhi [6,7]. There are also other studies on epidemiology of paediatric tumours in India [8,9] which showed the proportion of brain tumors in paediatric age group were heterogeneous. Still, there is a lack of Indian data about the prevalence of CNS tumors in paediatric population when compared to western countries. It is very important to maintain regional cancer registries especially with the help of hospital-based studies to assess the tumor burden in a nation which enables better research and therapeutic modalities.

The aim of this study is to analyze the incidence of various types of infratentorial tumors in a series of 31 paediatric patients, who underwent excision of the tumors from January 2008 to January 2018 in the Department of Neurosurgery, ASRAMS, Eluru.

Manuscript received: 30th August 2018
Reviewed: 8th September 2018
Author Corrected: 16th September 2018
Accepted for Publication: 20th September 2018

Materials and Methods

Ethics committee approval and patient's data- This is a retrospective hospital-based study approved by institutional ethics committee prior to collect the data from the department of pathology and department of neurosurgery. Data from January 2008 to January 2018 who underwent excision of the tumor was collected.

Inclusion and Exclusion criteria- A total of 31 paediatric patients with the age of ≤18 years operated in the neurosurgery department for infratentorial brain tumors and proven malignancy by histological examination was only included. Any case operated due to congenital malformations, trauma, infections were excluded from the study.

Data regarding age, gender, and histological type were collected from operated notes from the department of neurosurgery and medical records of individual patients.

The hematoxylin and eosin (H&E) stained slides of all 31 infratentorial brain tumors cases were studied and categorized according to the World Health Organization (WHO) classification of brain tumors. The results obtained were compared with available other Indian population data.

Statistics: Data of age, sex ratio, histology and grade of the tumors were analyzed and expressed in percentages.

Results

In this retrospective study, a total of 31 infratentorial tumors cases (table 1) age below 18 years were enrolled, Females (54.84%) were predominant when compared to males (45.16%) with a male/female ratio of 1:1.21 as shown in table 1. In the present study, we found one youngest case age of 4 months old. Age group of present study varied from 4 months to 18 years. We have categorised all cases into three groups 0-5 years: 12 (38.71%), 6-10 years: 5 (16.13%), 11-18 years: 14 (45.16%).

Table- 1: Clinico pathological presentation of the infratentorial tumor cases.

Variable	No of Cases (n=31)	in %
Gender		
Males	14	45.16
Females	17	54.84
Age (Years)		
0-5	12	38.71
06-10	05	16.13
11-18	14	45.16
Histology Type		
Embryonal tumors	13	41.93
Astrocytomas	08	25.8
Schwannomas	05	16.1
Mixed gliomas	03	9.6
Ependymomas	02	6.4
Embryonal tumors		
Medulloblastomas	11	84.5
Neuroblastomas	01	07.5
Atypical teratoid / Rhabdoid tumor	01	07.5
Astrocytoma		
Grade 1		
(Pilocytic Astrocytomas)	05	62.5
Grade 2		
(Diffuse Astrocytomas)	02	25
Grade 3	01	12.5
(Anaplastic Astrocytomas)		
Ependymomas		
Papillary Ependymomas	01	50
Anaplastic Ependymomas	01	50

Of 31 infratentorial tumor cases, Embryonal tumor type was most common which occupies 41.93% of all histological types followed by Astrocytomas 25.8%, Schwannomas 16.1%, Mixed gliomas 9.6% and least common histological type was ependymomas (fig 2) which accounts for 6.4%.

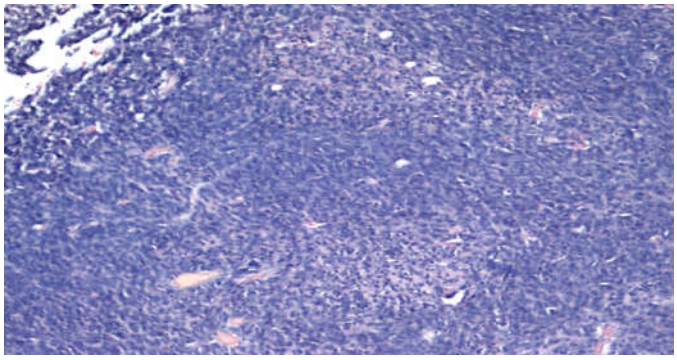

Fig-1: Medulloblastoma

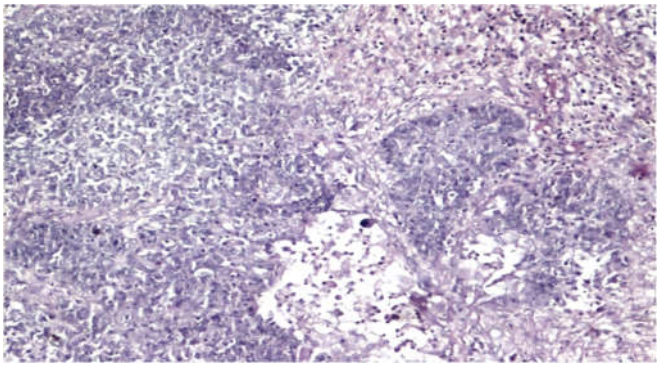

Fig-2: Anaplastic Ependymoma

A total of 13 cases with embryonal tumors were recorded. Among them, 11 cases were medulloblastomas (Fig 1), and neuroblastomas, atypical teratoid / rhabdoid tumor occupied one case each.

Of 8 cases of astrocytomas, most of the tumors fall under grade 1 pilocytic astrocytomas (62.5%), 25% cases were grade 2 diffuse astrocytomas and 12.5 cases were grade 3 anaplastic astrocytoma group.

Discussion

Studying the incidence and prevalence of infratentorial paediatric brain tumors are more important due to higher mortality and challenging aspects of neurosurgeons for surgery followed by clinical management. It was underestimated and unnoticed about the actual prevalence of paediatric brain tumors in national wide or region wise in India for long years. In recent years hospital-based reports were published about the incidence rates of paediatric brain tumors. One such study by Jain et al., in the year 2011 [8], had assessed and published the first report from the neuropathology records of seven tertiary hospitals in India. We have tried to study the prevalence of infratentorial paediatric brain tumors from our hospital, which is a tertiary care center in West Godavari district of Andhra Pradesh state.

In the present study, we found a marginal higher incidence rate of females than males below the age of 18 years. Of this one case was diagnosed at the age of 4 months, also we found that 55% of cases diagnosed below their age of 10 years. Prevalence of 55% cases at below 10 years age was in similar with Margam et al., 2016 and Shah H et al., 2015 [10,11] . All these cases are predominantly posterior fossa tumors.

In this study, embryonal tumors are the most common histology type, followed by astrocytomas, schwannomas, and least common type is of mixed gliomas and ependymomas. Prevalence of Medulloblastoma is similar to that observation by Jain et al 2011 and Qadri et al., 2017 [8, 12] where its account for more than 30%. Of these medulloblastoma cases, males (n=8) are more predominant than females (n=3) (table 2).

Table-2: Sex Distribution according to histological pattern

Histology	Males n=14	Females n= 17
Medulloblastomas (n=11)	08 (72.72%)	03 (27.3%)
Neuroblastomas (n=01)	00 (0%)	01 (100%)
Atypical teratoid / rhabdoid (n= 01)	00 (0%)	01 (100%)
Astrocytomas (n=08)	02 (25%)	06 (75%)
Ependymomas (n=02)	01 (50%)	01 (50%)
Mixed gliomas (n=03)	02 (66.7%)	01 (33.3%)
Schwannomas (n =05)	01 (20%)	04 (80%)

Second most common histological type in this study was astrocytoma (table 2), 08 cases were seen. The frequency was similar to others studies [13]. Under this histological type, pilocytic astrocytoma was commonly followed by diffuse astrocytoma. Our results are comparable to [12,14], except anaplastic Astrocytomas. Astrocytomas were common in females (n=6) than males (n=2).

This is a hospital-based study with a small number of cases, our data was restricted to only infratentorial tumors in paediatric CNS cases but results are comparable to those observed in other Indian hospital-based studies. The present study found that the incidence of paediatric brain tumors is increasing every year. This may be due to the accessibility to the tertiary care centers like ours, advanced radiology, pathology department, experienced surgeons availability and medical records of the patients. Thus, we strongly recommend hospital-based studies which play a major role in identifying the prevalence of various health issues in various regions of India in the absence of national wide registries. These studies will help the governing bodies to establish better healthcare facilities in order to take a preventive measure.

Conclusion

The incidence of paediatric brain tumors are increasing in India. In our study, we found that infratentorial tumors are more common below the age of 10 years which was a major health issue for further management and preventive measures. This kind of hospital-based studies can be utilized for awareness in the local population and improves better provisions for early diagnosis and better outcome after the treatment.

Authors contribution: Anjana Priyanka Aluri and Swathi Chilukuri designed the present study. Chaitanya Latha Sappidi and Anjana Priyanka aluri executed the protocol and data collection. Asha Thota and Swathi Chilukuri supervised the findings and investigated throughout the work. Ramesh teegala gave access to database and verified with clinico- pathological data. All authors verified and discussed the final results and findings. All authors contributed equally to the final draft preparation and submission.

Funding: Nil, **Conflict of interest:** None initiated
Permission from IRB: Yes

References

1. Sengupta S, chatarjee U, Banerjee U, Ghosh B, Chatarjee B, Ghosk AK. A study of histopathological spectrum and expression of ki-67,TP-53 in primary tumors of pediatric agegroup. Indian j med paediatric oncology. 2012;33:25-31.

2. Nasir S, Jamila B, Khaleeq S. A retrospective study of primary brain tumors in children under 14 years of age at PIMS, Islamabad. Asian Pac J Cancer Prev. 2010;11:1225-27.

3. Wilne SH, Ferris RC, Nathwani A, Kennedy CR. The presenting features of brain tumours: a review of 200 cases. Arch Dis Child. 2006 Jun;91(6):502-6. Epub 2006 Mar 17. doi:10.1136/adc.2005.090266

4. Louis DN , Ohgaki H, Wiestler OD, et al. The 2007 WHO classification of tumours of the central nervous system. Acta Neuropathol. 2007 Aug;114(2):97-109. Epub 2007 Jul 6. doi:10.1007/s00401-007-0243-4

5. Munshi Anusheel. Central nervous system tumors: Spotlight on India. South Asian J Cancer. 2016; 5; 146-47.

6. Jalali R, Datta D. Prospective analysis of incidence of central nervous tumors presenting in a tertiary cancer hospital from India. J Neurooncol. 2008 Mar;87(1):111-4. Epub 2007 Nov 15. doi: 10. 1007/s 11060-007-9487-z

7. Manoharan N, Julka PK, Rath GK. Descriptive epidemiology of primary brain and CNS tumors in Delhi, 2003-2007. Asian Pac J Cancer Prev. 2012; 13 (2) : 637-40.

8. Jain A, Sharma MC, Suri V, et al. Spectrum of pediatric brain tumors in India: a multi-institutional study. Neurol India. 2011 Mar-Apr;59(2):208-11. doi: 10.4103/0028-3886.79142.

9. Asirvatham JR, Deepti AN, Chyne R, et al. Pediatric tumors of the central nervous system: a retros-pective study of 1,043 cases from a tertiary care center in South India. Childs Nerv Syst. 2011 Aug;27 (8): 1257-63. doi: 10. 1007/ s00381-011- 1407-z. Epub 2011 Feb 23.

10. Sangita Ramulu Margam, Nitin Maheshwar Gadgil, Ganesh Ramdas Kshirsagar, Vaishali Prashant Gaikwad, Prashant Vijay Kumavat, Chetan Sudhakar Chaudhari. The Histopathological and Epidemiological Study of Pediatric. Annals of Pathology and Laboratory Medicine, 2016; 03:374-381.

11. Shah H, Ubhale B, Shah J. Demographic and histopathologic profile of pediatric brain tumors: A hospital-based study.Pediatric Oncology.2015;4:146-48

12. Qadri S, Hasan M, Akhtar K. Magnitude of neurogenic tumor burden in pediatric population: A tertiary care center study. J Pediatr Neurosci. 2017;12: 222-26.

13. Singh A, Singh R, Monalisa, et al. Histological spectrum of central nervous system tumours- A study at a tertiary care centre in Bihar. J. Evolution Med. Dent. Sci. 2017;6:1421-24.

14. Shankar SK. An overview of ontogeny and biology of pediatric brain tumours. In Copybook of abstract, CME in Pediatric Tumour Pathology. Mumbai: Tata Memorial Hospital; 2000.

.....

How to cite this article?

Aluri A.P, Teegala R, Sappidi C.L, Thota A, Chilukuri S. Spectrum of Infratentorial Paediatric CNS tumors in a tertiary care hospital. Trop J Path Micro 2018; 4(5):384-388.doi:10.17511/jopm.2018.i05.03

.....