International Journal of Clinical and Diagnostic Pathology

ISSN (P): 2617-7226
ISSN (E): 2617-7234
www.patholjournal.com
2019; 2(1): 06-09
Received: 04-11-2018
Accepted: 08-12-2018

Dr. Archana A Randale
Assistant Professor, Department of Pathology, GMCH & SSH, Nagpur, Maharashtra, India

Dr. Sanjay N Parate
Professor & Head, Department of Pathology, GMCH & SSH, Nagpur, Maharashtra, India

Dr. Saroj A Meshram
Assistant Professor, Department of Pathology, GMCH & SSH, Nagpur, Maharashtra, India

Dr. Shilpa P Tathe
Assistant Professor, Department of Pathology, GMCH & SSH, Nagpur, Maharashtra, India

Dr. Milind A Bhatkule
Assistant Professor, Department of Pathology, GMCH & SSH, Nagpur, Maharashtra, India

Correspondence
Dr. Sanjay N Parate
Professor & Head, Department of Pathology, GMCH & SSH, Nagpur, Maharashtra, India

Histomorphological spectrum of paediatric CNS tumours: An experience at tertiary care centre in central India

Dr. Archana A Randale, Dr. Sanjay N Parate, Dr. Saroj A Meshram, Dr. Shilpa P Tathe and Dr. Milind A Bhatkule

DOI: https://doi.org/10.33545/pathol.2019.v2.i1a.02

Abstract
Tumours of central nervous system occur relatively frequently in early years of life. They are the most common malignancy of childhood after leukaemia in overall cancer incidence. Paediatric brain tumours has histomorphological diversified spectrum & differ significantly from their adult counterpart. Present retrospective observational study was carried out to analyse the histomorphological spectrum of Paediatric CNS tumours at tertiary care centre from central India. This study is an attempt to map the rising trend of paediatric brain tumours in central India. This rise may be due to expansion of available neurosurgical services along with advanced imaging modalities in this part of India. Medulloblastoma, Pilocytic astrocytoma, Ependymoma, Craniopharyngioma & Choroid plexus papilloma were among the top five diagnosis in present study.

Keywords: Paediatric brain tumours, histomorphological spectrum, central India

Introduction
Tumours of central nervous system (CNS) occur relatively frequently in early years of life. They are the most common malignancy of childhood after leukaemia in overall cancer incidence [1, 2]. Childhood CNS tumours differ significantly from the adult counterpart with reference to their site of origin, clinical presentation, histological features & biological behaviour [3]. Paediatric CNS tumours are not only associated with mortality but also with significant morbidity both from the disease itself as well as treatment [4].

There is rising trend in paediatric brain tumours in recent years even in developing countries like India. This may be due to increased public awareness and / or availability of better diagnostic modalities like CT & MRI. With the advent of sophisticated imaging tools like CT & MRI we can get detail information about exact location, size, consistency (solid/cystic) & intensity (ring Enhancement). These are helpful in giving final histomorphological diagnosis in advance resources deprived institute [5].

Present retrospective observational study was carried out to analyse the histomorphological spectrum of Paediatric CNS tumours at tertiary care centre from central India which was lacking in recent multi-institutional study from seven prestigious tertiary care centre spread across India [3, 6].

Material & Methods
This ten years' retrospective, observational study (From Jan 2008 to Dec 2017) was carried out in pathology department of tertiary care centre in central India. Patients from 0-19 years of age (paediatric & adolescent age group) were included in the study as upper limit of adolescent age given by WHO is 19 years. We have excluded pituitary tumours from this study as they belong to neuroendocrine system. After taking complete clinical & radiological details, samples received were processed by standard formalin fixation and paraffin embedding method. In all cases, final histomorphological diagnosis were given on conventional haematoxylin & eosin stained sections according to WHO 2007 classification of CNS tumours as advance resources like immunohistochemistry & molecular diagnostic facilities were lacking in our institute.

Results
Total 752 cases of brain tumours were operated in the span of 10 years (From Jan 2008 to Dec 2017) at tertiary care centre in central India.

Out of this, 179 cases of CNS tumours (23.8%) occurred in the age group between 0-19 years. Among these 179 cases of paediatric & adolescent brain tumours, 107 were males and 72 were females with male to female ration being 1.48:1. The youngest patient was 3 months old male with morphological diagnosis of ependymoma.

The study population was divided into three age groups as pre-primary (0-5 yrs.), primary (6-12yrs) & teenagers (13-19yrs).

Table 1: Anatomical location of paediatric brain tumours in three age groups.

Age group (years)	Supratentorial	Infratentorial	Spinal
0-5	19	15	0
6-12	27	39	2
13-19	41	28	8
Total 179	87	82	10

Table 2: Histomorphological spectrum of CNS tumours in paediatric population (0-19 yrs.)

S. No	Tumour Category	No (%)	WHO grade (2007 Classification)
1	Astrocytic tumours (35.75%)		
	Pilocytic astrocytoma	37(20.7)	I
	SEGA	2(1.1)	I
	Pleomorphic xanthoastrocytoma	2(1.1)	II
	Diffuse astrocytoma	9(5)	II
	Anaplastic astrocytoma	4(2.2)	III
	Glioblastoma	9(5)	IV
2	Oligodendroglioma	3(1.7)	II
3	Ependymal tumours (13.5%)		
	Ependymoma	15(8.4)	II
	Anaplastic Ependymoma	9(5)	III
4	Choroid plexus tumours (5%)		
	Choroid plexus papilloma	9(5)	I
	Atypical CPP	1(0.5)	II
5	Embryonal tumours (25%)		
	Medulloblastoma	43(24)	
	Classical	33(18.4)	IV
	Desmoplastic	8(4.5)	IV
	Neuroblastic	2(1.1)	IV
	Pineoblastoma	1(0.5)	IV
6	Craniopharyngioma	14(7.8)	I
7	Neuronal & glioneuronal tumours		
	Ganglioglioma	2(1.1)	I
	Gangliocytoma	1(0.5)	I
	Central neurocytoma	1(0.5)	II
8	Peripheral nerve sheath tumours		
	Schwannoma	9(5)	I
	Neurofibroma	2(1.1)	I
9	Meningioma	5(2.8)	I
10	Germ cell tumour		
	Germinoma	1(0.5)	
	Mixed germ cell tumour	2(1.1)	

Two cases of drop metastasis to spinal cord from medulloblastoma.

Table 3: Top three histomorphological diagnosis offered in 3 age groups

S. No.	0 -5 years	6 -12 years	13 -19 years
1	Ependymoma	Medulloblastoma	Pilocytic Astrocytoma
2	Medulloblastoma	Pilocytic Astrocytoma	Craniopharyngioma
3	Choroid plexus papilloma	Craniopharyngioma	Medulloblastoma

Table 4: Showing comparative analysis of paediatric & adult CNS tumours

S. No	0-19 years	>19 years(Adult)
1	Medulloblastoma (24%)	Nerve sheath tumours (27%)
2	Pilocytic astrocytoma (20.7%)	Meningioma (26%)
3	Ependymoma (13.5%)	Diffuse astrocytoma (23%)
4	Craniopharyngioma (7.8%)	Oligodendroglioma (15%)
5	Choroid plexus papilloma (5.5%)	Pituitary adenoma (10.5%)

Discussion

According to Indian council of medical research (ICMR) & national cancer registry data, the incidence of paediatric brain tumour (PBT) in India varies from 0-21.1% [7, 8]. In 2011, Jain *et al* had assessed the hospital based prevalence of PBT by collecting data from neuropathology records of seven prestigious tertiary hospitals spread across India. Load of PBT in these institute was between 10-21% [3]. In recent studies from tertiary care hospital in Mumbai, south India & north India, incidence of PBT was 21%, 11.9% & 5.6% respectively [9, 10]. In present study, incidence of PBT was 23.8% mirroring the findings of prestigious institute in Mumbai while others had relatively lower incidence.

PBT had affected dominantly males in our study with M: F ratio 1.48:1, findings consistent with most of the studies on PBT in India except Madhavan *et al* who had slightly female preponderance [11].

Among anatomical location of PBT in present study, supratentorium (48.6%) slightly outnumbered infratenctorium (45.8%) mirroring the findings of Sengupta *et al*. [12] We had infratenctorium as dominant anatomical location in the age group of 6-12 years & supratentorium as favoured site in teens (13-19years), findings matching with Margam *et al*. [9]

Histopathological Distribution: In our study, top five histomorphological diagnosis offered in PBT were medulloblastoma (24%) followed by Pilocytic astrocytoma (20.7%), ependymoma (13.5%), Craniopharyngioma (7.8%) & Choroid plexus papilloma (5.5%) mirroring the findings of GB Pant, TMH, LTMC Mumbai [3, 9, 12]. We had choroid plexus papilloma, third most frequent diagnosis in pre-primary age group. A larger international meta-analysis by Rickert & Paulius [13] showed most common PBT in descending order were astrocytoma, medulloblastoma, ependymoma & Craniopharyngioma matching with the results of our study. Three oriental Asian countries namely China [14], Japan [15] & Korea had higher frequency of germ cell tumours & Craniopharyngioma suggesting environmental & genetic differences. In our study, Craniopharyngioma (7.8%) had marginally higher frequency but only three cases of germ cell tumours (1.6%) matching the findings of other Indian studies. histomorphological subcategorization of astrocytoma, medulloblastoma & ependymoma in present study had matched the findings from neighbouring country [16]. We had two cases of drop metastasis to spinal cord during study period, a known fact with spread of medulloblastoma.

We had benign nerve sheath tumour & meningioma as the most dominant adult CNS tumours mirroring the findings of Margam *et al*. [9]

Conclusion

Present study is an attempt to map the rising trend of paediatric brain tumours in central India. This rise may be due to expansion of available neurosurgical services along with advanced imaging modalities in this part of India. For the diagnosis of histomorphological diversified spectrum of paediatric brain tumours, histological features like tumour architecture, fibrillary background, degenerative features as Rosenthal fibres & granular bodies, rosettes, mitotic activity, calcification and necrosis still plays vital role in molecular diagnostic techniques deprived institute like us.

References

1. US. Cancer statistics working group. United States cancer statistics: 1999-2009 incidence & mortality web-based report. Atlanta U.S. Department of health & Human services, Centres of Disease control and prevention and National cancer institute, 2003.
2. Rosenberg S, Fujiwara D. Epidemiology of paediatric tumours of the nervous system according to the WHO 2000 classification: A report of 1,195 cases from single institute. Childs nerve Syst. 2005; 21:940-41.
3. Jain A, Sharma MC, Suri V, Kale SS, Mahapatra AK, Tatke M *et al*. Spectrum of paediatric brain tumours in India: A multi-institutional study. Neurol India. 2011; 59(2):208-211.
4. Strother DR, Pollack IF, Fisher PG, Hunter JV, Woo SY, Pomeroy SL *et al*. Tumours of the central nervous system in: Pizzo PA, Poplack DG, EDS. Principles & practice of paediatric oncology,4th ed. Philadelphia: Lippincott Williams and Wilkins, 2002, 751-824.
5. Birch JM, Hartley AL, Teare MD *et al*. The inter-regional epidemiological study of childhood cancer: case control study of children with central nervous system tumours. British Journal of Neurosurgery. 1990; 4:17-225.
6. Das U, Appaji L, Aruna Kumar BS, Sirsath NT, Padma M, Kavita S *et al*. Spectrum of paediatric brain tumours: A report of 341 cases from tertiary cancer centre in India. Indian J Paediatrics. 2014, 1387-6.
7. Consolidated report of population based cancer registries 2001-2004. National cancer registry program, Indian council of medical research, Bangalore, India, 2006.
8. First report of population based cancer registries under North Eastern regional cancer registry 2003-2004.National cancer registry programme, Indian council of medical research, Bangalore, India, 2006.
9. Margam SR, Gadgil NM, Kshirsagar GR, Gaikwad VP *et al*. The histopathological and epidemiological study of paediatric brain tumour in a tertiary care hospital, Mumbai. Annals of Pathology and Laboratory medicine. 2016; 3(5):374-381.
10. Shirazi N, Gupta M, Bhat NK, Kalra B, Ranjit Kumar, Saini M. Profile of primary paediatric brain and spinal cord tumours from North India. Indian Journal of Medical and Paediatric oncology. 2017; 38(1):10-14.
11. Madhavan R, Kannabiran BP, Nithya AM, Kani J, Balasubramaniam P, Shannuga Kumar S. Paediatric brain tumours: An analysis of 5 years of data from tertiary cancer care centre India. Indian Journal of Cancer. 2016; 53(4):562-565.
12. Sengupta S, Chatterjee U, Banerjee U, Ghosh S, Chatterjee S, Ghosh AK. A study of histopathological spectrum & expansion of Ki 67, Tp53 in primary brain tumours of paediatric age group. Indian Journal of Medical and Paediatric Oncology; official Journal of Indian society of medical & paediatric oncology. 2012; 33(1):25-31.
13. Rickert CH, Paulus. Epidemiology of central nervous system tumours in childhood & adolescence based on new WHO classification. Childs Nerv Syst. 2001; 17:503-11.
14. Zhou D, Zhang Y, Liu H, Luo H, Luo L, Dai K. Epidemiology of nervous system tumours in children: A

survey of 1,485 cases in Beijing Tiantan Hospital from 2001-2005. Pediatr Neurosurgery. 2008; 44:97-103.
15. Makino ME, Nakamura H, Yano S Kuratsu J. Kumamoto brain tumour group. Population based epidemiological study of primary intracranial tumours in childhood. Childs Nerv Syst. 2010; 26:1029-34.
16. Ahmed N, Bhuragri Y, Sadiq S, Shakoor KA. Paediatric Brain Tumours at a tertiary care hospital in Karachi. Ascian Pacific J Cancer Prev. 2007; 8:399-404.