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CENTRAL NERVOUS SYSTEM TUMOR-A 2 YEAR STUDY FROM JULY 2017 TO JUNE 2019

Pathology

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ABSTRACT

INTRODUCTION: In developing countries like India, due to lack of complete registration of newly diagnosed cases, the exact tumor burden of such disease goes unnoticed. The present study aims to evaluate the incidence, histopathological variations and socio-demographic profile in Indian patients.

METHODOLOGY: A Cross sectional 2 years prospective study from July 2017 to June 2019.

Technique: Interview and histopathological examination.

RESULTS: The annual incidence of CNS neoplasms is **10.09 % (74 cases)**. Astrocytomas constitute the most common neoplasm (28 cases, 37.84%). Meningiomas are more common in females 12 cases 60% compared to males with 08 cases (40%) with a M: F ratio of 1:1.5. Medulloblastoma is the commonest CNS neoplasm in pediatric population in our study (4 cases, 30.77%)

CONCLUSION: An epidemiological review of brain tumors is done so that it can focus vision in the changes of tumor spectrum of a population.

KEYWORDS

CNS Tumors, Astrocytoma.

INTRODUCTION

"Growth for sake of growth is the philosophy of the cancer cell"
-Edward Abbay

The central nervous system [CNS] is made up of the brain and the spinal cord. Cells within the CNS normally grow in an orderly and controlled way. If for some reason this disorder is disrupted the cells continue to divide and form a lump of tumor.

The incidence rate of **all primary malignant and non-malignant** brain and other CNS tumors is 23.03 cases per 100,000 for a total count of 392,982 incident tumors[1].

The incidence of central nervous system (CNS) tumors in India ranges from 5 to 10 per 100,000 population with an increasing trend and accounts for 2% of malignancies[2].

With increased availability of diagnostic facilities and better healthcare, the incidence of CNS tumors seems to be on the rise in developing countries[3].

Today in the era of 21st century where people are flooded with the vibrations of technology and radiation exposure almost 24x7 in the form of smart phones and are at the potential risk of brain tumors, there is a dire need of research on this issue. Hence an epidemiological review of brain tumors is done so that it can focus vision in the changes in the tumor spectrum of a population, reveal possible risk factors, and to generate awareness.

AIMS AND OBJECTIVES

1. To find out the incidence of CNS tumors.
2. To evaluate their age and sex distribution.
3. To evaluate the histopathological features with light microscopy.
4. To grade the CNS neoplasms according to guidelines provided by the World Health Organization [W.H.O.].

MATERIAL & METHODS

A health facility based Cross sectional prospective two years study (from July 2017 to June 2019) was conducted at R.N.T. Medical College, Udaipur. Tissue of patients of all ages with central nervous system tumour who have undergone histopathological examination following surgery were included in this study.

Staining technique: Haematoxylin and Eosin (Culling 1985).

Data was coded and entered on Microsoft excel sheet and analysis done on SPSS version 16. The plan was submitted to the Ethical Committee of the institute and study was initiated only after ethical approval.

RESULTS

During this period total number of specimens received were 7537, out of which 733 are malignant lesions. Total 74 cases of CNS neoplasm were observed and analysed.

Table-1: Incidence of CNS neoplasms.

Period	Total No. of Specimens received	Total Malignant Neoplasms	CNS Neoplasms	Incidence
July 2017 To June 2018	3821	376	39	10.37%
July 2018 To June 2019	3716	357	35	9.80%
Total	7537	733	74	10.09%

The annual incidence of CNS neoplasms in our study is 10.09% (74 cases) as illustrated in Table no. 1.

Table-2: Incidence of Benign and Malignant CNS neoplasms

Total number of CNS neoplasms	Number of benign neoplasms	Number of malignant neoplasms
74	43 (58.11%)	31 (41.89%)

Table No. 2 shows that out of 74 cases of CNS neoplasms benign neoplasm were 43 (58.11%) and, malignant neoplasms were 31 (41.89%).

Table-3: Incidence Of Various Cns Neoplasms.

S. No	HPE Diagnosis	No. of Cases	Percentage
1.	Astrocytomas	28	37.84
2.	Meningioma	20	27.03
3.	Medulloblastoma	06	8.11
4.	Oligodendroglioma	04	5.40
5.	Mixed Oligoastrocytoma	03	4.06
6.	Pituitary Macroadenoma	03	4.06
5.	Ependymoma	02	2.70
6.	Craniopharyngioma	02	2.70
7.	Central Neurocytoma	01	1.35
8.	Pituitary Adenoma	01	1.35
9.	Pineoblastoma	01	1.35
10	Hemangioblastoma	01	1.35
11	Metastasis	02	2.70

Table No.3 depicts the incidence of various histological types of CNS neoplasms seen in our study. Astrocytomas constitute the most common neoplasm (28 cases, 37.84%), followed by meningiomas (20 cases, 27.03%), medulloblastoma (6 cases, 8.11%), oligodendroglioma (04 cases, 5.40%), and metastatic tumors (02 cases, 2.07%).

Table-4: Age and sex wise distribution of CNS tumors in the present study.

Age	No. of Patients					
	Male	%	Female	%	Total	%
0-10 Yr	05	11.91	03	9.37	08	10.82
11-20 Yr	07	16.67	04	12.50	11	14.87
21-30 Yr	06	14.28	05	15.63	11	14.87
31-40 Yr	08	19.04	06	18.75	14	18.92
41-50 Yr	09	21.44	07	21.87	16	21.62
51-60 Yr	06	14.28	05	15.63	11	14.87
61-70Yr	01	2.38	02	6.25	03	4.05
Total	42	56.76	32	43.24	74	100

The present study revealed a male predominance constituting 42 out of 74 cases (56.76%), while only 43.24% were females. The male: female ratio being 1.3:1.

Table-5: Who Grading For Astrocytomas (28/74 Cases).

S.No	H.P.E. Diagnosis	Increased Cellularity	Nuclear Atypia	Mitosis	Microvascular Proliferation& Necrosis	Grade	No. of cases
1.	Astrocytoma	+ve	-ve	-ve	-ve	I	06
2.	Diffuse Astrocytoma	+ve	+ve	-ve	-ve	II	07
3.	Anaplastic Astrocytoma	+ve	+ve	+ve	-ve	III	09
4.	Glioblastoma Multiforme	+ve	+ve	+ve	+ve	IV	06

Astrocytomas are graded according to the W.H.O. grading system which includes cellularity, nuclear atypia, mitosis and microvascular proliferation/necrosis as shown in the following table.

Table No.5 shows that majority of the astrocytomas are of grade III (09 cases, 32.14%), followed by grade II (07 cases, 32.14%).

Table-6: WHO Grading System – Meningioma (20/74 cases).

S. No	H.P.E. Diagnosis	Increased Cellulity	Sheeting Pattern	Increased Mitosis	Grading	No. of cases
1.	Meningiothelial Meningioma	N	-ve	-ve	I	06
2.	Psammomatous Meningioma	N	-ve	-ve	I	04
3.	Transitional Meningioma	N	-ve	-ve	I	04
4.	Fibrous Meningioma	N	-ve	-ve	I	02
5.	Angiomatous Meningioma	N	-ve	-ve	I	02
6.	Atypical Meningioma	↑	+ve	-ve	II	01
7.	Anaplastic Meningioma	↑	+ve	+ve	III	01

Table No. 6 shows that 18/20 cases are in grade I with an incidence of 90% of varying histological patterns. One case with atypical features and one with anaplastic features seen.

DISCUSSION

Incidence of various CNS neoplasms is compared with the central brain tumor registry of United States. (CBTRUS study) 2004 – 2005 which is exhibited in the following table.

Table No. 7: Comparison of incidence of CNS tumours with CBTRUS study.

	Astrocytoma	Oligodendroglioma	Ependymoma	Meningioma	Neural Tumors	Craniopharyngioma
CBTRUS Study	41.2%	3.2%	2.3%	24%	6.5%	0.9%
Present Study	28Cases (37.84%)	4 Cases (5.4%)	2Cases (2.7%)	20 Cases (27.03%)	10 Cases (11.9%)	2Cases (2.7%)

Our study in accordance with CBTRUS[1] study shows that astrocytoma still remain to be the commonest CNS neoplasm (37.84%), followed by meningioma 27.03%. Nerve sheath tumors are common neoplasms found in our set up with a slightly higher incidence of 11.9%.

Table No.8 Comparison of common age group of CNS tumors in various studies.

S.No.	Name of study	Common age group
1	Schwartzbaum et al, 2006	0 to 60 yr
2	Lajavaara et al, 2007	0 to 70 yr
3	Jalali et al, 2008	0 to 70 yr
4	Hashmi et al, 2014	0 to 75 yr
5	Present study, 2019	0 to 70 yr

Glial lesions were mostly seen in males in the 3rd decade of life, however the age of patients ranged from 0-70 years. The observations are in consonance with studies done by Lajavaara et al[4] (2007), Jalali et al[5] (2008), Hashmi et al[6] (2014) while slightly differed from Schwatzbaum et al[7](2006).

Table No.9 Comparison of WHO grades of glial tumors.

Studies	Grade I	Grade II	Grade III	Grade IV
Lajavaara et al, 2007	19.1%	24.5%	9.4%	47%
Munshi and Jalali, 2009	5%	47.5%	32.5%	15%
Chawla et al, 2014	13.95%	44.18%	20.9%	20.9%
Hashmi et al, 2014	13%	26%	37%	24%
Present study, 2019	21.43	25	32.14	21.43

Majority of patients were suffering from grade III glial tumor in the present study (32.14%), followed by grade II (25%), grade I and grade IV glial tumors are 21.43% each.

This observation were are similar to observations made by Hashmi et al (2014), and slightly different from observation made by Lajavaara et al (2007), Munshi and Jalali[5] (2009) and Chawla et al [8](2014).

Table 10: Comparison of incidence of benign and atypical meningiomas.

Study	Benign	Atypical
Mahmood et al, 1993	92%	6.26%
Perry et al, 1997	81%	15%
Joseph et al, 2000	91.4%	8.3%
Samadi and Ahmadi, 2007	86.1%	8%
Present study, 2019	90%	5%

In our study 18 out of 20 of cases (90%) of meningioma were benign, 01 case(5%) was atypical and 01 case (5%) was anaplastic. Studies by Mahmood et al [9](1993) and Joseph et al[10] (2000) reported 92% and 91,4% respectively which are slightly higher as compared to our study while Perry et al[11] (1997) and Samadi and Ahmadi[12](2007) reported 81% and 86.1% of cases respectively as benign which are lower in comparison to the present study.

CONCLUSION

Prevention of cancer is important because fewer people would die of cancer if fewer people develop cancer.

There are only a few published reports about the incidence of tumors from various parts of India. The present one, serve a useful purpose as at least they do represent diagnosed cases of CNS cancer from a region. Such studies can suggest new approaches to brain cancer prevention, logistics required and also give direction to the planning of control programmes.

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