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Descriptive epidemiology of brain and central nervous system (CNS) Tumors in Fmri, Period: 2013-2017

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Abstract
Introduction and Aim of Work: Central nervous system (CNS) tumors represent a major public health problem. The epidemiological data in District- Gurugram (Haryana) has been rather incomplete except for some regional reports. There are no available frequency-based data on CNS tumors in our region.
The Objective of this Study: was to estimate the frequency of CNS tumors in National Capital of Region-Gurugram.
Materials and Methods: The data were collected during the 5-year period from January 2013 to December 2017 from Hospital Based Cancer Registry of Fortis Memorial Research Institute Gurugram, Haryana.
Results: During 2013 to 2017, a total of 1279 primary malignant brain and central nervous system tumors were registered. CNS tumors are more common in males than in females. The sex ratio was 498 females to 1,000 males. The most common histological type of primary CNS cancer in both sexes were glioblastoma (30.1%) followed by and glioma (18.8%), astrocytoma (16.7%), oligodendroglioma (7.2%), ependymoma (6.8%), medulloblastoma (5.1%), neuroblastomas (3.4%), primitive neuroectodermal tumor (3.0%), meningioma (2.5%) & others (5.7%)
Conclusion: This study provides the largest series of the relative frequency of CNS tumors in NCR region in Gurugram till now and may help to give insight into the epidemiology of CNS tumors.

Keywords: brain, glioblastoma, meningioma, tumors

Introduction

Brain tumors though not frequent, contribute significantly to morbidity because of their relatively poor survival rate. A number of studies from Western countries have reported on the pattern, incidence and mortality of brain and central nervous system (CNS) tumors. Non-communicable diseases have been known as diseases of long duration with slow progression. These diseases are the major cause of mortality and morbidity of adults all around the world.[1] Cancer is one of the most terrifying non-communicable diseases and the major cause of global burden of diseases.[2] Cancer is a public health problem; it is the second cause of death after cardiovascular disease in developed countries and the third leading cause of death in developing countries [3, 4] Brain cancer, is one of the most important cancers as it's incidence is increasing in the world and has attracted much attention in recent decades because of low survival rates. Several previous studies indicate an increasing trend in the incidence of this cancer [5] Central nervous system (CNS) tumors are not very common. However, the incidence of CNS tumors has rapidly increased over the past few years. [6, 7] The incidence of CNS tumors in India ranges from 5 to 10 per 100,000 populations with an increasing trend and accounts for 2% of all malignancies [8, 9] This substantial increase in the diagnosis of CNS tumors is mostly attributed to advances in neuroimaging technology [9] Till now, no hospital based data have been reported on the descriptive epidemiology of brain and CNS tumors from India. So an attempt has been made to present the descriptive analysis of Malignant Brain and CNS tumors at a single tertiary care referral centre, Gurgaon (Haryana).

Materials and Methods

This retrospective study was performed in Gurgaon city which contains medical reference centres from the Delhi NCR region. The data collected by FMRI Hospital Based Cancer Registry (HBCR) was utilized for this study. All the recorded data details are entered in Microsoft Excel data sheet. The information collected is cross-checked for completeness. The data is checked and validated by using quality control programs/tools for cancer registries of International Agency for Research on Cancer (IARC) for avoiding duplication and any unlikely combination of age, sex, site and morphology and other factors in the data base. The primary site and morphology data were coded using the *International Classification of Diseases for Oncology, third edition.* [10] Information on other variables was coded according to the international guidance. [11] The data utilized for this study covers the period from 2013-2017 with a primary tumor at any of the following sites (International Classification of Diseases for Oncology codes): meninges (C70.0-C70.9), brain (C71.0-C71.9), spinal cord, cranial nerves and other parts of central nervous system (C72.0-C72.9). Collected data was analyzed using the software of Statistical Package for Social Sciences (SPSS) version23.0. Descriptive statistical measures such as percentage, mean

and standard deviation were applied. Inferential statistics test such as z-test and chi square test are also applied to identify important relationship between variables.

Results

During 2013 to 2017, a total of 15148 of new cancer cases were registered. Of these 1279 (8.4%) primary malignant brain and central nervous system tumors were registered. CNS tumors are more common in males than in females. A male predominance was observed in the incidence of brain tumors (n = 854, 66.8%) as compared to females (n = 425, 33.2%). The sex ratio was 498 females to 1,000 males. Since 2013 to 2017 increasing number of new cancer cases and Brain & CNS cases has been recorded. Table 1 & Fig.1 depicts the year-wise distribution of total number of new cancer cases versus all primary Brain & CNS tumor cases.

Table 1: Distribution of new cancer Patients registration and Primary Brain and CNS Tumor by sex, Period: 2013-2017

Year	New cancer cases				Brain & CNS cases				% Brain & CNS cases (Total cases)
	Male	Female	**Total**	%	Male	Female	**Total**	%	
2013	832	658	1490	9.8	95	57	152	11.9	10.2
2014	1191	966	2157	14.2	155	62	217	17.0	10.1
2015	1888	1587	3475	22.9	179	94	273	21.3	7.9
2016	2013	1685	3698	24.4	223	87	310	24.2	8.4
2017	2381	1947	4328	28.6	202	125	327	25.6	7.6
Total (2013-2017)	8305	6843	15148	100.0	854 (10.3%)	425 (6.2%)	1279 (8.4%)	100.0	8.4
%	54.8	45.2	100.0		66.8	33.2	100.0		

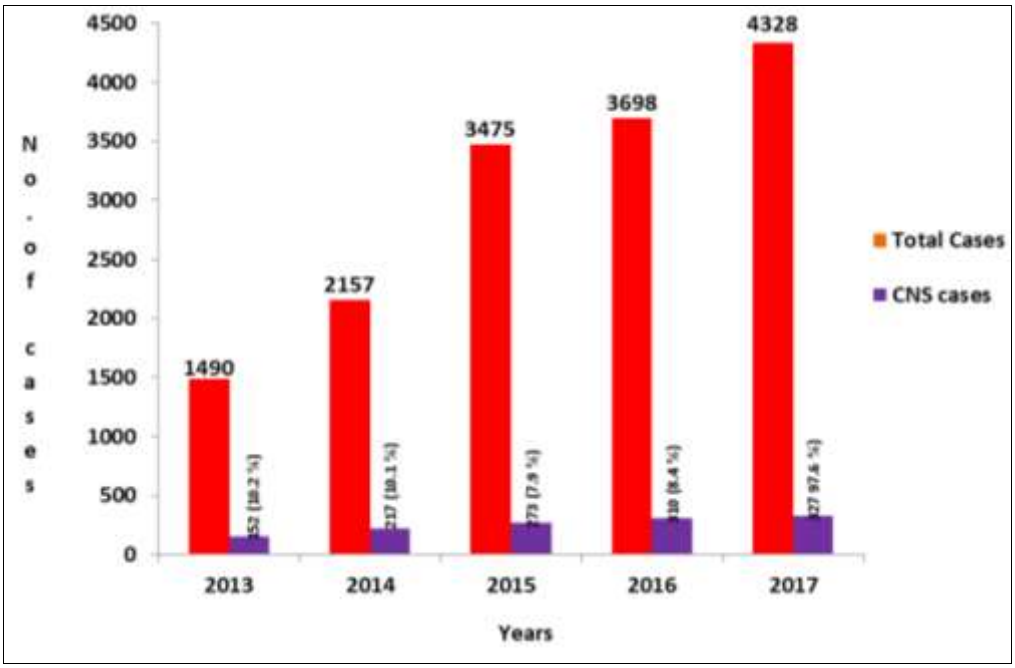

Fig 1: Year-wise distribution of all primary CNS tumor cases versus total cases

Age distribution seen in our study revealed that tumors were more common in the age group of 45–54 years (n = 234, 18.3%) followed by 55–64 years (n = 221, 17.3%) and in paediatrics age group 0-14 years (n = 208, 16.3%). The young patients were 15-34 years; middle age adults were 35- 64 years while the oldest patient was 65+ years of age. The age group from 0 to 14 years showed the presence of 208 cases of neoplastic lesions, among which neuroblastomas (n= 40) were more common followed by ependymoma (n= 39), medulloblastoma (n= 38) and gliomas (n= 31) were maximum. The age group of 45–54 years showed 234 neoplastic lesions with predominance of glioblastoma (n = 95), glioma (n= 48) and astrocytoma (n= 32). The age group of 55–64 years showed 221 neoplastic lesions with predominance of glioblastoma, glioma and astrocytoma [Table 2].

The leading histology frequency of 1279 CNS tumors by sex among Gurgaon region was demonstrated in (Fig. 2, Table 2). The most common histological type of primary CNS cancer in both sexes was glioblastoma (30.1%, average age of diagnosis 51.5 years). The incidence increases with age peaking at 45–64+ years. Glioblastoma is uncommon in children (0-14 years). GBM is followed by and glioma (18.8%, average age of diagnosis 41.1 years), astrocytoma (16.7%, average age of diagnosis 37.2 years), oligodendroglioma (7.2%, average age of diagnosis 42.8 years), ependymoma (6.8%, average age of diagnosis 26.9 years), medulloblastoma (5.1%, average age of diagnosis 14.0 years), neuroblastomas (3.4%, average age of diagnosis 7.9 years), primitive neuroectodermal tumor (3.0%, average age of diagnosis 23.2 years), meningioma (2.5%, average age of diagnosis 53.6 years) & others includes (5.7%, average age of diagnosis 40.5 years) a group of various gliomas viz:- neoplasm/epithelial tumor/ Squamous cell carcinoma/ adenocarcinoma/ medullary carcinoma/ spindle cell sarcoma / solitary fibrous tumor/ malignant fibrous histiocytoma/ Epithelioid/ Ganglioglioma, anaplastic hemangioendothelioma/ malignant lymphoma /germinoma/ teratoma/ nerve sheath tumor/ peripheral neuroectodermal/ ganglioneuroblastoma tumor/ Ganglioneuroblastoma

/atypical teratoid/ rhabdoid tumor.

There were 1206 cases of primary CNS tumors (94.3%) and 73 cases of other groups /metastatic origin (5.7%). The "others" group (73 cases, 5.7% of all cases), included neoplasm, malignant (34 cases), epithelial tumor (9 cases), squamous cell carcinoma (2 cases), adenocarcinoma (1 case), medullary carcinoma (1 case), spindle cell sarcoma (1 case), solitary fibrous tumor (1 case), malignant fibrous histiocytoma (1 case), epithelioid hemangioendothelioma (1 case), Peripheral neuroectodermal tumor (3 cases), astroblastoma (3 case), malignant lymphoma (1 case), germinoma/teratoma (4 case), peripheral nerve sheath tumor (4 cases), ganglioneuroblastoma (3 cases), ganglioglioma, anaplastic (1 case), atypical teratoid/ rhabdoid tumor (3 cases).

Table 2: Distribution of the leading relative frequency (#) and proportion (%) of different histologic type of Brain, NS tumors (ICD-10: C70-C72) by age groups and sex

Rank	ICDO	Histology/ Morphology		Age Groups									Mean Age
				0-14	15-24	25-34	35-44	45-54	55-64	65+	Total	%	
Sex- Male													
1	9440	Glioblastoma	Freq.	5	9	24	41	69	68	57	273	32.0	51.1
			%	0.6	1.1	2.8	4.8	8.1	8.0	6.7	32.0		
2	9380	Glioma	No.	12	8	25	34	36	28	12	155	18.1	42.6
			%	1.4	0.9	2.9	4.0	4.2	3.3	1.4	18.1		
3	9400	Astrocytoma	Freq.	14	19	30	36	20	15	4	138	16.2	35.8
			%	1.6	2.2	3.5	4.2	2.3	1.8	0.5	16.2		
4	9450	Oligodendroglioma	Freq.	0	3	13	18	12	9	1	56	6.6	42
			%	0.0	0.4	1.5	2.1	1.4	1.1	0.1	6.6		
5	9391	Ependymoma	Freq.	32	3	4	8	9	8	2	66	7.7	26.9
			%	3.7	0.4	0.5	0.9	1.1	0.9	0.2	7.7		
6	9470	Medulloblastoma	Freq.	23	17	3	0	0	0	1	44	5.2	14.8
			%	2.7	2.0	0.4	0.0	0.0	0.0	0.1	5.2		
7	9500	Neuroblastoma	Freq.	25	3	0	0	0	0	0	28	3.3	8.3
			%	2.9	0.4	0.0	0.0	0.0	0.0	0.0	3.3		
8	9473	Primitive Neuroe-ctodermal Tumor	Freq.	9	7	2	1	4	1	0	24	2.8	23.1
			%	1.1	0.8	0.2	0.1	0.5	0.1	0.0	2.8		
9	9530	Meningioma	Freq.	0	1	0	1	3	5	3	13	1.5	44.5
			%	0.0	0.1	0.0	0.1	0.4	0.6	0.4	1.5		
10	9442	Gliosarcoma	Freq.	0	1	0	3	2	2	0	8	0.9	36.2
			%	0.0	0.1	0.0	0.4	0.2	0.2	0.0	0.9		
11	Others**		Freq.	8	5	7	3	4	10	12	49	5.7	43.0
			%	0.9	0.6	0.8	0.4	0.5	1.2	1.4	5.7		
Total (All)			Freq.	128	76	108	145	159	146	92	854	100.0	40.1
			%	15.0	8.9	12.6	17.0	18.6	17.1	10.8	100.0		
Sex- Female													
Rank	ICDO	Histology/Morphology		0-14	15-24	25-34	35-44	45-54	55-64	65+	Total	%	Mean Age
1	9440	Glioblastoma	Freq.	4	7	3	11	26	33	28	112	26.4	52.5
			%	0.9	1.6	0.7	2.6	6.1	7.8	6.6	26.4		
2	9380	Glioma	No.	19	6	13	9	12	15	11	85	20.0	38.1
			%	4.5	1.4	3.1	2.1	2.8	3.5	2.6	20.0		
3	9400	Astrocytoma	Freq.	7	5	15	20	12	9	7	75	17.6	39.9
			%	1.6	1.2	3.5	4.7	2.8	2.1	1.6	17.6		
4	9450	Oligodendroglioma	Freq.	2	1	7	5	12	7	2	36	8.5	44.1
			%	0.5	0.2	1.6	1.2	2.8	1.6	0.5	8.5		
5	9391	Ependymoma	Freq.	7	3	6	2	0	1	2	21	4.9	26.8
			%	1.6	0.7	1.4	0.5	0.0	0.2	0.5	4.9		
6	9470	Medulloblastoma	Freq.	15	4	1	0	1	0	0	21	4.9	12.5
			%	3.5	0.9	0.2	0.0	0.2	0.0	0.0	4.9		
9	9530	Meningioma	Freq.	0	0	0	4	8	4	3	19	4.5	52.7
			%	0.0	0.0	0.0	0.9	1.9	0.9	0.7	4.5		
7	9500	Neuroblastoma	Freq.	15	0	0	0	0	0	0	15	3.5	7.0
			%	3.5	0.0	0.0	0.0	0.0	0.0	0.0	3.5		
8	9473	Primitive Neuroectodermal Tumor	Freq.	3	3	7	1	0	0	0	14	3.3	23.2
			%	0.7	0.7	1.6	0.2	0.0	0.0	0.0	3.3		
10	9442	Gliosarcoma	Freq.	1	0	0	1	0	1	0	3	0.7	35.3
			%	0.2	0.0	0.0	0.2	0.0	0.2	0.0	0.7		
11	Others**		Freq.	7	2	3	1	4	5	2	24	5.6	35.4
			%	1.6	0.5	0.7	0.2	0.9	1.2	0.5	5.6		
Total (All)			Freq.	80	31	55	54	75	75	55	425	100.0	39.8
			%	18.8	7.3	12.9	12.7	17.6	17.6	12.9	100.0		
Sex- Both													
1	9440	Glioblastoma	Freq.	9	16	27	52	95	101	85	385	30.1	51.5
			%	0.7	1.3	2.1	4.1	7.4	7.9	6.6	30.1		

2	9380	Glioma	Freq.	31	14	38	43	48	43	23	240	18.8	41.1
			%	2.4	1.1	3.0	3.4	3.8	3.4	1.8	18.8		
3	9400	Astrocytoma	Freq.	21	24	45	56	32	24	11	213	16.7	37.2
			%	1.6	1.9	3.5	4.4	2.5	1.9	0.9	16.7		
4	9450	Oligodendroglioma	Freq.	2	4	20	23	24	16	3	92	7.2	42.8
			%	0.2	0.3	1.6	1.8	1.9	1.3	0.2	7.2		
5	9391	Ependymoma	Freq.	39	6	10	10	9	9	4	87	6.8	26.9
			%	3.0	0.5	0.8	0.8	0.7	0.7	0.3	6.8		
6	9470	Medulloblastoma	Freq.	38	21	4	0	1	0	1	65	5.1	14.0
			%	3.0	1.6	0.3	0.0	0.1	0.0	0.1	5.1		
7	9500	Neuroblastoma	Freq.	40	3	0	0	0	0	0	43	3.4	7.9
			%	3.1	0.2	0.0	0.0	0.0	0.0	0.0	3.4		
8	9473	Primitive Neuroec- todermal Tumor	Freq.	12	10	9	2	4	1	0	38	3.0	23.2
			%	0.9	0.8	0.7	0.2	0.3	0.1	0.0	3.0		
9	9530	Meningioma	Freq.	0	1	0	5	11	9	6	32	2.5	53.6
			%	0.0	0.1	0.0	0.4	0.9	0.7	0.5	2.5		
10	9442	Gliosarcoma	Freq.	1	1	0	4	2	3	0	11	0.9	42.0
			%	0.1	0.1	0.0	0.3	0.2	0.2	0.0	0.9		
11	Others**		Freq.	15	7	10	4	8	15	14	73	5.7	40.5
			%	1.2	0.5	0.8	0.3	0.6	1.2	1.1	5.7		
Total (All)			Freq.	208	107	163	199	234	221	147	1279	100.0	40
			%	16.3	8.4	12.7	15.6	18.3	17.3	11.5	100.0		

Others**(includes the ICDO-codes): 8000/8010/8070/8140/8510/8801/8815/8830/9133/505/9591/9064/9080/ 9540/9364 /9430/9490/9508 (Neoplasm/Epithelial tumor/Squamous cell carcinoma/Adenocarcinoma/Medullary carcinoma/Spindle cell sarcoma/Solitary fibrous tumor/Malignant fibrous histiocytoma/ Epithelioid/ Ganglioglioma, anaplastic hemangioendothelioma /Malignant lymphoma /Germinoma/Teratoma/Nerve sheath tumor/ Peripheral Neuroectodermal/ Ganglioneuroblastoma tumor /Ganglioneuroblastoma/Atypical teratoid/Rhabdoid tumor)

Table 3: Comparison of the relative frequency (#) and proportion (%) of different histologic type of Brain and CNS tumors in Gurugram and other Indian Registries, Males and Females

Histologic Type	TMH*		KMIO*		CI (WIA)*		BRAIRCH*		RCCTVM**		AMC***		BBCI***		PGIMER***		FMRI##	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Males																		
Neoplasm Malig.	1	1.1	0	0.0	0	0.0	0	0.0	1	3.4	2	18.2	0	0.0	0	0.0	0	0.0
Gliomas	12	13.0	3	13.0	0	0.0	12	30.0	6	20.7	0	0.0	2	28.6	35	7.0	155	18.1
Ependymoma	4	4.3	8	34.8	0	0.0	3	7.5	1	3.4	0	0.0	0	0.0	17	3.4	66	7.7
Astrocytoma	21	22.8	1	4.3	0	0.0	0	0.0	9	31.0	7	63.6	2	28.6	99	19.7	138	16.2
Glioblastoma	35	38.0	4	17.4	0	0.0	3	7.5	6	20.7	0	0.0	1	14.3	170	33.8	273	32.0
Oligodendroglioma	11	12.0	5	21.7	0	0.0	7	17.5	3	10.3	0	0.0	0	0.0	74	14.7	56	6.6
Medulloblastoma	3	3.3	1	4.3	0	0.0	4	10.0	0	0.0	0	0.0	0	0.0	49	9.7	44	5.2
Others	5	5.4	1	4.3	1	100.0	11	27.5	3	10.3	2	18.2	2	28.6	59	11.7	122	14.3
All Microscopic	92	100.0	23	100.0	1	100.0	40	100.0	29	100.0	11	100.0	7	100.0	503	100.0	854	100.0
Females																		
Neoplasm Malig.	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**0**	**0.0**
Gliomas	5	10.2	5	38.5	0	0.0	3	27.3	1	5.9	0	0.0	0	0.0	23	9.1	85	20.0
Ependymoma	6	12.2	0.0	0.0	0.0	0.0	1	9.1	0	0.0	0	0.0	0	0.0	12	4.7	21	4.9
Astrocytoma	6	12.2	0	0.0	0	0.0	3	27.3	7	41.2	2	66.7	0	0.0	50	19.7	75	17.6
Glioblastoma	16	32.7	3	23.1	0	0.0	2	18.2	4	23.5	0	0.0	0	0.0	74	29.1	112	26.4
Oligodendroglioma	10	20.4	1	7.7	0	0.0	0	0.0	1	5.9	1	33.3	0	0.0	45	17.7	36	8.5
Medulloblastoma	2	4.1	0	0.0	0	0.0	1	9.1	1	5.9	0	0.0	0	0.0	14	5.5	21	4.9
Others	4	8.2	4	30.8	0	0.0	1	9.1	3	17.6	0	0.0	3	100.0	36	14.2	75	17.6
All Microscopic	49	100.0	13	100.0	0	0.0	11	100.0	17	100.0	3	100.0	3	100.0	254	100.0	425	100.0

*TMH- Mumbai, KMIO- Bangalore, CI (WIA)- Chennai and BRAIRCH- AIIMS, New Delhi HBCR's data correspond to the year 2012, **RCC - TVM 2012-2013, ***whereas data from AMC- Dibrugarh, BBCI- Guwahati and PGIMER– Chandigarh are for the complete three years (2012 -2014). ##FMRI- Gurugram 2013-2017

Discussion

The present study attempted to estimate the frequency of CNS tumors in the population of the Gurugram region for the period in between 2013 - 2017. In our work, glioblastoma accounted about one third of CNS tumors (30.1%). Incidence was higher in males than in females (32.0% vs. 26.4%). In comparison to Indian registries[12] this is lower to TMH (male-38%, female- 32.7%), PGIMER (male-33.8%) and higher to KMIO (male- 17.4%, female-23.1%), RCC- TVM (male- 20.7%, 23.1%), BBCI (male-14.3), BRAIRCH (male- 7.5%, female- 18.2%). The current study were compared to that of some other worldwide publications and found lower than that of recorded by Zalata *et al* (1999-2007) [13] who reported that glioblastoma constitutes 38.3% of all gliomas and Swensen, and kirsch[14] who reported that glioblastoma constitutes 61% of all and CBTRUS(2005-06) [15] in which glioblastoma formed 50.7% of all gliomas.

In the present study, gliomas are common CNS neoplasms and representing the second most common brain tumors had accounted (20.0%) higher in females than in males (20.0% vs. 18.1%) in comparison to Indian registries[12] higher to

TMH (male-13.0%, female-10.2%), RCC- TVM (female-5.9%), PGIMER (male-7.0%, female-9.1%) and lower to KMIO (female-38.5%) and BRAIRCH (male-30.0%, female-27.3%) and compared to worldwide publications higher that of Egypt (0.4%),[13] USA (1.1%) [15] and Korea. [16]

The most frequent astrocytoma malignant tumors include astrocytoma/astrocytoma, anaplastic/ gemistocytic astrocytoma/ fibrillary astrocytoma/ pleomorphic xanthoastrocytoma anaplastic (grade III, grade IV). Astrocytoma is primarily diagnosed in all ages with a median age of 37.2 years at diagnosis. The incidence increases with age peaking at 25–44+ years. Astrocytoma was common in children (0-14 years). The incidence of astrocytoma had accounted (16.7%) higher in females than in males (17.6% vs. 16.2%) in comparison to Indian registries**[12]** higher to KMIO (male- 4.3%), TMH (female-12.2%) and lower to TMH (male- 22.8%), RCC- TVM (male- 31.0%, female-41.2%), AMC (male-63.6%, female-66.7%), BBCI (male- 28.6%), PGIMER (male-19.7%, female- 19.7%) and BRAIRCH (female- 27.3%) and lower worldwide publications than that of Egypt (27.9%),[13] USA (30.1%),[15] Korea (19.6%)[16] and Japan (21.9%).[17]

The frequency of oligodendroglioma in relation to all CNS tumors, our results, 7.2 % the incidence of oligodendroglioma was higher in females than in males (8.5% vs. 6.6%) were lower to representing the Indian registries series.[12] This is higher from that of numerous epidemiologic studies of CNS tumors estimating the differences in the frequency between populations worldwide publications of Asian, American and the Mexican series.[13, 15, 16, 17, 18] The reason for this might be the referral tertiary centre status of the institution.

The relative frequency of ependymoma in relation to all CNS tumors, in our study was 6.8% the incidence of ependymoma was higher in males than in females (7.7% vs. 4.9%) and comparing with Indian registries series**[12]** lower to KMIO (males- 34.8%), TMH (female- 12.2%), BRAIRCH (male- 7.5%, female- 9.1%) and higher to TMH (male- 4.3%), RCC- TVM (male- 3.4%), PGIMER (male-3.4%) and higher compared with worldwide publications of Asian, American and the Mexican series**[13, 15, 16, 17]**. The reason for this might be the referral tertiary centre status of the institution.

In this study, about 5.1% (male- 5.2%, female- 4.9%) of cases representing the frequency of medulloblastoma in relation to all CNS tumors The incidence of medulloblastoma was higher comparing with Indian registries series [12] TMH (male- 3.3%, female- 4.1%), KMIO (male- 4.3%) and lower to BRAIRCH (male-10.0%, female- 9.1%) and PGIMER (male- 9.7%, female- 5.5%). The incidence of medulloblastoma in various studies was initially found to increase with passing years, but after the segregation of medulloblastoma from primitive neuroectodermal tumor **[19, 20, 21, 22]** the recent studies have found that the incidence of medulloblastoma has not increased with time. [23].

Neuroblastoma is the most common malignant extra cranial solid tumor found in children, and it is the most common cancer to be diagnosed in the first year of a child's life.][24, 25, 26, 27, 28, 29] The annual incidence of the disease is 10.5 per one million children under the age of 15, and there around 700 new cases per year in the United States [24, 25, 27, 28, 30] In this work, the frequency of neuroblastomas formed 3.4% which was the most common malignant paediatric tumor in the central nervous system (CNS). The mean age at diagnosis was 7.9 years. Neuroblastoma is the most common cancer in children.

Primitive Neuroectodermal Tumor (PNET) is a rare tumor and usually occurring in children and young adults under 34 years of age. Some primitive neuroectodermal tumors develop in the brain and central nervous system (CNS-PNET), and others develop in sites outside of the brain such as the limbs, pelvis, and chest wall (peripheral PNET); also called PNET. The frequency of PNET in relation to all CNS tumors, in our study was 3.0%; the incidence was higher in females than in males (3.3% vs. 2.8%) is the most common malignant in paediatric age lower comparing with Indian registries series [12] BRAIRCH (16.8%), TMH (29.0%) and PGIMER (21.6%). The mean age at diagnosis was 23.2 years.

Regarding frequency of meningioma in relation to all other central nervous system (CNS) tumors, our results represented 2.5%, were lower than that of Egypt (25.6%), [13] USA (30.1%),[14] Japan (26.4%), [15] Korea (24.1%) [16] And were similar to some Indian publications that reported by Jalali R, Datta *et al* (2.9%) [31]

In the present study, the frequency of others (metastatic) tumors 5.7% appeared to be similar to Egypt (5.8%) [13] and lower than that reported for metastatic in Indian series (11.8%)[31] but it goes higher with than that of Korea (0.6%)[16] and Mexico (4.0%) [32] The frequency of other CNS tumors may be lower because metastases to brain from other malignancies is mostly confirmed on radiological investigation and not pathologically. The relative frequencies of Brain & CNS tumors in the current study were compared to the other Indian Hospital Based Cancer Registries (2012-2014) (Table 3).

Conclusion

The present study highlights the histological diversity in CNS tumors in both, adult and paediatric age groups. A retrospective epidemiological review of brain tumors is particularly important for future research because it can demonstrate the changes in the tumor spectrum of a population. It can reveal possible risk factors. Further multicentric studies need to be conducted to have substantial data for use in future. Educating people about risk factors of brain and nervous system cancer and prevention of these factors is recommended for decreasing the incidence of this disease.

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Conflicts of Interest

There are no conflicts of interest.

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