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EPIDEMIOLOGY AND PATHOLOGY OF PRIMARY CNS NEOPLASMS AT A TERTIARY CARE HOSPITAL IN EASTERN INDIA - A SINGLE INSTITUTIONAL RETROSPECTIVE STUDY

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Keywords:
Primary CNS tumours, Epidemiology.

Abstract

INTRODUCTION

CNS tumours are rare neoplasms comprising 1-2% of all neoplasms. With availability of better pathological evaluation, the characterisation of CNS tumour histology has improved which has not been reflected sufficiently in the existing data registry systems.

We, at a Tertiary Care Hospital, in Eastern India made an effort to evaluate the epidemiological and histopathological data of the patients presenting with primary CNS tumours.

MATERIALS AND METHODS

Records of patients having primary CNS neoplasms presenting between 1st January 2017 and 31st December 2017 were evaluated and the epidemiological factors and histopathological features were recorded.

RESULTS

Median age of presentation was 33 years with a Male to Female ratio of 2.36:1. Astrocytomas comprised 37.8% cases with a mean age of presentation of 29.38 years for Grade II and 35.67 years for Grade III. WHO Grade IV tumours comprised 32.43% of cases. Frontal lobe was the most common site(29.73%).

CONCLUSION

The findings of our study corresponded to the available Indian data. However the median age of presentation was lower compared to data available from developed countries. The mean age of presentation of GBMs was also lower compared to western data indicating a difference in proportion of primary and secondary GBMs.

Introduction

CNS tumours are rare neoplasms comprising 1-2% of all neoplasms.[1] However, they are an extremely heterogeneous entity with a variety of primary tumour histology and a large number of secondary tumours. CNS tumours are the second most common tumours in the paediatric age group accounting for 25% deaths.[1] With improvements in diagnostic imaging, surgical and radiation modalities as well as understanding of the tumour biology, the outcomes in these cases have improved. It is important to develop a system to cater to the requirements of different patients with different tumour types.

A patient database should contain accurate information regarding the demographic and clinical profiles of the patients. Such information is readily available in most of the developed countries. However the scenario is hardly the same in medium to low resource income countries where a lack of well structured reporting systems often causes under reporting of cases, sometimes to a gross extent.

In India, the incidence of cancers is generally recorded from national cancer registries.[2,3] In recent years, the incidence of CNS tumours appears to be increasing. [4] Moreover, with availability of better pathological evaluation, the characterisation of CNS tumour histology has improved which has not been reflected to a great extent in the existing data registry systems.

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We, at a Tertiary Care Hospital, in Eastern India made a small endeavour to record and evaluate the epidemiological and histopathological data of the patients presenting with primary CNS tumours.

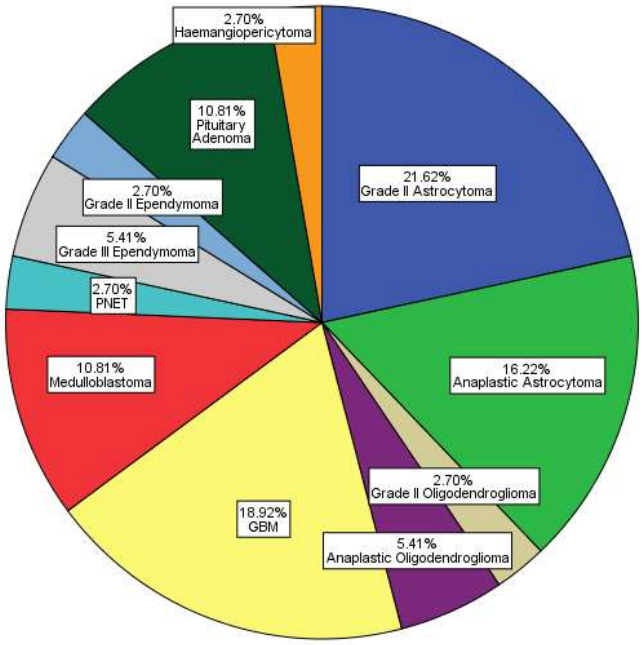
Materials and methods

The records of all the patients having primary CNS neoplasms presenting at the Department of Radiotherapy, Medical College Kolkata between 1st January 2017 and 31st December 2017 were obtained and evaluated. Documents relating to histopathology and initial imaging modalities were double checked and the details regarding epidemiological factors and histopathological features were recorded.

Results and discussion

Median age of presentation was 33 years . The ratio of males to females was 2.36:1. Astrocytomas comprised 37.8% cases with a mean age of presentation of 29.38 years for Grade II and 35.67 years for Grade III. GBMs comprised 18.9% cases with mean age of 49.86 years. Medulloblastomas and pituitary adenomas each comprised 10.8% cases.[Fig. 1, Table 1] Overall WHO Grade IV tumours comprised 32.43% of cases.[Fig. 2] Frontal lobe was the most common site accounting for 29.73% tumours. [Fig. 3]

Fig. 1 :



Distribution according to Histology

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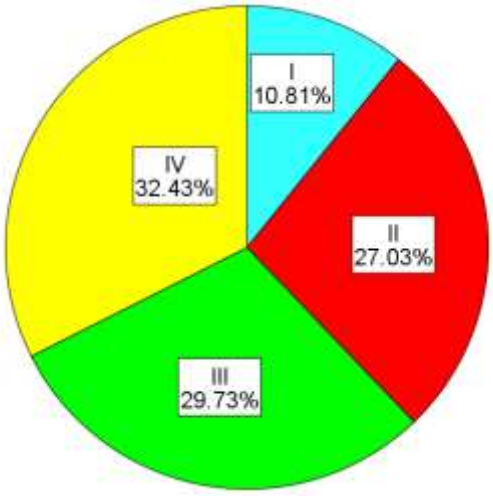
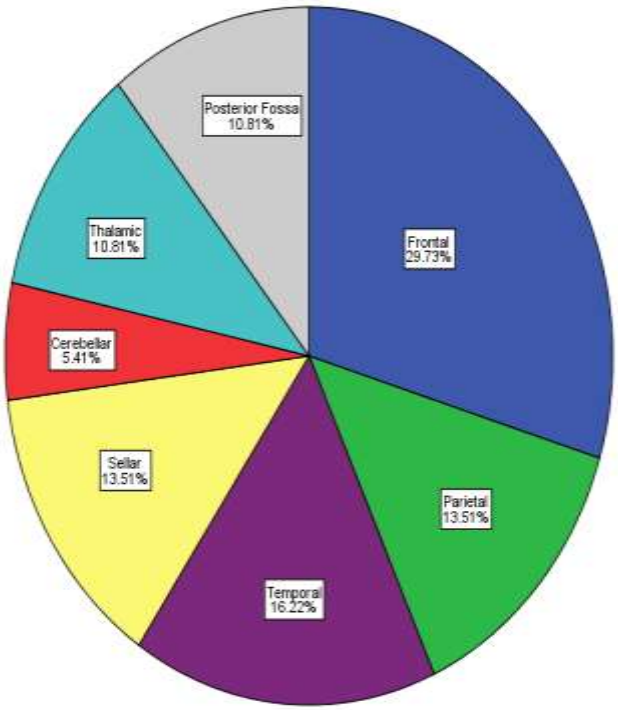
Fig. 2 :



Distribution according to WHO Grade

Fig. 3 :



Distribution according to Site of Tumour

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Table 1 – Comparison of Epidemiological Factors According to Histology

	SEX		AGE GROUPS				MEDIAN AGE		
HISTOLOGY	MALE	FEMALE	<18 YEARS	19-40 YEARS	41-60 YEARS	>60 YEARS	MCH	TMH	US
Grade II Astrocytoma	8	8	4	8	4	0	29.3	35	33
Grade III Astrocytoma	8	4	0	10	2	0	35.6	36	49
Grade-II Oligodendroglioma	0	2	2	0	0	0	16	37	41
Grade-III Oligodendroglioma	4	0	0	4	0	0	31.5		
GBM	12	2	0	0	14	0	49.8	50	62
Medulloblastoma	6	2	8	0	0	0	11.2	10	9
PNET	2	0	2	0	0	0	17	15	9
Grade II Ependymoma	4	0	2	2	0	0	4	18.5	19
Grade III Ependymoma	0	2	2	0	0	0	17		
Pituitary Adenoma	8	0	2	4	0	2	38.2	39	41
Haemangiopericytoma	0	2	0	0	2	0	44	-	-
Meningioma	0	0	0	0	0	0	-	46.5	55

The incidence of CNS tumours is quite low in adults while they form the second most common childhood tumours after leukaemia. [5] Adult brain tumours differ significantly from their childhood counterparts in relation to their sites of origin, clinical presentation, tendency to disseminate, histological features and biological behaviour. In adults the predominant CNS tumour types are metastases, glial neoplasms, and meningiomas, in children, besides gliomas, other major tumour types including primitive embryonal neoplasms are also common. In recent times, an enhanced understanding of these biological differences between adult and childhood CNS tumours has led to investigations in distinct molecular and genetic pathways and therapeutic approaches for each tumour type.

Data from the International Agency for Research on Cancer showed that the worldwide incidence rate of CNS tumours in 2002 was 3.7/100,000 population among males and 2.6/100,000 population among females. The incidence rates were higher in developed countries (males-5.8/100,000; females-4.1/100,000) than in developing countries (males-3.0/100,000; females-2.1/100,000). [6] In 2008, the rates had risen to 3.8/100,000 in males and 3.1/100,000 in females, although the incidence rates in developed countries (males-5.8/100,000; females-4.4/100,000) still remained higher than those in developing countries (males-3.2/100,000; females-2.8/100,000).

In developing countries like India, due to lack of complete registration of newly diagnosed cases with local cancer registries, the exact tumour burden of such disease goes unnoticed and is underestimated. Hospital-based prevalence data, therefore, forms the basis for estimating the disease load. On the other hand, there are dedicated cancer registries in most of the developed world to document all cases and thus a prospective database is available for comparison [7-10]. These information help to predict the incidence of different cancers in coming years and specific measurements required to combat the problem. Unfortunately, the interpretation from developed countries cannot be

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applied directly in developing countries like ours. There may be variations in clinical presentation, natural history of the disease and possibly the response to treatment [3, 4].

Our study showed some interesting findings, which while mostly corroborating with available Indian data seem to be different from the data generally available from other parts of the world. The median age of presentation of most of our patients was lower than the developed countries. The median age of presentation of malignant tumors was 33 years, comparable to 37 years in Indian data[11] but markedly lower than 63 years in the developed countries, respectively.[8, 9]

In terms of specific histology, median age of presentation of diffuse astrocytomas (WHO Grade II), anaplastic astrocytomas (WHO Grade III) and glioblastoma were 29.3, 35.6 and 49.8 years. The corresponding values for Indian data were 35, 36, 50 years[11] compared to 33, 49, 62 years recorded in developed countries [10].

In our setup, patients with GBM present at an earlier age (median age 49.8 years) compared to developed countries, which may have implications regarding the relative proportion of primary and secondary glioblastomas.

One significant variation compared to available Indian data was the proportion of elderly population in our study. 29.7 % of our study population were above 60 years, with roughly 23% above 65 years which was considerably higher than the 9% seen in Indian data but still lower than the 36.5% observed in developed countries.[12] This difference may well be due to the different population distribution and life expectancy at birth between developed and developing countries. The average life span of people in developing countries is generally shorter than those living in the developed countries. For instance, the average life expectancy in India is 62 years for men and 63 years for women, whereas it is 73 and 79 years respectively in developed countries [12]. Similar findings have also been seen in other cancers such as cervical and breast cancers, which are known to present one decade early than their western counterparts [13, 14].

On the other hand, population distribution below 15 years is 35% in developing and 17% in developed countries, respectively [2, 9]. Therefore, there is a higher probability of having more number of pediatric and less numbers of geriatric cancer patients in developing countries like India. In our study, 29.7% of the study population were less than 18 years old. Median age of presentation of medulloblastoma was 11.2 years in our setting compared to 10 years in available Indian data and 9 years in the developed countries.

Incidence of benign brain tumours such as pituitary adenomas, meningiomas and craniopharyngiomas also seem to be slightly lower in our set up but could well be because of relative lack of resources and knowledge of detection on a wide scale throughout the country. Additionally, many of these tumours such as meningiomas and acoustic neuromas are treated mainly by surgery and very few cases referred for adjuvant treatment.

The proportion of metastatic brain tumour are expected to be 8–10 times more than the primary brain tumours [1]. Metastatic brain tumours were registered in much less number in all the western brain tumour registries [8, 9]. In our centre, metastatic brain tumours were treated chiefly by the primary treating physician, therefore not commonly registered separately, thus explaining the disparity.

Our data has some obvious limitations which cannot be overlooked. The data is based on a single institution experience and may not completely represent the profile of entire population. Being a tertiary centre, there are confounding factors, such as bias in referral patterns. Moreover, ours was a retrospective study with such a design carrying its own set of limitations.

Conclusion

In conclusion, there seems to be an apparent increase in registration of brain tumours in recent years, which may well reflect the changing awareness and improved treatment facilities. The median age of presentation of patients with brain tumours seem to be lower in our data than traditionally obtained from the Western data. The findings of our study corresponded to the available Indian data.

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