RESEARCH ARTICLE

Brief Descriptive Epidemiology of Primary Malignant Brain Tumors from North-East India

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Abstract

Brain tumors are a mixed group of neoplasms that originate from the intracranial tissues and the meninges with degrees of malignancy varying greatly from benign to aggressive. Not much is known about the epidemiology of primary malignant brain tumors (PMBTs) in our population in North-East India. In this analysis, an attempt was made to identify the age groups, gender distribution, topography and different histological types of PMBT with data from a hospital cancer registry. A total of 231 cases of PMBT were identified and included for the present analysis. Our analysis has shown that most of PMBT occur at 20-60 years of age, with a male to female ratio of 2.3:1. Some 70.5% of cases occurred in cerebral lobes except for the occipital lobe, and astrocytic tumors were the most common broad histological type. In our population the prevalence of PMBT is 1% of all cancers, mostly affecting young and middle aged patients. As brain tumors are rare, so case-control analytic epidemiological studies will be required to establish the risk factors prevalent in our population.

Keywords: Brain tumors - epidemiology - North-East India - risk factors

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Introduction

The term brain tumors are referred to a mixed group of neoplasms that originates from the intracranial tissues and the meninges with degrees of malignancy varying from benign to aggressive. Malignant neoplasms in the brain are mostly metastatic and primary malignant brain tumors (PMBT) are relatively uncommon. In the Indian population there has been an rising trend in the cancers of central nervous system in both males and females (Yeole, 2008). The established risk factors for PMBTs are genetic (P-53 mutation, Li-Fraumeni cancer family syndrome etc) and ionizing radiations. However, the results of epidemiologic studies on radiofrequency exposures (mobile phones), low frequency magnetic fields and immune factors like viruses, allergies etc are not convincing for establishing their link with PMBT (Mckinney , 2004). There are several clinico-pathological entities of PBTs. In this brief retrospective analysis, we had tried to identify the age groups, gender distribution, topography and different histological types of PMBT of our population. Although a population based data would have shed light on the real picture of epidemiology of PMBT of our population, as advocated by Nasir et al., (2010). However, our hospital based study can define the pattern of PMBT prevalent in our population.

Materials and Methods

The data on PMBT was obtained from the data base of a hospital cancer registry in the North-Eastern India. The data set consisted of information of 19,304 patients with cancer that was registered during the period of January 2010 to December 2012. Strict confidentiality of patient information was maintained while handling the data sets. The topography of PMBT were identified by the coding according to international statistical classification for disease (ICD-10, C71.0-9) and histopathological type of PMBT was identified by international statistical classification of diseases for oncology, 3rd revision (ICD-0-3) coding. Our analysis did not include the data of spinal cord tumors, meningeal tumors and lymphomas, germ cell tumors and tumors of sellar region.

Results

A total of 244 cases of PMBT were identified. Out of which, 13 PMBTs were diagnosed by radiological methods (CT-scan or MRI) and so, that was excluded from the present analysis. There were 161 males and 70 female patients. The age of patients ranged from 1 year to 78 years. The median age of males was 34 years and in females it was 31.5 years. The highest number of patients

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was seen in the age-group of 20-39 years in both males and females ie, 33.5% and 38.6% respectively (Table 1). In the age group of 0-19 years, there was a female preponderance with 28.5% (20/70) versus 24.3% (39/160) in boys. The anatomic sub sites of PMBT were on frontal, temporal and parietal lobes in 70.5% of cases as shown in Table 2. Histological types are classified here according to WHO classification (Louis et al., 2007). The main histological sub types were diffuse astrocytoma in 37.2% (86/231), glioblastoma multiforme in 21.2% (49/231), astrocytic glioma in 10.3% (24/231), medulloblastoma in 9.5% (22/231), and oligodendroglioma was seen in 6.4% (15/231) patients (Table 3).

Table 1. The Table Shows the Age Group and Gender Distribution of Brain Tumors

Age group	Gender	
	Males	Females
0-19 years	39 (24.2%)	20 (28.6%)
20-39 years	54 (33.5%)	27 (38.6%)
40-59 years	53 (32.9%)	17 (24.3%)
>60 years	15 (9.3%)	6 (8.6%)
Total	161	70

Table 2. The Table Shows the Anatomic Sites Involved by the Brain Tumors

Topography (ICD-10)	#(%)
Cerebrum, except lobes and ventricles and Brain, NOS (C 71.0, C71.9)	23 (10%)
Frontal lobe (C71.1)	103 (44.6%)
Temporal lobe (C71.2)	29 (12.5%)
Parietal lobe (C71.3)	31 (13.4%)
Cerebral ventricle (C71.5)	4 (1.7%)
Cerebellum (C71.6)	27 (11.7%)
Brain Stem (C71.7)	12 (5.1%)
Overlapping lesion of brain (C71.8)	2 (0.8%)

#=Numbers, %=percentage

Table 3. It Shows the Various Groups and Sub Types of Numbers of Brain Tumors in this Study

Tumors of neuroepithelial tissue	#
Astrocytic tumors	
Pilocytic astrocytoma	1
Anaplastic astrocytoma	13
Diffuse astrocytoma	86
Glioblastoma	49
Astrocytic glioma	24
Embryonal tumors	
Medulloblastoma	22
PNET	7
Neuroblastoma	1
Rhabdoid tumor	1
Oligodendroglial tumors	
Oligodendroglioma	15
Oligoastrocytic tumors	
Oligoastrocytoma	6
Anaplastic oligoastrocytoma	2
Neuronal and mixed neuronal glial tumors	
Anaplastic ganglioglioma	2
Ependymal tumors	
Ependyoma	2

*#=Numbers

Discussion

The incidence of brain tumors has been reported to be around 3.9 and 3.2 /one lakh/year in males and females respectively (Ferlay et al., 2010).The age adjusted incidence rates (AAR) of malignant brain tumors in our population is not significant. In the population covered by our hospital cancer registry, the age adjusted incidence rates of brain and CNS tumors are low compared to the AAR of other registries of India (Manoharan et al., 2012). Literature suggests the prevalence of malignant brain tumors to be around 1-2% of adult cancers (Wrensch et al., 2002; Mckinney, 2004). Our analysis has shown that the prevalence of PMBT was around 1.1% (231/19,304) of all cancers in our population. In our analysis, males were over twice affected (M:F=2.3:1) than females. Our analysis has shown that most of PMBT occurs at 20-60 years of age (62-66% of cases) and with advancing age (above 60 years) there was a decline in the numbers of patients. Also, the common anatomic sites for the development of PMBT in our population were centered on the cerebral lobes. Most of the times PMBT involves adjacent cerebral lobes, so it is imperative to present the anatomical sub sites based on the combined involvement of cerebral lobes. Interesting to note was the absence of PMBT at the occipital lobe. Age and anatomic locations are few clinical criteria's to assess the prognosis of brain tumors (Louis et al., 2007). Considering age and topography of PMBT, significant numbers of patients in our analysis were in the favorable set for survival. At times when the PMBT is diagnosed by radiological methods only due to poor health, non compliance and inoperability etc, the histological types is not available for registry purpose. From this analysis, in our population the main histological types of PMBT are astrocytic tumors followed by embryonal tumors. This finding is similar to the one published in the literature on brain tumors in children (Jain et al., 2011). Previous studies have shown a decline in rates of low grade gliomas, like astrocytoma in the developed societies, but an increase on the overall brain cancers (Wrensch et al., 2002; Hess, 2004). With increase in the use of mobile phones, an area of interest for epidemiological research on brain tumors is the possible association of radio frequency (RF) radiation ie, radiation emitted by mobile phones. However, the results on cellular effects of RF radiation do not hold much of biological plausibility and were not convincing for association of RF radiation (Barchana et al., 2012). Jazayeri et al. (2013) has shown that cancer registries should also include benign brain tumors for a better understanding of the epidemiology of brain tumors as a whole. However, population cancer registry of our region does not record benign brain tumors. Our hospital cancer registry maintains paper records (proforma) of benign lesions of the brain, but it is not entered onto the data management software for hospital based cancer registry (HBCRDM 1.0).

In our population the prevalence of PMBT is 1% of all cancers, mostly affecting young and middle aged patients, and adult males are more affected with PMBT. However, in children, females were more affected. A systematic review by Qin et al. (2014) has shown that genetic

polymorphism may increase the risk of brain tumors. Case-control study on small number of patients with brain tumors have shown altered expression of xenobiotic metabolizing genes (Wahid et al., 2013). Brain tumors are rare, so case-control analytic epidemiological studies will be required to establish the risk factors prevalent in our population.

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