EVALUATION OF PEDIATRIC INTRACRANIAL NEOPLASM IN TABRIZ, IRAN

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Abstract- Tumors of the central nervous system (CNS), occur relatively frequently during the early years of life. They are the most common solid tumors of childhood and are second only to leukemia in overall cancer incidence and account for a high proportion of deaths. In different studied performed in several countries, astrocytomas and other gliomas (combined) account for half of the CNS malignancies, followed by PNET/MB, and ependymomas, and then craniopharyngioma. We have undertaken a perspective study with 349 brain tumor patients, ranging from 0-14 years of age, throughout a five- year period (1998-2003). Who were admitted in Tabriz children hospital or were diagnosed in Tabriz Hafez imaging center, during radiological evaluation by CT. Craniopharyngioma was the most common type of tumors among patients studied in our Series, and astrocytomas was second and medulloblastoma was third common type. The Male/Female proportion of patients in total brain tumors according to our results is 1.56 and it is similar to previous studies. About medulloblastoma and ependymomas, Male/Female proportion of patients in this study is less than 1 (0.88, 0.7), but in previous series it seems to be more than 1 (about 1.4). Age- related distribution of brain tumors in children under the age 14 was similar to that of other series to some extent. Also, since the causes and risk factors of CNS cancers remain largely undetermined, we could not reach a significant relationship between the tumors and residency of patients. Hope our results make a useful for the future studies in this field, and differences obtained in this study with results of other series, can help us more and more in management and treatment strategies in brain tumors in children of our population.

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INTRODUCTION

Tumors of the central nervous system (CNS) occur relatively frequently during the early years of life. They are the most common solid tumors of childhood and afflict approximately 1,500 patients every year in the United States. Reported incidence rates have varied from 2 to 5 per 100,000 children.

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Representing 20% of all pediatric malignancies, they are second only to leukemia in overall cancer incidence and account for a high proportion of deaths (1-4).

Although the incidence of leukemia has remained relatively stable, the incidence of brain tumors has increased approximately 2% per year in the past 20 years. A review of earlier studies on the incidence of intracranial space-occupying lesions indicates that the relative frequency of pathologic varieties have changed. Tuberculoma was the most common intracranial tumor of childhood in 1925 (5). A series

of 107 cases was reported from India at 1965((6). Subsequent surveys stressed the preponderance of gliomas (7). Meningiomas and neurinomas were virtually absent, except in association with neurofibromatosis. Tuberculomas are now rare in the developed countries. From 1981 through 1993, the incidence of Primitive Neuroectodermal Tumor/ Medulloblastoma (PNET/MB), the most common malignant posterior fossa tumor, has risen more than 4% per year (8-11).

Pediatric brain tumors include a spectrum of both glial and nonglial tumors that differ significantly in location and biologic behavior from that of adults (12, 13) (Table 1).

Infratentorial tumors constitute more than 50% of all intracranial space- occupying lesions in children; in adults, only 25% to 30% of tumors originate below the tentorium. In children younger than 1 year old, as in adults, supratentorial tumors are most frequent; in infancy these often arise from hamartomas or other congenital malformations (12, 13). Neurological symptoms produced by brain tumors are general or local. General symptoms result from increased intracranial pressure, which results directly from progressive enlargement of the tumor within the limited volume of the cranial vault; local symptoms are due to the effects of the tumor on contiguous areas of the brain (14). Increased intracranial pressure produces headaches, vomiting, impaired vision, and changes in consciousness, and, when sutures have not fused, an enlarging head (15). Advances in computer technology have helped establish more effective methods of identifying and characterizing pediatric brain tumors (10, 16). The primary objective for any diagnostic MRI or computed tomography (CT) study is to distinguish between normality and abnormality, and to determine the reliance of the findings on neuroimaging to the clinical situation. In the initial evaluation of child with brain tumor, careful staging is particularly essential to appropriate treatment decisions. This process is critical, as the initial surgical resection may be the only time some tumors can be cured. Several factors contribute to assisting the radiologist with the differential diagnosis of a particular tumor, the age of the patient, the location of the tumor, and the inherent imaging features.

In the experience of Sartor and co-workers, who compares the accuracy of CT scanning and MRI in delineating mass lesions in sellar region, MRI was superior in 41% and inferior in only 5% (17, 18).

The aim of this study was determine frequency of different type of pediatric brain tumors and sex-age related distribution of each tumors.

MATERIALS AND MEHTODS

This study was performed on 349 subjects (213 males and 136 females) with age ranging from 0-14.

The cases were selected from patients admitted in Tabriz children hospital at five year period (1998-20003) with the diagnosis of brain tumor and data added to those, which were evaluated with CT scanning in Tabriz Hafez imaging center. It also should be noted that the data reported here, are comprised of CNS tumors which 4 of them, are metastasis and others are primary brain tumors.

We studied incidence of pediatric brain tumors and assessed correlation between these tumors and patient's age and sex related distribution of each tumor and patient's residency for each of them.

For that, we studied patient's past medical history that was registered in their documents in hospital. The kinds of pediatric brain tumors that determined from hospitably documents, classified in 9 groups. These groups are Astrocytomas, Oligodendroglioma, Medulloblastoma, Lymphoma, Craniopharyngioma, Dermoid tumor Teratoma, Choroids plexus papilloma and Ependymomas.

Table 1. Incidence of brain tumors in the pediatric population younger than 15 years of age versus all ages.

Tumors	Children (%)	All ages (%)
Gliomas	70	45
Astrocytoma	30	15
Glioblastoma	5	15
Oligodendroglioma	1	8
Medulloblastoma	20	4
Ependymoma	10	4
Meningiomas	1	15
Neurinomas	<0.5	6
Pituitary Adenoma	1	6
Metastases	<0.5	5-20
Craniopharyngioma	10	3

RESULTS

From 349 patients with brain tumor, 61% were male and 39% were female. Two patients were under the age 1, nine were 1-3 year old, 93 were between 4-7 year old and 245 were between 7-14 year old. The count and percent of total for each tumor in each sex are shown in table 2. The count of age related distributions of each tumor are shown in table 3.

Table 3. Age related distribution of brain tumors

	Age			
Tumors Type	**0-7**	**3-7**	**7-12**	**12-18**
Astrocytoma	0	6	49	41
Oligodendroglioma	0	1	0	0
Medulloblastoma	0	38	20	8
Lymphoma	1	0	2	0
Craniopharyngioma	0	4	71	37
Dermoid	0	0	1	0
Teratoma	6	3	0	0
Choroid plexus Papilloma	0	4	2	0
Ependymoma	2	37	12	0
Total + metastasis	11	93	158	87

DISCUSSION

Tumors of CNS afflict approximately 1,500 patients every year in the USA, representing 20% of all malignancy second only to leukemia in overall cancer incidence (1-4). Diffuse intrinsic brainstem gliomas constitute 15-20% of all CNS tumors in children, and are the main cause of death in children with brain tumors (19). Kadri *et al*. found that 47% of brain tumors were located in the supratentorial, and 53% in the infratentorial region (19-20). The most common tumor found in our childhood population was medulloblastoma (27.5%), followed by astrocytomas (25.8%), then craniopharyngioma (14.1%). According to the previous studies gliomas, Astrocytomas, Oligodendroglioma, Medullo-blastoma, Ependymomas and Craniopharyngioma account for 70, 1, 20, 10 and 10 present of CNS tumors of childhood, respectively (13). Histopathological diagnosis in Siria were as follows: pilocytic astrocytomas (48.2%); medulloblastoma (22.2%); ependymomas (18.5%); fibrillary astrocytomas grade III (3.7%); cystic oligodendroglioma (3.7%), and hemangioblastoma (3.7%) (19). Varan *et al.* had 32 (37.2%) patients

Table 2. Sex Related distribution of brain tumors*

	Gender		
Tumors Type	**Male**	**Female**	**Total**
Astrocytoma	64(18.3)	32(9.2)	96(27.5)
Oligodendroglioma	1(0.3)	0	1(0.3)
Medulloblastoma	31(8.9)	35(10)	66(18.9)
Lymphoma	2(0.6)	1(0.3)	3
Craniopharyngioma	68(19.5)	44(12.6)	112(32.1)
Dermoid	1(0.3)	0	1(0.3)
Teratoma	7(2)	2(0.6)	9(2.6)
Choroid plexus Papilloma	2(0.6)	4(1.1)	6(1.7)
Ependymoma	36(10.3)	51(14.6)	87(24.9)

Data are given as number (percent).

with embryonic tumors (21 medulloblastoma, 4 ependymoblastoma, 5 with atypical teratoid rhabdoid and 2 with supratentorial primitive neuroectodermal tumors), 21 (24.4%) with ependymomas, 14 (16.3%) with optic glioma, 10 (11.6%) with astrocytomas, 3 (3.5%) with pons glioma and 6 (7.0%) with others (20). According to data, craniopharyngioma is the most common type of brain tumors (32.1%) and pilocytic astrocytomas is second tumor (27.5%).

According to the study of childhood cancer incidence in north America (1988-1992), in which, the data analyzed for it consist of cancers diagnosed among children under the age of 15 years and included in the North American Association of Central Cancer Registries (NASCCR), male/female ratio of pediatric brain cancers in total, is about 1.12 and for astrocytomas the ratio is 1.07, and for medulloblastoma it is about 1.38. The ratio of male to female occurrence was 1:1.2 (52% males, 48% females) (19). In this study, male/female proportion of patients with brain tumor is about 1.56. For astrocytomas this proportion is about 2 and for medulloblastoma is 0.88. As seen above, the incidence of brain tumors, in total, is higher in males than females; and it is not in contrast with previous works. But the male/female proportion suffer form medulloblastoma in our study, is in contrast with previous results. Such a difference is seen about ependymomas in which, the male/female proportion of patients in our study was 0.7 but in previous trials, result is 1.4 craniopharyngioma has a small sex related distribution differences in our study compare with other series (M/F ratio is about 1.50). 55.5% of patients with Teratoma diagnosis were under the age of 3 and others were at the 3-7 years. According to other series (Table 1-2), Teratoma is a tumor with the age at proportion of 0-3 years (13), and this is

equal with our results. About medulloblastoma no certain distribution pattern of age-related patients was found in previous series (13), and in our study, from 66 patients with this diagnosis, no patient has found under the age of 3, and 8 patients (12.2%) were elder than 13, but 58 patients (87.8 of medulloblastomas) were at the age between 3-13 and of them, 34 patients (51.5%) were at the range of 7-10 years old.

Regarding to the results of this study, the epidemiology of brain tumors in children of our population is different form other countries in some aspects, such as common tumor types, so we should adjust our healthy programs according to our statistics. It should be mentioned that the brain tumor treatment by itself (including surgeries, radiotherapy, chemotherapy) is harmful to the brain tissue, thus increasing the risk of sequels, and because of the neurological disorders in surviving patients are related to the type of tumor and side effects on impaired structures, therapeutic methods applied and patients age, we should pay more attention to patients with brain cancer in early diagnose of their illness and screening programs for their probable disease. Now we know that, craniopharyngioma is the most common tumor type among the children under the age of 18 in our population. We hope that this and other such differences obtained among our results and other series can help us more and more in management and treatment strategies of brain tumors in children, and make a useful data for the future studies in this field.

Conflict of interests

We have no competing interests.

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