International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

Original Research Article

Epidemiology of Brain Tumor Among Children in Kyrgyzstan

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ABSTRACT

Introduction: The rate of brain tumors in children has been noted to be very high in nations like Brazil, Hawaian Islands, US, Canada, Poland, and Finland. Asia and Africa are reported to be having very low occurrence except Israel, because Jewish population in Israel have very high occurrence of brain tumor in children. Childhood brain tumors are the most common pediatric solid tumor and include several histological subtypes.

Aim of Study: To evaluate and assess the epidemiology of brain tumor among children in Kyrgyzstan.

Materials and Methods: The present retrospective study was carried out in the National Centre of Oncology, Bishkek, Kyrgyzstan and included assessment of frequency of occurrence of brain tumors in pediatric patients in Kyrgyzstan. All the data were recorded on the excel files and were compiled and analyzed based on their prevalent among males and females. Evaluation of all the data records was done by SPSS software.

Results: For the period of research we studied records of 932 patients whose age ranged from 1 month to 18 years. The mean age of patients was 11.12±2.98 years. Male gender have higher annual rate of CNS malignant tumor morbidity, i.e., 4.04±0.14. The annual rate of females was 3.37±0.1 and annual rate for both genders was 3.69±0.1. The maximum frequency of patients was seen in the Angiosarcoma followed by Hemangioma.

Conclusion: Male child patients have more annual rate of morbidity due to brain tumor as compared to female child patients. More researches under this are needed to be done.

Keywords: Brain Tumor, CNS Tumor, Malignant, Pediatric.

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Article History:

Received: 11-06-2017, **Revised:** 09-07-2017, **Accepted:** 27-07-2017

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2017.3.4.048	

INTRODUCTION

In countries like Brazil, Hawaian Islands, US, Canada, Poland, and Finland, pediatric cranial tumors have high rate of occurrence. Asia and Africa are reported to be having very low occurrence except Israel, because Jewish population in Israel have very high occurrence of brain tumor in children.[1,2]

Childhood brain tumors are the most common pediatric solid tumor and include several histological subtypes. Although progress has been made in improving survival rates for some subtypes, understanding of risk factors for childhood brain tumors remains limited to a few genetic syndromes and ionizing radiation to the head and neck. Studies have reported that at the age of 10 years, the incidence curve of brain tumor experiences a sharp peak and reduces on both sides. The incidence curve of astrocytomas is similar to corresponding curve for brain tumors.[3,4] Incidence of other tumors such as oligodendrogiomas, astrocytoma start increasing at the age of 10 years and continues to increase till 20 years. In case of ependydoma, the incidence is seen to be highest at 10 years age and reduces after that till 20 years.[5] The embryonic tumors were reported to be mostly present below the age of 5 years and the occurrence decreases after 5 years.[6] Hence, we planned the present study to evaluate and assess the epidemiology of brain tumor among children in Kyrgyzstan.

MATERIALS AND METHODS

The present retrospective study was carried out in the National Centre of Oncology, Bishkek, Kyrgyzstan and included assessment of frequency of occurrence of brain tumors in pediatric patients. The ethical clearance for the study was obtained from the ethical committee of the institute before starting the study. The data for the research was obtained from oncological institutes of the republic. Also, data from Statistical Agency of Kyrgyzstan on population was obtained and used for research purposes. The study is a retrospective study and previous records of patients with malignant tumor of CNS were analyzed. The average annual rates of CNS malignant tumor morbidity were calculated for both the sexes and analyzed. Also, the frequency of patients with various CNS malignant tumors were also calculated and analyzed. The statistical analysis of the data was done using SPSS software for windows. The significance of the data was checked using Student's t-test and Chi-square test. A p-value <0.05 were predefined to be statistically significant.

RESULTS

For the period of research we studied records of 932 patients whose age ranged from 1 month to 18 years. The mean age of patients was 11.12±2.98 years (Table 1). Table 2 shows the average annual rates of CNS malignant tumor morbidity in Kyrgyzstan. We observed that Male gender have higher annual rate of CNS malignant tumor morbidity, i.e., 4.04+0.14. The annual rate of females was 3.37+0.1 and annual rate for both genders was 3.69+0.1 (Fig 1). Table 3 shows the frequency of patients in various types of CNS malignant tumor. We observed that frequency of patients in Protoplasmatic astrocytoma was 82, in Fibrillar and protoplasmatic astrocytoma was102, in Subependymal astrocytoma was 57, Mast cell astrocytoma was 81, Hemangioblastoma was 105, Neurocytoma was 81, Anaplastic ependymoma was 79, Angiosarcoma was 106, Desmoplastic medulloblastoma was 42, Gliosarcoma was 104, and in Giant cell glioblastoma was 93. Thus, maximum frequency was seen in the Angiosarcoma (n=106) followed by Hemangioma (n=105) (Fig 2).

Table 1: Demographic details of the subjects

Parameter		Number
Gender	**Male**	522
	Female	410
Mean age (years)		11.12

Table 2: The average annual rates of CNS malignant tumor morbidity in Kyrgyzstan

Gender	Average annual rate of CNS malignant tumor	p- value
Male	4.04±0.14	0.02*
Female	3.37±0.1	

*Significant

Table 3: Frequency of patients in various types of CNS malignant tumor

Type of CNS malignant Tumor		Gender wise No. of patients	Total No of Patients	P -value
Protoplasmatic astrocytoma	**Male**	50	82	>0.05
	Female	32		
Fibrillar and protoplasmatic astrocytoma	**Male**	50	102	>0.05
	Female	52		
Subependymal astrocytoma	**Male**	30	57	>0.05
	Female	27		
Mast cell astrocytoma	**Male**	49	81	>0.05
	Female	32		
Hemangioblastoma	**Male**	61	105	>0.05
	Female	44		
Neurocytoma	**Male**	40	81	>0.05
	Female	41		
Anaplastic ependymoma	**Male**	30	79	>0.05
	Female	49		
Angiosarcoma	**Male**	61	106	>0.05
	Female	45		
Desmoplastic medulloblastoma	**Male**	22	42	>0.05
	Female	20		
Gliosarcoma	**Male**	60	104	>0.05
	Female	44		
Giant cell glioblastoma	**Male**	69	93	>0.05
	Female	24		
TOTAL	**Male**	522	**932**	>0.05
	Female	410		

Fig 1: Showing the average annual rates of CNS malignant tumor morbidity in Kyrgyzstan

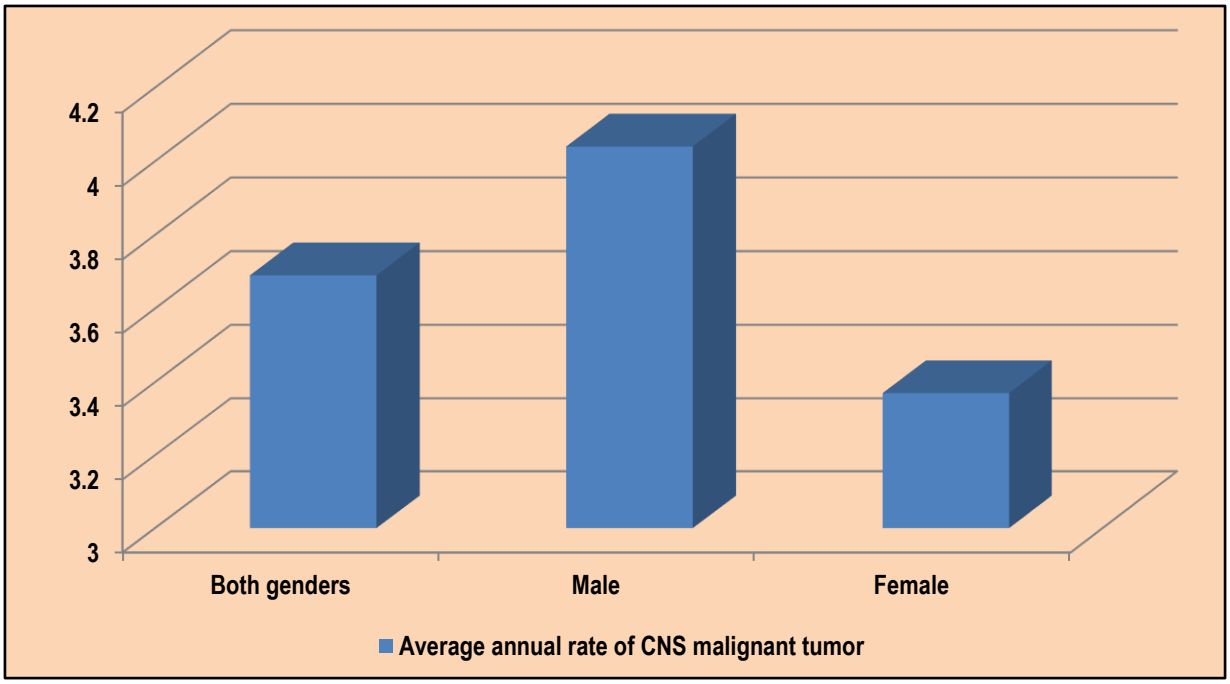
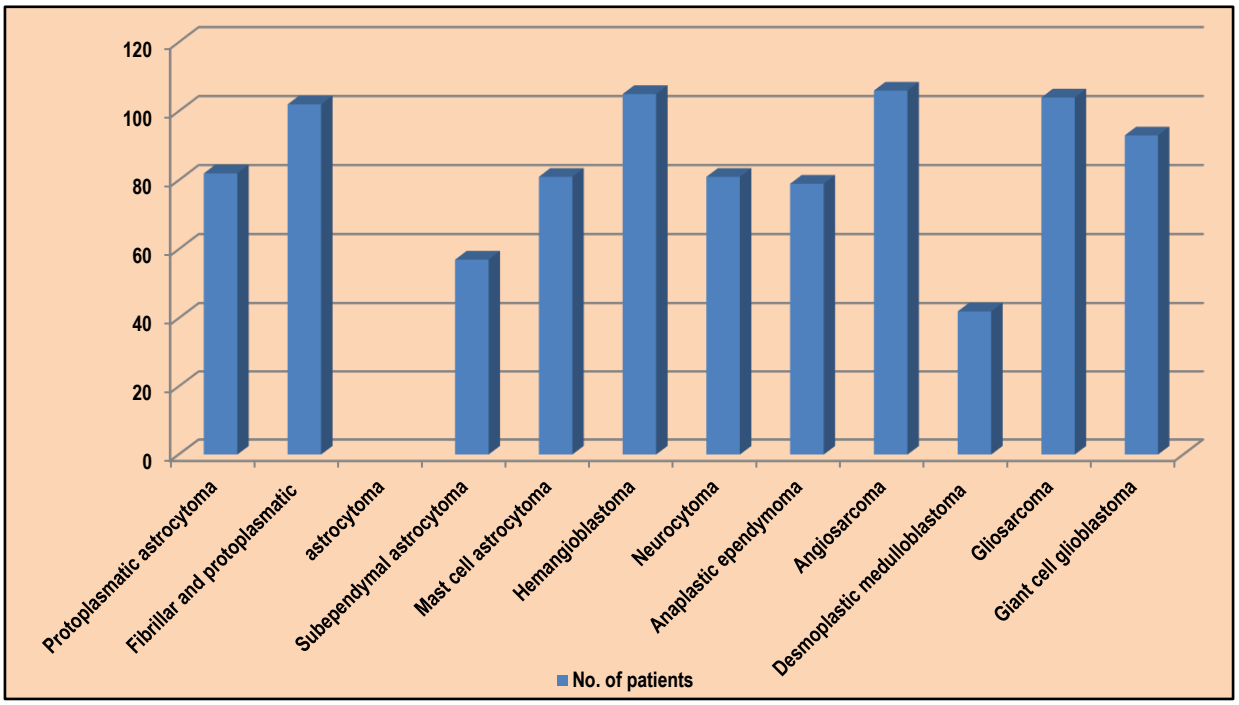


Fig 2: Showing frequency of patients in various types of CNS malignant tumor



DISCUSSION

Brain tumors in children are widely documented and one of the most common solid tumors in children. It incorporates few histological subtypes. In spite of the fact that advance has been made in enhancing survival rates for some subtypes, comprehension of hazard factors for child cerebrum tumors stays constrained to a couple of hereditary disorders and ionizing radiation to the head and neck. In a report, Johnson KJ et al studied the previous studies regarding epidemiology of brain tumors in children. In particular, they reduced the aftereffects of a survey of concentrates distributed since 2004 that have investigated rate and survival in various universal locales and that have analyzed potential hereditary, invulnerable framework, formative and birth qualities, and natural hazard factors.[7]

Hence, we planned the present study to evaluate and assess the epidemiology of brain tumor among children in Kyrgyzstan. In the present study, we observed that in comparison to females, males were more commonly affected by CNS malignancies in pediatric patients.

Malignancies in pediatric patients in Kyrgyzstan was also assessed by Zardze DG et al, who observed that, danger of intense leukemia climbed essentially with expanding vicinity of living arrangement to the testing territories, despite the fact that the outright estimation of the hazard inclination was moderately little. The relative hazard for those living less than 200 km from the airtesting site was 1.76 contrasted and those living 400 km or all the more far from the site. Comparative relative dangers were seen for the underground site and "Particle Lake." There was

likewise some confirmation of expanded danger of mind tumors in relationship with closeness to the test destinations. In 2 of the 4 zones considered, there was significant territorial variety in intense leukemia rates which was not owing to separate from the test site.[8] We also observed that Angioblastoma was the most commonly encountered pediatric brain malignancy with highest frequency followed by hemangioma.

Epidemiological study of the sensory malignancies in Kyrgyzstan was studied by Igissinov N et al discovered that over the considered period, there were 4,604 instances of MT CNS. The normal yearly unrefined occurrence rate of MT CNS in complete populace was 3.7±0.10/0000. Patterns in adjusted rate rates in the entire nation tended to build. Characterized levels of MT CNS in the entire populace in various districts of Kyrgyzstan: low up to 2.870/0000, the normal from 2.87 to 4.450/0000 and high from 4.450/0000 or more on the premise of which was given the space-time evaluate.[9]

In another study, assessing the one-year survival rate of patients with essential threatening CNS tumors after surgical treatment in Kyrgyzstan, Akshulakov S et al observed that the general one-year general survival rate (n=152) was 56.5%, and 79.5% and 33.1% for Grades I-II and Grades III-IV, separately.[10]

In the recent past, advancements in the technology in many fields have given us with an improved appreciation of the biological behavior of cranial tumors in pediatric patients. Particularly, the advancements in neuro-imaging have helped us to make quicker diagnosis and to be more certain about tumor recurrence and dissemination.[11] Magnetic resonance imaging (MRI), positron emission tomography (PET), magnetoencephalography, diffusion tensor imaging, and functional MRI have helped us to map cranial malignancies with extraordinary precision. For the neurosurgeon, the operating microscope, variable angled neuro-endoscopes, neuronavigation platforms, intraoperative MRI, cortical mapping, intraoperative evoked potentials, and high-resolution ultrasound have advanced the safety options and outcome of neurosurgical procedures, elevating the rate of affected children who survive to adulthood.[12] Statistically non- significant results were obtained while comparing the incidence of brain malignancies among males and females (Table 3). There has been improvement in the survival rates for patients with high-risk disease. Aggressive chemotherapy during and after radiation therapy has led to increase in survival rates ranging from 60% to 70%, which in is comparatively high, when compared to 30% to 40% with radiotherapy alone. These advancements have been accomplished with more aggressive surgery, detailed radiotherapy planning, and the routine use of chemotherapy. Interestingly, and somewhat surprisingly, chemotherapy used before radiation, which by design delays the initiation of radiotherapy, has not been as successful in controlling disease as using chemotherapy during and after radiotherapy. In the present scenario, most of the ongoing research is now focusing on the use of chemotherapy primarily during and after radiotherapy.[13,14]

CONCLUSION

From the results of present study, this can be concluded that male child patients have more annual rate of morbidity due to brain tumor as compared to female child patients. More researches under this are needed to be done.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Chokoev Asan Lenarovich. Epidemiology of Brain Tumor Among Children in Kyrgyzstan. Int J Med Res Prof. 2017; 3(4):219-22. DOI:10.21276/ijmrp.2017.3.4.048