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INCIDENCE OF BRAIN TUMOURS AT AN ACADEMIC CENTRE IN WESTERN SAUDI ARABIA

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INCIDENCE OF BRAIN TUMOURS AT AN ACADEMIC CENTRE IN WESTERN SAUDI ARABIA

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ABSTRACT

Objective: To determine the incidence of brain tumours at King AbdulAziz University Hospital (KAUH) in Jeddah, Saudi Arabia, over eight year period.

Design: Retrospective study.

Sitting: King Abdul Aziz University Hospital in Jeddah Saudi Arabia.

Subjects: Patients with intracranial tumours.

Results: The overall average annual incidence rate for the adult population at KAUH was found to be 6.5×10^5 . The most common brain tumour in adults at KAUH was metastatic brain tumour (28.5%). The average annual incidence rate in paediatric patients at KAUH was found to be 5.2×10^5 . The most common paediatric brain tumour at KAUH was astrocytoma (37.1%). The results show that the overall incidence of brain tumours at KAUH was 6.0×10^5 , in line with other studies that reported incidence rates ranging from 4.5 to 14.5×10^5

Conclusions: The pattern of brain tumours at KAUH fell within the range of international figures for brain tumours in both adults and children.

INTRODUCTION

Brain tumours are considered to be one of the common human tumours (1). Evidence suggests geographical variation in primary brain tumours, (2) and through epidemiological information, one can explore their incidence and demographic distribution (3). For example, in Iran, meningioma is reported to be the most common tumour overall, whereas the most common tumour in children in Iran is reported to be astrocytoma (3-5); in addition, the incidence of low-grade glioma is highest in Syria (6). Moreover, some reports have indicated a rise in the incidence of brain tumours over the years (7). The aim of this study was to determine the pattern of brain tumours at King Abdul Aziz University Hospital (KAUH) in Jeddah, Saudi Arabia, over eight year period.

MATERIALS AND METHODS

Patient medical files were reviewed between January 2001 and January 2009. All included files were reviewed for age, year of diagnosis, sex, tumour type, nationality, and city of residency. The non-brain-tumour files were excluded (such as scalp neurofibroma (n=98), scalp squamous cell carcinoma (n=8) and scalp melanoma (n=5)). In addition,

outpatient's intracranial tumours records were not accessible from the hospital medical record system, whereas all intracranial tumours were included (both benign and malignant). A total of 223 patient files were reviewed, and 111 files were excluded. A total of 112 files were included. All collected data were processed using Smith's Statistical Package version 2.80, September 26, 2005.

The population reviewed was divided into adult and paediatric groups, with an age of 14 years serving as the line of demarcation between the two groups. For the statistical analysis, the inpatients with all diagnoses other than brain tumours at KAUH were considered as the general population in the study. To include the entire Jeddah population would not be accurate because our sample does not cover the whole city; however, our sample does represent the population of Jeddah because of the presence in KAUH's patient population of members of the various different cultures that could be found in the city-a presence not found in any other governmental hospital in Jeddah. Because of the presence of widely varying nationalities in Jeddah, nationality was taken into consideration when evaluating the results of this study.

The tumours are presented within the sub-categories form for each age group. The diagnoses

were based on the histopathology and/or the radiology reports that were done by the KAUH staff members. In case of controversy between the two reports, the histopathology report was taken for the study.

RESULTS

Tumour statistics: A total of 112 patient records were reviewed, including 77 adults and 35 children. The overall prevalence of brain tumours at KAUH was 54.8×10^5 , considering that the general population in the study were all inpatients in the hospital for the same period regardless of their diagnoses. The average annual incidence rate of brain tumours was 6.0×10^5 for the same population. The male brain tumour average yearly incidence rate was 3.7×10^5 and the female brain tumour average yearly incidence rate was 2.4×10^5 .

Adult population: At KAUH, the prevalence of brain tumours in adults was found to be 59×10^5 . The adult male prevalence rate was 32.9×10^5 , and the adult female prevalence rate was 26.1×10^5 . The average annual incidence rate for the adult population was 6.5×10^5 . The average annual incidence rate for adult males was 4.1×10^5 , and the average annual incidence rate for adult females was 2.4×10^5 . Table 1 shows the most common brain tumour types among the adult population, with metastasis leading at 28.57%. The most common city of residence for patients with brain tumours at KAUH was Jeddah (80.6%), followed by Makkah (14.4%).

Table 2 displayed the age distribution of the adult population. The mean age was 46 years, with a standard deviation of 19.9 years. Of the population, 55.8% were men and 44.2% were women, with a male: female ratio of 1:1.12.

The most affected nationality found in the data were Saudi (36.36%), followed by Yemeni (28.57%). The most common tumour affecting adult Saudis at KAUH was metastatic brain tumour (25%), followed by astrocytoma and meningioma at 17.8% each. The most common tumour among adult Yemenis at KAUH was astrocytoma (25%), followed by pituitary adenoma and metastatic brain tumour at 14.2% each. Table 3 showed different types of astrocytoma in adult population.

The data showed that the year 2004 had the highest incidence of brain tumours. However, the incidence for 2004 was not statistically significantly different from the incidences found in other years ($p > 0.99$).

The mean duration of symptoms prior to presentation for all tumours was 15.2 months. The most common presenting symptom was headache (68%), followed by nausea and vomiting (32%). The most common sign was weakness (37.6%), followed by cranial nerve abnormalities (29.8%) and abnormal reflexes (27.2%). The frequency of tumours with regard to location showed that the frontal lobe is the most commonly affected area (23.3%), followed by the suprasellar area (16.8%) and the parietal lobe (16.8%).

Table 1
Tumour Types among the Adult Population

Tumour type	No. of patients	Percentage (%)
Metastasis	22	28.57
Astrocytoma	16	20.77
Pituitary adenoma	12	15.58
Meningioma	9	11.68
Craniopharyngioma	5	6.49
Medulloblastoma	2	2.59
euroblastoma	2	2.59
Central neurocytoma	1	1.29
Ependymoid tumour	1	1.29
Colloid cyst	1	1.29
Ganglioglioma	1	1.29
Glomus jugulari	1	1.29
Unknown	1	1.29
Anaplastic ependymoma	2	2.59
Germinoma	1	1.29
Total	77	100

Paediatric population: At KAUH, the prevalence rate of paediatric brain tumours was 47×10^5 . The male paediatric prevalence rate was 27×10^5 and the female paediatric prevalence rate was 20×10^5 . The average annual incidence rate in paediatrics was 5.2×10^5 . The average annual incidence rate for paediatric males was 3.0×10^5 , whereas the average annual incidence rate for paediatric females was 2.2×10^5 . Table 4 shows the most common paediatric brain tumours at KAUH, led by astrocytoma at 37.1%. Most paediatric brain tumour patients lived in Jeddah (85.71%), followed by Makkah (11.43%).

Table 5 displayed the age distribution of the paediatric population. The mean age was 5.52 years, with a standard deviation of 4.3 years; 25.7% of the patients were under two years of age. Of the paediatric population, 20 (57.14%) were boys and 15 (42.86%) were girls, with a female: male ratio of 1:1.3.

The most common nationality involved with paediatric brain tumours at KAUH were Saudi (54.29%), followed by Yemeni (25.71%). The most common paediatric brain tumour among Saudis

at KAUH was astrocytoma (42%), with (53%) experiencing pilocytic astrocytoma (Table 6) followed by pineal cyst (25.71%). The most common paediatric tumour among Yemenis at KAUH was craniopharyngioma (44.4%).

The data showed that the year 2004 had the highest incidence of brain tumours. However, as for the adult population, the incidence for 2004 was not statistically significantly different from the incidences found for other years ($p > 0.99$). The most common tumour location in the paediatric population was the cerebellum (46.6%) and the sellar/suprasellar region (12.2%), followed subsequently by the pineal region (11.43%). The mean duration of symptoms in the paediatric population prior to presentation to the hospital was 12.1 months. The most common paediatric brain tumour symptom was headache (45.7%), followed by vomiting (37.1%). The most common paediatric brain tumour sign at KAUH was abnormal reflexes (34.2%), followed by cranial nerve abnormalities (25.7%).

Table 2
Age Distribution of the Adult Population

Age interval (years)	Frequency	Percentage (%)
14.1-19.9	10	12.99
20-29.9	7	9.09
30-39.9	12	15.58
40-49.9	17	22.08
50-59.9	10	12.99
60-69.9	11	14.29
70-79.9	7	9.09
80-89.9	2	2.60
90-100	1	1.30

Table 3
Astrocytoma types among the Adult Population

Astrocytoma grade	No. of patients	Percentage (%)
I	4	25.00
II	2	12.50
III	2	12.50
IV	8	50.00
Total	16	100.00

Table 4
Tumour Types among the Paediatric Population

Tumour type	No. of patients	%
Medulloblastoma	4	11.42
Astrocytoma	9	25.71
Pineoblastoma	1	2.85
Choroid plexus cyst	6	17.14
Pineal cyst	4	11.42
Pontine glioma	2	5.71
Midbrain glioma	1	2.85
Chordoma	1	2.85
Germinoma	1	2.85
Craniopharyngioma	4	11.42
Hamartoma	1	2.85
Hypothalamic glioma	1	2.85
Total	35	100%

Table 5
Age Distribution of the Paediatric Population

Age interval (years)	Frequency	%
0-1.9	9	25.71
2-3.9	4	11.43
4-5.9	4	11.43
6-7.9	6	17.14
8-9.9	5	14.29
10-11.9	2	5.71
12-14	5	14.29

Table 6
Astrocytoma types among the Paediatrics Population

Astrocytoma grade	No. of patients	%
I (all Pilocytic Astrocytoma)	7	53.85
II	3	23.08
III	2	15.38
IV	1	7.69
Total	13	100.00

DISCUSSION

As shown in the results, the incidence of brain tumours at KA UH is 6.0×10^5 . In comparison to other studies (8-15) that reported incidence rates ranging from 4.5 to 14.5×10^5 , it was found that the KA UH brain tumour incidence rate was comparable, whereas incidence rates of brain tumours were greater in developed countries such as the United States (9.5×10^5). This variation between countries was most likely due to the improvements in medical care and increased availability of diagnostic facilities and accessibility to health care providers. However, at KA UH, medical care is provided free of charge, encouraging everyone to utilise the hospital's health care services (2,3,16).

Keeping in mind that this study sample was very limited and giving only a rough idea about the actual population of the city.

This study did not show an increase in brain tumour incidence over the years; however, in comparison to a previous study done in Eastern Saudi Arabia in 1992 (17) that reported an incidence of 3.1×10^5 , the results of this study may show an overall increase in the incidence of brain tumours over an 18-year period. This trend can be explained by advancing health care in Saudi Arabia, the improved availability of less invasive diagnostic tools and advances in communication of medical information among the international health establishment.

This study shows that the most common

brain tumour among adults at KAUH is the metastatic tumour. This finding is related to the presence of a well-established oncology service. In the paediatric population, the most common tumour type was the astrocytoma, which was close to a Pakistani finding regarding this trend (18).

The total number of brain tumours captured may seem low; however, the neurosurgery service at KAUH is a new service that has been operating for only eight years.

Another possible reason for the seemingly low number of brain tumours is that the patients included in this study were inpatients only; outpatients who were not admitted for tumours such as pituitary tumours or conservatively treated small meningiomas were not included. Additionally, post-mortem studies were very limited.

The findings among the paediatric brain tumour population, including regarding sex, mean age, tumour type, and tumour signs, are closely related to the findings of a study from Brazil (19) and differ only in the most common location of the tumour, which, in the Brazilian study, was reported to be in the supratentorial compartment.

Of note was that no common tumours were reported for example acoustic neuroma (20) this was probably related to outpatient management of these tumours or some other factors (such as environmental or genetic predisposition) that needed further study.

This study shows that the mean duration of symptoms prior to presentation in adults was 15.2 months, and for paediatrics, 12.1 months. Both results are comparable to the results of a study from Thailand (21) that reported an average duration of symptoms of 471 days (15.7 months) in adults. A public awareness programme needs to be established regarding brain tumour symptomatology and risk.

The findings of this study can be utilised in planning health care requirements in the future as well as in analytic epidemiology studies to discover the possible causes of brain tumours among patients at KAUH. There is a need for a larger epidemiological study to cover all parts of Saudi Arabia to avoid the sampling limitations that occurred in this study.

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REFERENCES

- Ohaegbulam, S. C. Geographical neurosurgery. *Neurol. Res.* 1999; **21**: 161-170.
- Alimohamadi, S. M., Ghodsi, S. M. and Ketabchi, S. E. Epidemiologic patterns of primary brain tumors in Iran. *Asian Pac. J. Cancer Prevo.* 2008; **9**: 361-362.
- McCarthy, B. J. and Kruchko C. Consensus conference on cancer registration of brain and central nervous system tumors. *Neuro. Oncol.* 2005; **7**: 196-201.
- Mehrazin, M., Rahmat, H. and Yavari, P. Epidemiology of primary intracranial tumors in Iran, 1978-2003. *Asian Pac. J. Cancer Prevo.* 2006; **7**: 283-288.
- Mehrazin, M. and Yavari, P. Morphological pattern and frequency of intracranial tumors in children. *Childs Nerv. Syst.* 2007; **23**: 157-162.
- Kadri, H., Mawla, A. A. and Murad, L. Incidence of childhood brain tumors in Syria (1993-2002). *Pediatr. Neurosurg.* 2005; **41**: 173-177.
- Preston-Martin, S. Descriptive epidemiology of primary tumors of the brain, cranial nerves and cranial meninges in Los Angeles County. *Neuroepidemiology.* 1989; **8**: 283-295.
- Schoenberg, B. S., Christine, B. W. and Whisnant, J. P. The descriptive epidemiology of primary intracranial neoplasms: the Connecticut experience. *Am. J. Epidemiol.* 1976; **104**: 499-510.
- Schoenberg, B. S., Christine, B. W. and Whisnant, J. P. The resolution of discrepancies in the reported incidence of primary brain tumors. *Neurology.* 1978; **28**: 817-823.
- Annegers, J. F., Schoenberg, B. S., Okazaki, H. and Kurland, L. T. Epidemiologic study of primary intracranial neoplasms. *Arch. Neurol.* 1981; **38**: 217-219.
- Fogelholm, R., Uutela, T. and Murros, K. Epidemiology of central nervous system neoplasms: a regional survey in central Finland. *Acta. Neurol. Scand.* 1984; **69**: 129-136.
- Heshmat, M. Y., Kovi, J., Simpson, C., et al. Neoplasms of the central nervous system: incidence and population selectivity in the Washington DC, metropolitan area. *Cancer.* 1976; **38**: 2135-2142.
- Walker, A. E., Robins, M. and Weinfeld, F. D. Epidemiology of brain tumors: the National Survey of Intracranial Neoplasms. *Neurology.* 1985; **35**: 219-226.
- Ahsan, H., Neugut, A. I. and Bruce, I. N. Trends in incidence of primary malignant brain tumors in USA, 1981-1990. *Int. J. Epidemiol.* 1995; **24**: 1078-1085.
- Kuratsu, J. and Ushio, Y. Epidemiological study of primary intracranial tumors: a regional survey in Kumamoto Prefecture in the southern part of Japan. *J. Neurosurg.* 1996; **84**: 946-950.
- Radhakrishnan, K., Mokri, B., Parisi, J. E., et al. The trends in incidence of primary brain tumors in the population of Rochester, Minnesota. *Ann. Neurol.* 1995; **37**: 67-73.
- Ibrahim, A. W. C. N.S. tumors in eastern Saudi Arabia. *Neurosurg. Rev.* 1992; **15**: 295-302.
- Ahmed, N., Bhurgri, Y., Sadiq, S. and Shakoore, K. A. Pediatric brain tumours at a tertiary care hospital in Karachi. *Asian Pac. J. Cancer Prevo.* 2007; **8**: 399-404.
- Argollo, N., Lessa, I. [Clinical epidemiological aspects of cerebral neoplasms in childhood in the state of Bahia, Brazil]. *Arq. Neuropsiquiatr.* 1999; **57**: 442-451.
- Harner, S. G. and Laws, E. R. Jr. Clinical findings in patients with acoustic neurinoma. *Mayo Clin. Proc.* 1983; **58**: 721-728.
- Bunyaratavej, K., Siwanuwatn, R., Chantra, K. and Khaoroptham, S. Duration of symptoms in brain tumors: influencing factors and its value in predicting malignant tumors. *J. Med. Assoc. Thai.* 2010; **93**: 903-910.