BRAIN TUMORS AMONG MOROCCAN ADOLESCENTS IN THE REGION OF RABAT-SALE-KENITRA, MOROCCO

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Background:
Brain tumours refer to all tumors, both benign and malignant, which develop in the cerebral parenchyma. In Africa, including Morocco, there is a paucity of descriptive brain tumors data. The aim of this study to describe the epidemiological profile of brain tumors types among Moroccan adolescents.

Material/Methods:
Our study is a descriptive epidemiological study targeting all adolescent patients, aged between 10 and 19, suffering from a brain tumor and admitted from January 1 to December 31, 2020, to the neurosurgery department of the Hospital of Specialities-CHU-Rabat-Morocco.

Results:
During these period, the neurosurgery department admitted 179 patients diagnosed with a brain tumor, including 18 adolescents, which represents 10.05% of all admitted patients. The 18 teenagers found include 11 females patients and 7 males patients which means a sex-ratio Male/Female of 0.64. The average age of our patients is 13.05 years, with extremities ranging from 10 to 19 years. It was found that for the topographic distribution 50% of tumors are infratentorial and 50% are supratentorial. The most presented revealing symptomatology is headaches (12 patients, 66.67%). The other symptoms experienced by patients were fatigability (11 patients), dizziness (10 patients), vomiting (8 patients), weightloss (8 patients), seizures (6 patients), visual disturbances (5 patients), balance disorder (4 patients), hemiparesis (3 patients), hypoacusis (2 patients) and other. We found that Astrocytomas come in first position of diagnosed tumors with a percentage of 22.22% followed by Vestibular schwannoma and Craniopharyngioma with a percentage of 16.67% each. The topographic diagnosis finds an infra-tentorial localization equal to the supra-tentorial localization with 50% each. A rare tumor was detected in our study, which is hemangiopericytoma in a 15-year-old male patient.

Conclusions:
The epidemiological profile of brain tumors in Morocco and more specifically in the Rabat-Salé-Kenitra region has similarities with other studies in Morocco and also presents differences. However, other multicenter studies are necessary in our country to establish a Moroccan national registry of brain tumors that can be used for other epidemiological studies on a continental scale.

Key words: brain tumors, Morocco, Rabat, adolescent, epidemiology
BACKGROUND

Brain tumours refer to all tumours, both benign and malignant, which develop in the cerebral parenchyma. Childhood brain tumors are the most common pediatric solid tumours. They represent 20% of malignant diseases in children and are the second leading cause of cancer death after leukemia [Linabery, Ross 2008; Bauchet, Rigau, Mathieu-Daude 2009].

The brain plays a central role in the control of most bodily functions, including awareness, movements, sensations, thoughts, speech, and memory. A tumor can affect the brain’s ability to work properly and adequately perform such functions. Thus, they affect the formation of the biological, emotional and cognitive self system in adolescents and reduce their quality of life [Pachalska 2019]. It is therefore important to monitor the epidemiology of these tumors, in order to give people with brain tumors better medical care.

In Africa, including Morocco, there is a paucity of descriptive brain tumors data. Therefore, we conducted this study to describe the epidemiological profil of brain tumors types among moroccan adolescents. The study was conducted at the neurosurgical departement which receives all tumor patients from the second largest region of Morocco; the Rabat-Salé-Kénitra region, as well as the complicated cases of northern Morocco.

MATERIAL AND METHODS

Our study is a descriptive epidemiological study targeting all adolescent patients, aged between 10 and 19, suffering from a brain tumor admitted from January 1 to December 31, 2020, to the neurosurgery department of the Hospital of Specialities-CHU-Rabat-Morocco. Data collection was carried out from medical files and reports.

RESULTS

From January 1st to December 31, 2020, the neurosurgery department admitted 179 patients diagnosed with a brain tumor, including 18 adolescents, which represents 10.05% of all admitted patients. The 18 teenagers found include 11 females patients and 7 males patients which means a sex-ratio Male/Female of 0.64. The average age of our patients is 13.05 years, with extremities ranging from 10 to 19 years. The age most present in our sample is 14 years old, with 5 patients and a percentage of 27.8%, followed by ages 10, 11, 13 and 17 years old with 2 patients in each of these ages; corresponding to 11,11%. In the last position, each of ages 12, 15, 16, 18, 19 corresponds to the percentage of 5,55% with only one patient in each category (see: Fig. 1 and 2).

The majority of patients admitted come from the city of Chaouen with a percentage of 22,22%, followed by Kenitra with 16,67%, Rabat and Ouazzane come in 3rd position with 11,11% each, and in last position the cities of Sale, Tiflet, Sidi Slimane, Souk Larbaa, Meknes, Nador and Bouznika with a percentage of 5,55%
Fig. 1. Number of patients according to the age

![Number of patients](image1)

Fig. 2. Number of patients according to the age and sex

![Number of patients](image2)

each (see: Table 1).

Tab. 1. Distribution of patients according to cities of provenance

<table>
<thead>
<tr>
<th>GEOGRAPHIC ORIGIN</th>
<th>NUMBER OF CASES</th>
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<td>Rabat</td>
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<tr>
<td>Sale</td>
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<tr>
<td>Kenitra</td>
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<tr>
<td>Tiflet</td>
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<td>Souk Larbaa</td>
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<td>Meknes</td>
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<td>Nador</td>
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<tr>
<td>Bouznika</td>
<td>1</td>
</tr>
<tr>
<td>Chaouen</td>
<td>4</td>
</tr>
<tr>
<td>Ouazzane</td>
<td>2</td>
</tr>
<tr>
<td>Sidi Slimane</td>
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The onset of symptoms before consultation has an average of 5.88 months with ends of 1 year for the longest period of consultation, and 1 month for the fastest (see: Table 2).

It was found that the revealing symptoms which motivated the parents to bring their children for consultation are headaches and dizziness, observed respectively in 12 cases (66.67%) and 10 cases (55.55%). The other symptoms that motivated the consultation are summarized in Fig. 3.

The main symptoms experienced by patients were: Headache (12 patients), Fatigability (11 patients), Dizziness (10 patients), Vomiting (8 patients), Weightloss (8 patients), Seizures (6 patients), Visual disturbances (5 patients), Balance disorder (4 patients), Hemiparesis (3 patients), Hypoacusis (2 patients), Behavior disorder (1 patients), Hemiplegia (1 patient), Blindness (1 patient), Tinnitus (1 patient), Anacusis (1 patient), Weight gain (1 patient), Broca’s aphasia (1 patient), Wernicke aphasia (1 patient). The different symptoms are summarized in Fig. 4.

We are summarizing brain tumors syndromes in Fig. 5. It was found that Intracranial hypertension with a percentage of 44.44% (8 patients), Frontal lobe syndrome with a percentage of 16.67% (3 patients), Upper motor neuron syndrome with a percentage of 11.11% (2 patients), and in the last position we have Cerebellar syndrome with the percentage of 5.55% (1 patient).

<table>
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<th>ONSET OF SYMPTOMS IN MONTHS</th>
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Fig. 4. The different symptoms of brain tumors

Fig. 5. Brain tumors syndromes

Fig. 6. Localisation of brain tumors
It was also found that topographically, 50% of the tumors were located at the infra-tentorial level and 50% at the supra-tentorial level. The tumors were located in different parts of the brain: 3 tumors in the frontal lobe, 3 tumors in the 4th ventricle, 3 tumors in the Cerebellopontine angle, 2 tumors in the vermis, 2 tumors in the suprasellar region, 1 tumors in the intrasellar region, 1 tumor in the frontoparietal lobe, 1 tumors in the temporal lobe, 1 tumors in the occipital lobe and 1 tumors in the brain stem (see Fig. 6).

For the different classification of brain tumors in our serie we found: 4 Astrocytomas, 3 Vestibular schwannoma, 3 Craniopharyngioma, 2 Ependymoma, 2 Medulloblastoma, 1 Hemangiopericytoma, 1 Glioblastoma, 1 Oligodendroglioma and 1 Metastasic tumor. The percentage of those tumors are corresponding respectively to 22,22%, 16,67%, 16,67%, 11,11%, 11,11%, 5,55%, 5,55%, 5,55%, 5,55% (see: Fig. 7).

We confirmed that 27,78% of the tumors found were malignant and 72,22% were benign. Histopathological classification of tumors is presented in Table 3.
DISCUSSION

Brain tumors are the second leading cause of childhood cancer [Koob, Girard, 2014]. Brain tumors are very varied. However, the epidemiological particularities of these tumors are rarely reported in the literature, especially in Africa [Hazmiri, Boukis, Ait Benali et al. 2018] and particularly in Morocco. The number of cases collected in our study is 18 patients in the year 2020. This number exceeds the number of annual cases collected in an old study conducted in the same hospital between the year 1983 and 1992, in which there are on average 11 teenagers [El Madhi, Zentar, El Azzouzi et al 1996] per year. The Benomar’s study, made in southern Morocco, collected an average of 7 patients per year [Benomar 2010].

The predominance is female in our patients with a sex ratio of 0.64. However, the predominance is male in El Madhi’s study [Hazmiri, Boukis, Ait Benali et al. 2018] with a sex ratio of 1.18, as well as in southern Morocco in Benomar's study with a sex ratio of 1.04 [El Madhi, Zentar, El Azzouzi et al 1996]. For average age found in our study is 13.05 years, which is close to the literature in the south of the country in which the average age of adolescents with a brain tumor is 12.37 years [El Madhi, Zentar, El Azzouzi et al 1996].

The most presented revealing symptomatology is headaches with a percentage of 66.67%. This dominance is similar to the literature in southern Morocco in which headaches take the second position with a percentage of 66% [El Madhi, Zentar, El Azzouzi et al 1996].

The topographic diagnosis finds an infra-tentorial localization equal to the supra-tentorial localization with 50% each. Our study agrees with the study by El Madhi, Zentar, El Azzouzi et al [1996], which finds the same percentage, 50% each, for the infra and supratentorial locations. However, the infra-tentorial and supra-tentorial distribution in southern Morocco among children and adolescents combined correspond to the respective percentage of 45.8% and 54.2% [El Madhi, Zentar, El Azzouzi et al 1996].

The most common tumors in our study are astrocytomas in first position with 22.22% of tumors collected followed by Vestibular schwannoma and Craniopharyngioma both with a percentage of 16.67%. Benomar’s study [El Madhi, Zentar, El Azzouzi et al 1996] shows an astrocytoma percentage of 21.56% in adolescents and a 5.08% percentage of Craniopharyngiomas. Tumors in southern Morocco among adolescents are dominated by Medulloblastomas with a percentage of 29.41% [El Madhi, Zentar, El Azzouzi et al 1996]. found in 3rd position with a percentage of 11.11% in our study.

A rare tumor was detected in our study, which is hemangiopericytoma in a 15-year-old male patient.
To sum up, we should pointed out, as it was stated previously Linabery & Ross (2008) that the etiology of most neoplasms remains elusive. Examination of population-based incidence data provides insight regarding etiology among various demographic groups and may result in new hypotheses, which might improved further scientific research and thus contribute to improving the quality of life related to the health status of these children (see also: Nourelhouda, Khadmaoui, Jaafer et al. 2021). The observed trends reinforce an ongoing need for population-based surveillance and further etiologic studies.

CONCLUSION

The epidemiological profile of brain tumors in Morocco and more specifically in the Rabat-Salé-Kenitra region has similarities with other studies in Morocco and also presents differences. However, other multicenter studies are necessary in our country to establish a Moroccan national registry of brain tumors that can be used for other epidemiological studies on a continental scale.

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References


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