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Pattern of Primary Brain Tumors Among Children in Basrah Pediatric Oncology Center

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1. Abstract

1. 1. Background : Brain tumors are the second most common neoplasm in children after leukemia, accounting for about 20% of all childhood cancers, they are the most common solid tumors in children under 15 years of age and Primary brain tumors consist of a large spectrum of clinically and genetically heterogeneous disorders.

1.2. Objective: To assess the characteristic features of patients with primary brain tumors who have been registered and admitted to Basra Children's Specialty Hospital (Oncology center)

1.3. Subjects and Methods: A retrospective study was carried out from the 1st of June till the end of December 2018 of patients with primary brain tumors who have been registered and admitted to Basra Children's Specialty Hospital (Oncology center) during the period from the 1stof January 2004 till the end of December 2017. A special data sheet was designed for the purpose of the study; the information was taken from patients' record sheets; name, age (date of birth), date of admission, gender and residence.

1.4. Results: The total number of patients with brain tumors who were admitted to the Oncology Center during a period over 14 years were 133 (7.3%) cases, out of 1820 cases with malignancy. Their age ranged from less than 2 years up to15years, (76) were males and (57) were females. The study showed that the percentage of patients with brain tumors treated in Basra Pediatric Oncology Center increased gradually from (1.45%) at 2004 to (10.52%) at 2012.Higher numbers of patients with brain tumors were from the central and northern areas of Basra (38.47%,26.06%) respectively and Other governorates like ThiQar and Maysan account for high rates (21.83%, 12.74%) respectively. Headache and Vomiting were the most presenting clinical symptoms (46.87%), and males were affected more than females (57.12%, 42.88%) respectively but statistically not significant (P-value 0.161), most of cases occurred in the age group (> 5 – 10) years and constitute (45.16%), while lower percentage of cases occur in age group (<2 years) (11.36%) respectively and statistically significant (P-value 0.004)

The study showed that the majority of tumors was infratentorial in location (69.84%) and Astrocytoma was the most common type recorded followed by medulloblastoma (48.15%, 33.16%) respectively, statistically significant (p- value. 0.005)

The total died cases were (58) constitute (43.61%), and the outcome of patients with brain tumors varied with age; high percentage of death occur at age group (>5 – 10) years but statistically not significant (P-value 0.161) and varied with types of tumors, Choroid plexus tumors had a higher rate of death followed by medulloblastoma (100%, 47.72%) respectively, and this was related to the grade of tumor and site.

1.5. Conclusion: The frequency of brain tumors had increased gradually from 2004 to 2012, Brain tumors occur more commonly among male gender and most common type was Astrocytoma followed by Medulloblastoma so Improve the facilities to increase the rate of early diagnosis and early management of the patients can improve survivors.

2. Introduction

Brain tumors are the second most common neoplasm in children after leukemia, accounting for about 20% of all childhood cancers, they are the most common solid tumors in children under 15 years of age [1].

Primary brain tumors consist of a large spectrum of clinically and genetically heterogeneous disorders [2]. Intracranial tumors are the leading cause of morbidity and mortality in children with

cancer, improving in the diagnosis and management can increase long-term survivors and quality of life [3].

The prognosis of patients with brain tumor depend on the histological and behavioral pattern of the tumor. So benign brain tumors may be cured by neurosurgical resection only, while tumors with malignant behavior typically require adjuvant therapy i.e. chemotherapy, radiation therapy [2].

The etiology of brain tumors is poorly understood, the only established risk factor for brain tumors is ionizing radiation exposure. The majority of brain tumors occur in sporadic pattern, also they may occur at early ages of life, suggesting that prenatal and postnatal factor might be the etiologic causes [4].

Very little information is known about the epidemiology of brain tumors in childhood in developing countries, due to economic constraints and poor infrastructure [5,6].

Many Attempts had been made for many years to classify brain tumors, and the most widely used classification now is that of the World Health Organization (WHO) [7]. The newest update of the WHO classification; the 2016 World Health Organization Classification of Tumors of the Central Nervous System, lists more than 130 different types and variants of brain tumors [8].

The WHO grades brain tumors from I to IV on the basis of their histopathological features and malignant potential. Grade I tumors are the least malignant and are associated with a good overall outcome while grade IV tumors are the most malignant and have a significantly poor long term prognosis [7].

Primary Pediatric brain tumors are more common in the first decade of life and with the highest incidence during the first 5 years [8] About 60% of brain tumors in children below one-year age are supratentorial in their location and 40% are infratentorial, and after one year of age, the majority are located infratentorial [10].

Intracranial tumors mostly presented with the symptoms of raised intracranial pressure (early morning headache with vomiting) with or without focal neurological signs [11].

A visible cranial mass, proptosis, or increase size of head due to the development of secondary obstructive hydrocephalus may be the only clue that lead to doctor attention, [12] and can find the following signs (papilledema, cranial nerve abnormalities, cerebellar signs, sensory abnormalities, and reduced level of consciousness) [13].

Brain tumors diagnosis is usually done by Magnetic Resonance Imaging (MRI); if not available, Computed Tomography (CT) scanning also be used as a first diagnostic procedure. [4,14] A detailed diagnosis can have obtained by microscopic evaluation of resected tissue of the tumor for the histological features [15]. MRI of the brain and spine, with CSF cytology, usually done for staging of the brain tumors. In addition, some types of brain tumors like germ cell tumors secrete substances that can be found in the CSF or bloodincluding alpha -fetoprotein or human chorionic gonadotropin, and used as diagnostic and prognostic tumor markers [8].

The treatment decisions depend on many factors, including: the type of tumor, location of tumor, symptoms and age of the child. If the tumor is completely resected by surgery, and of non-malignant type (WHO grade I-II), so no further treatment is usually required. The malignant tumors (WHO grade III-IV) cannot be cured by surgery alone, and they are treated with surgery together with chemotherapy and/or radiotherapy. Current treatment protocols fail in 25% of patients and are associated with significant long-term side effects in survivors [8,15].

Astrocytic tumors are the most common brain tumors in children (40%). [16] Low-grade astrocytomas (WHO grade I Pilocytic astrocytomas and grade II) are the most common primary brain tumors among children and are usually associated with an excellent prognosis, for those in whom total excision is possible [17,18] and most frequently infratentorial in location [1]. High-grade astrocytomas (grade III anaplastic astrocytoma and grade IV) compose about 5-15% of all pediatric brain tumors and are associated with the worst prognosis [15].

The first-line treatment of pilocytic and diffuse astrocytomas consists of surgical resection. Radiation or chemotherapy are preserved for patients with recurrent or progressive disease [18].

The second most common pediatric brain tumors are the embryonal tumors (20%), which are divided into 3 large groups: medulloblastoma, primitive neuro ectodermal tumors (PNETs) and atypical teratoid/rhabdoid tumors (AT/RTs) [16].

Medulloblastoma is the most common malignant brain tumor among children, constituting about 15% of all CNS tumors. Medulloblastoma is sorted as WHO grade IV tumors, and patients have a poor prognosis. [15] There is standard risk Medulloblastoma which is completely resected tumors from patients older than 3 years of age with no leptomeningeal dissemination at diagnosis, whereas all others are considered high risk [19].

Primitive Neuro Ectodermal Tumors (PNETs)refers to a heterogeneous group of malignant embryonal tumors of unknown etiology, may morphologically appear similar to medulloblastoma, but are generally more aggressive, accounting for approximately 2% of CNS tumors in childhood [16,20].

Atypical teratoid/rhabdoid tumor (AT/RT) of the brain is a highly malignant neoplasm (WHO grade IV) primarily affecting young children, most patients withAT/RTssuffer from rapid disease progression and death [15,21]. This tumor is mainly found in the posterior fossa of young children and is associated with a very poor prognosis, often being refractory to treatment [16]. The third most common brain tumors of childhood are the ependymomas, accounting for about 10% of brain tumors. They may develop in all age groups with most cases occurring in children younger than 4 years. In general, outcome of ependymomas in children is

significantly worse than in adults, and histologically classified as WHO grade II or III [16,15,22]. Ependymomas, predominantly are occurring in the posterior fossa in childhood and may also in the supratentorial region [16].

Intracranial GCTs are rare group of brain tumors accounting for only 3% of all pediatric brain tumors, commonly arise from the pineal or suprasellar regions in patients of all ages [23]. Neuroimaging studies cannot differentiate GCTs from other types of tumors, and therefore, the diagnosis usually requires histologic confirmation. They canalso diagnosed by characteristic elevations of tumor markers, including alpha -fetoprotein or human chorionic gonadotropin in the serum or CSF [24].

Craniopharyngiomas account for 2–5% of all primary brain tumors. They can occur at any age, despite their benign histological features, Craniopharyngiomas are associated with increased mortality with marked physical and cognitive sequelae affecting adversely the quality of life due to their proximity to the visual pathways, the pituitary gland, and the hypothalamus [25]. Choroid plexus tumors are rare CNS neoplasms that comprise 1% of all pediatric CNS tumors [26]. They are classified into three groups according to the histological features; choroid plexus papilloma (CPP) which classified by the WHO as grade I, Atypical Choroid Plexus Papilloma (ACPP) as grade II, and the malignant Choroid Plexus Carcinoma (CPC) as grade III [27].

3. Patients and Methods

A retrospective study was carried out in the period between the 1st of June till the end of December 2018, on children younger than 15 years' old who were diagnosed with primary brain tumors. These children were admitted and registered at Basra Pediatric Oncology center during the period from the 1st of January 2004 till the end of December 2017.

Total cases of all cancers admitted to the center during that period were 1820 cases, 133 cases were diagnosed with brain tumors, of them 76 were male and 57 were female. The diagnosis was made by history of the patient, clinical examination, imaging studies and by histological confirmation.

4. Data collection and Methods

A special data sheet was designed for the purpose of study (Appendix 1). The following information was obtained: name, age, gender, date of admission, residence, clinical presentation, types of tumors and its location, mode of diagnosis and finally the outcome of the patient.

The residency of patients was taken and to simplify the major area of Basra, a classification was designed by Habib OS et al. in 2007 [28]. Basra governorate was separated into 5 district areas: central area, northern area (include Al Hartha, Al Qurna, Al Modiana), western area (Al zubair district), eastern area (Shatt Al Arab and Al Jazeera), and southern area (Abu Alkhaseeb and Fao), other governorate like Maysan, Thi qar were also included in the sheet.

The clinical presentation includes: vomiting, headache, disturbed consciousness level, eye symptoms like squint and impair vision, ataxia, fit, weakness, growth failure, speech impairment, torticollis and hydrocephaly. Tumor locations were counted as supratentorial and infratentorial, the supratentorial compartment includes the cerebral hemispheres, the pineal region and the sellar/suprasellar region, while the infratentorial compartment include the cerebellum, brain stem and posterior fossa [10].

For tumors without histologic diagnosis, the diagnoses and classifications were made from related specific clinical features, image findings and locations of tumors [20].

The outcome of patients also was studied according to age and types, non-compliance defined as the patients who dose note take a prescribed medication or follow a prescribed course of treatment [30].

The sources for these information was from the hospital records, medical records and documentation about the child's treatment held by the parents. Statistical analysis was done using the statistical packages for Social Sciences (SPSS) software version 24, data were expressed and mean age ± standard deviation was performed. Comparisons of proportions were performed by cross tab using Chi-Square test when each cell has an expected frequency of five or more, and the Fisher's exact test was used when one more of cells have an expected frequency of less than five. P-value of < 0.05 was considered as statistically significant.

5. Results

5.1. Distribution of patients with brain tumors according to the years of diagnosis.

The total cases of primary brain tumors were 133 (7.3%) patients from 1820 patients with cancer were diagnosed during that period, the patients were classified according to the years of admission in the table below.

Table 1: Distribution of patients with brain tumors over 14 years

Years	No. (%)
2004	2 (1.45)
2005	2 (1.45)
2006	5 (3.85)
2007	5 (3.85)
2008	2 (1.45)
2009	4 (2.96)
2010	2 (1.45)
2011	3 (2.33)
2012	14 (10.52)
2013	15 (11.34)
2014	19 (14.36)
2015	17 (12.82)
2016	20 (15.02)
2017	23 (17.15)
Total	133 (100)

Table shows that the higher percentage of patients was at 2017(17.15%), then follow by 2016(15.02%), 2014(14.36%), and increase the frequency of brain tumors since 2012.

5.2. Residence of patients with brain tumors

The distribution of patients according to their governorate was studied; the results are shown in the table below.

Table shows that most of patients were from Basra (60.17%). Other governorates like Thi Qar and Maysan represent (21.83%, 12.74%) respectively of admitted cases

Table 2: Distribution of patients with brain tumors according to their residence

Residence	No. (%)
Basra	80 (60.17)
Thi qar	29 (21.83)
Maysan	17 (12.74)
Other(Baghdad,Wasid)	7 (5.26)
Total	133 (100)

5.3. Distribution of patients with brain tumors in Basrah

Most of patients were from central and northern areas of Basrah, the results are shown in the table below.

Table shows high frequency of patients with brain tumors were from the central and northern areas of Basra (38.47%, 26.06% respectively), and lower percentage of patients from eastern areas (2.96%).

Table 3: Distribution of patients with brain tumors in Basra

District of Basrah	No. (%)
The Center	31 (38.47)
The North	21 (26.06)
The South	14 (17.54)
The West	12 (14.97)
The East	2 (2.96)
Total	80 (100)

5.4. Distribution of patients with brain tumors according to the initial symptoms

Table show that headache and vomiting were the most presenting features, which represented the symptoms of increase intracranial pressure (45.87%) while the least presenting feature was speech impairment (2.26%).

Table 4: Distribution of patients with brain tumors according to the initial symptoms

Clinical features	No. (%)
Headache and Vomiting	65 (45.87)
Disturbed consciousness level	9 (6.79)
Squint and impaired vision	13 (10.12)
Ataxia	10 (7.27)
Fit and ataxia	8 (5.31)
Weakness and Vomiting	12 (8.32)
Growth failure andHydrocephaly	9 (6.79)
Speech impairment	3 (2.26)
Torticollis and Squint	10 (7.27)

5.5. Distribution of patients with brain tumors according to the age and gender

All patients with brain tumors were distributed according to the age and gender at diagnosis, the mean age 6.6±3.5 years and male to female ratio 1.3:1, the results are shown in the table below.

The age groups of the patients were classified as <2 years, >2–5 years, >5–10 years, >10–15 years [31, 32].

Table shows that males were more than females (57.12%, 42.88% respectively), most of cases had occurred at age group (> 5 – 10) years (45.16%), while the lower frequency of cases had occurredat age group (< 2 years) (11.36%) and statistically not significant (P-value 0.161)

Table 5: Distribution of patients with brain tumors in relation to the age and gender

Age (Years)	Male	Female	Total	P-value
	No. (%)	No. (%)	No. (%)	
< 2	8 (10.62)	7 (12.35)	15 (11.36)	
> 2 - 5	20 (25.88)	12 (20.93)	32 (23.75)	
> 5 - 10	29 (38.17)	31 (54.37)	60 (45.16)	0.161*
> 10 - 15	19 (25.33)	7 (12.35)	26 (19.73)	
Total	76 (57.12)	57 (42.88)	133 (100)	

*p-value assessed by chi-square

5.6. Patients with brain tumors in relation to the location of tumor and age

The site of tumor can be supratentorial or infratentorial, and its relation to the age shown below.

Table shows the majority of tumors were located infratentorial (69.84%) and the high frequency of them found at (> 5 – 10 years) age group, while the supratentorial locations (30.16%) were found mainly at age > 10 years old, and statistically significant (P-value 0.004).

Table 6: The relation of brain tumors location to the age of the patients

Age	Supratentorial	Infratentorial	P - value
(Years)	No. (%)	No. (%)	
< 2	8 (20.62)	7 (6.12)	
> 2 – 5	5 (12.51)	27 (28.88)	
> 5 – 10	6 (14.55)	54 (59.46)	
> 10 – 15	21 (52.32)	5 (5.54)	
Total	40 (30.16)	93 (69.84)	0.004*

*P-value assessed by chi-square

5.7. Relation of brain tumors to the types of tumor and mode of diagnosis

Table shows that the majority of cases were diagnosed by histological biopsy in percentage of 63.89%, while the rest (36.11%) were diagnosed clinically.

Table 7: Relation of brain tumors to the types of tumor and mode of diagnosis

Type of tumor	Clinical diagnosis No. (%)	Histological diagnosis No. (%)
Astrocytoma	21 (32.81)	43 (67.19)
Ependymoma	0 (0.0)	11 (100)
Medulloblastoma	20 (45.45)	24 (54.55)
PNET	1 (16.67)	5 (83.33)
Choroid plexus tumor	1 (50)	1 (50)
Germ cell tumor	0 (0.0)	1 (100)
Craniopharyngioma	4 (100)	0 (0.0)
Pineal tumor	1 (100)	0 (0.0)
Total	48 (36.11)	85 (63.89)

5.8. Distribution of brain tumors in relation to the types of tumor and gender

Table shows that Astrocytoma was the most type observed followed by medulloblastoma (48.15%, 33.16% respectively). The predominance of male gender occur among children with medulloblastoma (65.92%) and statistically not significant.

5.9. Distribution of brain tumors in relation to the types of tumor and age

Table shows high percentage of medulloblastoma occurred at age group (> 5 – 10) followed by Astrocytoma (52.28% and 64.88%) respectively, and statistically significant.

Table 8: distribution of brain tumors in relation to the types of tumor and gender

Types of tumor	Male	Female	Total	P – value
	No. (%)	No. (%)	No. (%)	
Astrocytoma	33 (51.56)	31 (48.44)	64 (48.15)	
Ependymoma	7 (63.63)	4 (36.37)	11 (8.105)	
Medulloblastoma	29 (65.92)	15 (34.08)	44 (33.16)	
PNET	4 (64.67)	2 (35.33)	6 (4.41)	
Choroid plexus tumor	1 (50)	1 (50)	2 (1.59)	0.152*
Germ cell tumor	1 (100)	0 (0.0)	1 (0.85)	
Craniopharyngioma	0 (0.0)	4 (100)	4 (2.94)	
Pineal tumor	1 (100)	0 (0.0)	1 (0.85)	
Total	76 (57.12)	57 (42.88)	133 (100)	

*p-value assessed by fisher's exact tests

Table 9: distribution of brain tumors in relation to the types of tumor and age

Types of tumors	< 2 years	> 2 - 5 years	> 5 - 10 years	> 10 – 15 Years	P – value
Astrocytoma	5)7.81(	13(20.31)	30(46.88)	16(25)	
Ependymoma	1(9.09)	4(36.35)	4(36.35)	2(18.21)	
Medulloblastoma	3(6.82)	14(31.82)	23(52.28)	4(9.08)	
PNET	3(50)	1(16.67)	0(0.0)	2(33.33)	
Choroid plexus tumor	2(100)	0(0.0)	0(0.0)	0(0.0)	0.005*
Germ cell tumor	0(0.0)	0(0.0)	1(100)	0(0.0)	
Craniopharyngioma	1(25)	0(0.0)	2(50)	1(25)	
Pineal tumor	0(0.0)	0(0.0)	0(0.0)	1(100)	
Total	15(11.38)	32(24.06)	60(45.11)	26(19.55)	

*p-value assessed by fisher's exact tests

5.10. Distribution of patients with brain tumors according to the outcome of patients in relation to types of tumors

Table shows that CPTs had a higher rate of death followed by medulloblastoma (100%, 47.72% respectively). The total died cases were (43.61%) compare to (41.35%) finished treatment, and statistically significant.

5.11. Relation of outcome in patients with brain tumors according to their age

Table shows that the age group (< 2 years) had a higher percentage of death (66.67%) and low percentage of death (34.62%) was at age group (>10-15 years), and there is significant decrease in the death rate with increasing the age of the patients.

6. Discussion

Patients with primary brain tumors have the highest morbidity among all childhood malignancies [33]. This study provided important data concerning the age, types, locations of tumors, clinical features of Iraqi children in Basra with primary brain tumors and their expected outcome.

Table 10: Distribution of patients with brain tumors according to the outcome of patients in relation to types of tumors

Types of tumors	Finish treatment No. (%)	Still on treatment No. (%)	Died No. (%)	Non compliance No. (%)	P –value
Astrocytoma	23 (35.94)	3 (4.69)	29 (45.31)	9 (14.06)	
Ependymoma	6 (54.55)	0 (0.0)	5 (45.45)	0 (0.0)	
Medulloblastoma	16 (36.36)	2 (4.55)	21 (47.72)	5 (11.37)	
PNET	5 (83.33)	0 (0.0)	1 (16.67)	0 (0.0)	
Choroid plexus tumor	0 (0.0)	0 (0.0)	2 (100)	0 (0.0)	0.004*
Germ cell tumor	1 (100)	0 (0.0)	0 (0.0)	0 (0.0)	
Craniopharyngioma	4 (100)	0 (0.0)	0 (0.0)	0 (0.0)	
Pineal tumor	0 (0.0)	1 (100)	0 (0.0)	0 (0.0)	
Total	55(41.35)	6(4.51)	58(43.61)	14(10.53)	

*p-value assessed by fisher's exact test

Table 11: Relation of outcome in patients with brain tumors according to their age

Age (Years)	Finish treatment No. (%)	Still on treatment No. (%)	DiedNo. (%)	Non compliance No. (%)	P – value
< 2	4 (26.67)	1 (6.66)	10 (66.67)	0 (0.0)	
> 2 – 5	11 (34.38)	1 (3.13)	16 (50)	4 (12.49)	0.011*
> 5 – 10	27 (45.01)	2 (3.3)	23 (38.33)	8 (13.33)	
> 10 – 15	13 (50)	2 (7.69)	9 (34.62)	2 (7.69)	
Total	55 (41.35)	6 (4.51)	58 (43.61)	14 (10.53)	

*p-value assessed by fisher's exact test

The current study showed that brain tumors constitute about 7.3% of all cancers that diagnosed over a period of 14 years; the numbers of patients with brain tumors were treated in Basra Pediatric Oncology Center increased gradually from (1.45%) at 2004 to (10.52%) at 2012. This is may be due to improve registration of cases and increase the awareness of people about the presence of specialized center.

Brain tumors among children showed prominent distribution rate within patients that live in the center of Basra followed by northern areas, this is the same to the result of study of Habib OS et al. in Basra [28]. this is may be related to the life styles changes or exposure to various risk factors.

Concerning gender, the results showed that brain tumors were more common in male than female, with male to female ration 1.3:1, these result is comparable to studies done by El-Gaidi MA in Egypt [29], Beygi S et al. in Iran [34], Asirvatham JR et al. in India [35] and Zhou D et al. in China [36], While studies done by Elhaj A et al. in Sudan [33] and Kadri H et al. in Syria [37] showed a slightly female predominant. This male predominance of pediatric brain tumors reflects the gender distribution ratio in the normal population under 15 years of age [38].

In this study, the mean age at diagnosis was 6.6 years which is slightly comparable with the result of Lannering B et al. in Sweden at 2009 [39] and Pinho RS et al. in Brazil at 2011[40], while a higher mean age was observed by Mehrazin M et al. in Iran at 2007 (32), Uche EO et al. in Nigeria at 2013 [41], Karkouri M et al. in Morocco at 2010 [42] (8.8 years, 9.7 years and 9.3 years respectively). This variation may likely be due to differences in the study size [10].

The highest incidence of brain tumors (45.16%) occur at age group (>5 - 10) years, this is in agreement with Cho KT et al. in Korea (35.4%) [43] and Ahmed N et al. in Pakistan (53.1%) [43], while studies by Mehrazin M et al. in Iran [23] and Asirvatham JR et al. in India [26] showed that the highest age group affected was (>10 - 15) years.The lowest incidence of brain tumors (11.36%) occur at age group (0 - 2) years, this is comparable with Kadri H et al. in Syria (11%) [37], Mehrazin M et al in Iran (6.2%) [32]; this may be related to a fact that primary brain tumors are more common in the first decade of life [44].

In the present study, it was observed that headache and vomiting were the most common presenting symptoms (46.87%). This is comparable with studies of Mehrvar A et al. in Iran (51.5%) [3] and Pinho RS et al. in Brazil (44.8%) [40]; this can be explained by the high frequency of infratentorial tumors, which are more commonly presented with symptoms of increase intracranial pressure [29].

The study showed that the majority of cases were diagnosed by histological examination (63.89%) rather than clinical diagnosis. This is comparable with studies of Wong TT et al. in Taiwan (85.4%) [45] and Monteith SJ et al. in New Zealand (91.6%) [46],

while a study done by Elhaj A et al. in Sudan [33] showed that most of the diagnosis was made clinically (59%). This could be related to the referral of most of the brain tumors in Basrah center to neurosurgeon doctors for staging of the tumor of the planning of treatment.

Concerning the location of tumors, the result showed that the majority of brain tumors were infratentorial in their location (69.84%), this is in agreement with studies of Mehrvar A et al. in Iran (67.7%) [3], Kadri H et al. in Syria (53%) [37] and Nayil K et al. in Kashmir (55%) [31], while studies of Mehrazin M et al. in Iran [32], Cho KT et al. in Korea [43] and Shuangshoti S et al. in Thailand [7] showed that the majority of locations were supratentorial, The high supratentorial predominance in East Asian countries is primarily due to the high frequency of GCTs in these countries which are the majority of them presented above the tentorium [29].

The infratentorial tumors were predominant among the age group (>5 – 10) years (59.46%)and this is comparable with study of El-Gaidi MA in Egypt (76%) [29], the current study showed that the supratentorial tumors were predominant among the age group (>10 – 15) years (52.32%) and this is disagreeing with Mehrazin M et al. in Iran [32].

The current study showed that the most common tumor was astrocytoma (48.15%) followed by medulloblastoma (33.16%) in all age groups, similar results had been reported in studies done by El-Gaidi MA in Egypt (35%, 19%) [29], Mehrazin M et al. in Iran (40.4%, 18.4%) [32] and Kaatsch P et al. in German (41.7%, 18.1%) [47], while studies of Kadri H et al. in Syria [37] and Karkouri M et al. in Morocco [42] showed that medulloblastoma was the most common types of tumors followed by astrocytoma. This variation is related to environmental and geographical factors.

The astrocytomas were occured mainly at age group (>5 – 10) years (46.88%), this is in agreement with study of Mehrazin M et al. in Iran (41.9%) [32] while a study by Zhou D et al. in China [36] showed that astrocytomas were occur mainly at age group > 10 years old. This is may be explained by increasing the astrocytomas as the age increased. [43].

About the medulloblastomas, they occured mainly at age group (>5-10) years (52.28%) which is agrees with the study of Nayil K et al. in India (40%) [31]. This study showed that medulloblastomas occur mainly between males (65.92%) and the similar result found in Iran by Beygi S et al [34]. and Mehrazin M et al. [32] and Cho KT et al. in Korea [43].

The third most common brain tumor was ependymomas (8.05%), this result is similar to the results of Ahmed N et al. in Pakistan (9.5%) [43] and Kadri H et al. in Syria (11.4%) [73], but this is disagreeing with Zhou D et al. in China [33] and Uche EO et al. in Nigeria [41].

In this study, it was observed that Craniopharyngiomas had a low percentage (2.94%) among the tumors and this is consistent with studies of Elhaj A et al. in Sudan (5.9%) [41] and Mehrvar A et al. in Iran (1%) [3], while they represented one of the common tumors in the studies of Asirvatham JR et al. in India (10%) [35] and Zhou D et al. In China (18.5%) [36]; the low frequency of Craniopharyngiomas in Basrah center may be explained by the absence of the radiotherapy center in the in Basra in the past years which represent the main treatment for them. The Craniopharyngiomas were occur mainly among female which is agrees with study of Karkouri M et al. in Morocco [42], but a study by Asirvatham JR et al. in India (35) showed a male predominance.

The choroid plexus tumors in this study show a low incidence (1.59%) and found mainly in the first 2 years of life, this is agreeing with a study of El-Gaidi MA in Egypt [29] but a study from Uganda [5] by Stagno V et al. showed a relatively prominent presentation of choroid plexus tumors (9.3%).

The current study shows only one case of pineal tumor while a study from Korea by Cho KT et al. [43] found a higher percentage.

Many differences in the incidence, predominant type and anatomic location of brain tumors had been noted between the countries; these are related togeographical, environmental, ethnic variations and may be due to genetic factors [29, 36].

Thenon – compliance constitute about 10.53 % of patients with brain tumors; the common reasons for thisresult may be related to poverty, living away from the treating center and some traditional treatment could not be denied as some cases associated with CNS symptoms managed first by religious beliefs, the similar result was observed in study of Elhaj A et al. in Sudan [33].

Regarding the mortality rate of brain tumors in children, in this study was 43.61%, which is higher than that in the developed world; this may be due to different histology, ages, and follow-up or may be due to delayed presentation, diagnosis and advanced disease [5]. The same result is observed by Mehrvar A et al. in Iran (41.4%) [3] and of Elhaj A et al. in Sudan (42%) [33].

A Kaatsch P et al. in Germany [47] showed less death rate with advanced age of patients, the same result of the current study which showed less death rate at age groups (> 10 – 15) years. This study showed that astrocytomas had a death rate of (45.31%), similar to a study of Mehrvar A et al. in Iran [3]; this may explain by their high grade or their locations especially in the brain stem

As the frequency of brain tumors had increased gradually from (2004 to 2012) So Improve the facilities for early diagnosis and early management of the patients can improve survivors.

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