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Evaluation of Brain Tumors by using Computed Tomography among Adult Saudi Patients

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Abstract: *This descriptive and analytical study was conducted at Jeddah hospital in Jeddah in the period from January 2019 to April 2019, to evaluate brain tumors using computed tomography (CT) scan.*

The study was done by collecting 30 patients (male and female) with different ages (20 -80) years old with suspected brain tumors. From our results, we found that the most affected age group was (40 to 60 years old) represented the highest percentage 43.3% while the age group (60 to 80 years old) represented the lowest percentage 26.7%. The male patients affected more than female patients with percentage (60%) and (40%) respectively, the non-malignant tumors represented the highest percentage of 60%. According to malignant classification, 91.7% were primary type; with only 8.3% from malignant cases is secondary type. Headache is the highest associated symptoms with cases 42.11%, followed by interpreting language with 21.05%. Finally, we found: meningioma represented 66.7% in CT findings which is the highest findings among males and females.

Keywords: *brain tumors, CT scan, headache, non-malignant tumors, meningioma.*

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I. Introduction

Brain tumor is the mass or growths of abnormal cells in the brain. Several different types of brain tumors affected the brain and associated parts. Some brain tumors are non-cancerous which conceder (benign tumors) and some are cancerous tumors (malignant). Brain tumors can begin in the brain primary brain tumors or cancer can begin in other parts of the body and spread (metastases) to the brain secondary or degenerative brain tumors. The growth rate of brain tumors may vary greatly. The growth rate of the brain tumor, as well as its location, determines how well it affects the function of your nervous system and can lead to dysfunction of affected parts. Treatment options for brain tumors depend on the type, location size, and brain tumor.[1]

Medical imaging plays an important role in the diagnosis and assessment of brain tumors; however computed tomography scans is the best one. The tumors will often appear to be different colored and different as the processes are referred to in the CT images results. The benign brain tumors often appear darker than the normal brain tissue on CT scans. Although the tumor appearance can be variable. When the brain absorbs chemicals called "contrast factors named as contrast media CM", most primary brain tumors and secondary tumors malignant neoplasm's can be detected in any CT and may indicate a tumor that is spread because of the unclear boundaries surrounding the tumor and the tumor cell enhance with the contrast media and become either hypodense (low CM appearance) or hyperdense (high CM appearance).[2,3]

The physical presence of a tumor in the brain can cause problems with some mental (cognitive) functions.

In some cases, these include thinking, understanding, learning, attention/concentration, problem-solving, planning and making decisions.[3]

Tumors are groups of abnormal tissue cells that form lumps or mass growths. They can start in any one of the trillions of cells in our bodies. Tumors grow and behave differently, depending on whether they are cancerous (malignant), non-cancerous (benign) or precancerous cells. [3]

Most brain tumors are not diagnosed until after signs and symptoms appear in patients. Often a brain tumor is initially diagnosed by a neurologist. A neurologist is a doctor who specializes in problems with the brain and central nervous system. [4]

Computerized tomography (CT) takes images of the inside of the body using x-rays taken from different angles, to form a 3-dimensional image that shows any abnormalities in the body or tumors. Changes to the bone in the skull can also be seen on CT images, and it can be used to measure a tumor's size. A CT scan may also be used rather than magnetic resonance imaging (MRI) in cases of there was ferromagnetic materials inpatient or there are some contraindications of using an MRI scan. Sometimes, a contrast medium is given before the scan to provide better detail on the image and better visualization of brain tumor site and size. [4, 5]

II. Materials and Methods

2.1Material

2.1.1Area and duration

This study was carried out in JEDDAH hospital in SAUDI ARABIA, which started in January 2019 to April 2019.

2.1.2 Sample study

Descriptive and analysis study, The study was conducted on 30 patient (male and female) during the age period from 20 to 80 suspected brain tumors came to the radiology department and done CT scan imaging to investigate brain. Patients were selected conveniently.

Inclusion criteria: Patient in age group > 20 < 80 years and patient with mental (cognitive) functions.
Exclusion criteria: Patient in age group < 20 > 80 years and patients with normal brain CT images.

2-2 Methods

2-2-1 CT Technique and machine used

By using computed tomography big-bore Philips, the patient in supine position with head first and pillow under patient's head to be comfortable position, arms along the sides of the body, head immobilized in the head holder Support is placed under the head the brain scan is horizontal and Sagittal in the Medline above start: For coronal sections, patient position is prone position and the specific positioning methods and routines for cranial CT vary, depending on radiologist preferences and departmental protocols. Reconstruction CT images can be recommended.

Cuts begin at foramen magnum to the vertex .in the brain CT scan can detect the tumor in any lobe of the brain so we can determine that if the tumor is benign or malignant by performing water-soluble contrast media intravenously and amount of contrast media is vary according to the size and type of lesion. For further diagnosis and differentiate between benign and malignant brain tumor biopsy procedures under the guidance of CT scan and lab correlation such as tumor markers and blood tests can be done.

2.2.2 Statistical analyses

By using SPSS program version16 all data and variables are analyzed. Descriptive statistics, including frequency and percentages, were calculated. ANOVA test was applied to test the significance, the *p*-value of less than 0.005 was considered to be statistically significant.

III. Results

All collected data analyzed and tabulated in tables and graphs as follows:

Table no 1: Frequency distribution of the patient's gender and age

		Count	%
Gender	Male	18	60.0%
	Female	12	40.0%
Age	20 to 40 years old	9	30.0%
	40 to 60 years old	13	43.3%
	60 to 80 years old	8	26.7%

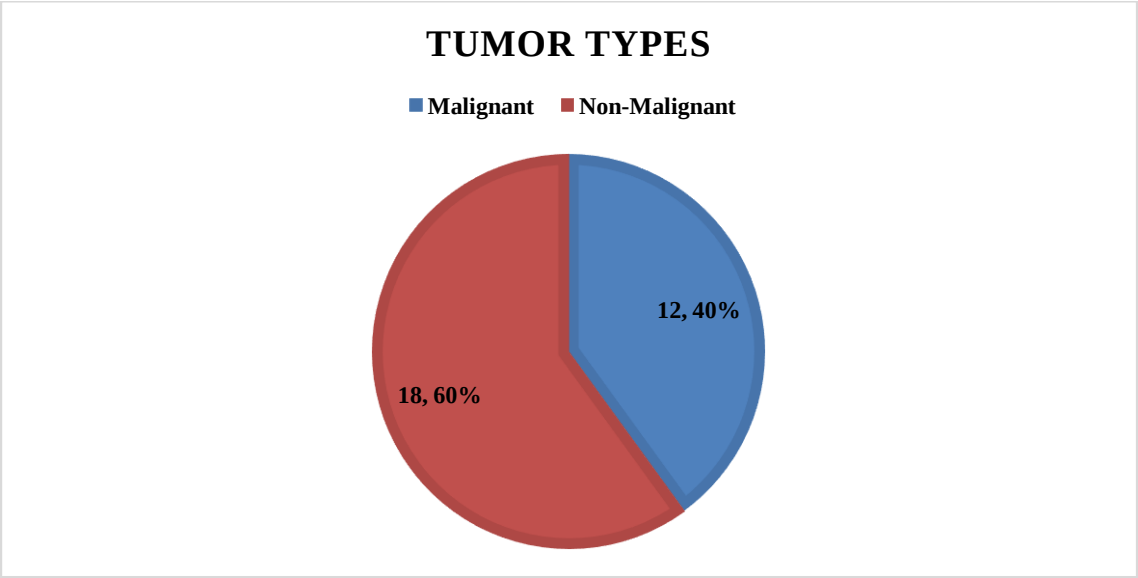

Fig no 1: A bar graph displays the frequency distribution of age group distribution.

Table no 2: Frequency distribution show malignancy type (n= 30)

		Count	Table N %
Type of tumor	Malignant	12	40.0%
	Non-Malignant	18	60.0%
If malignant	Primary	11	91.7%
	Secondary	1	8.3%

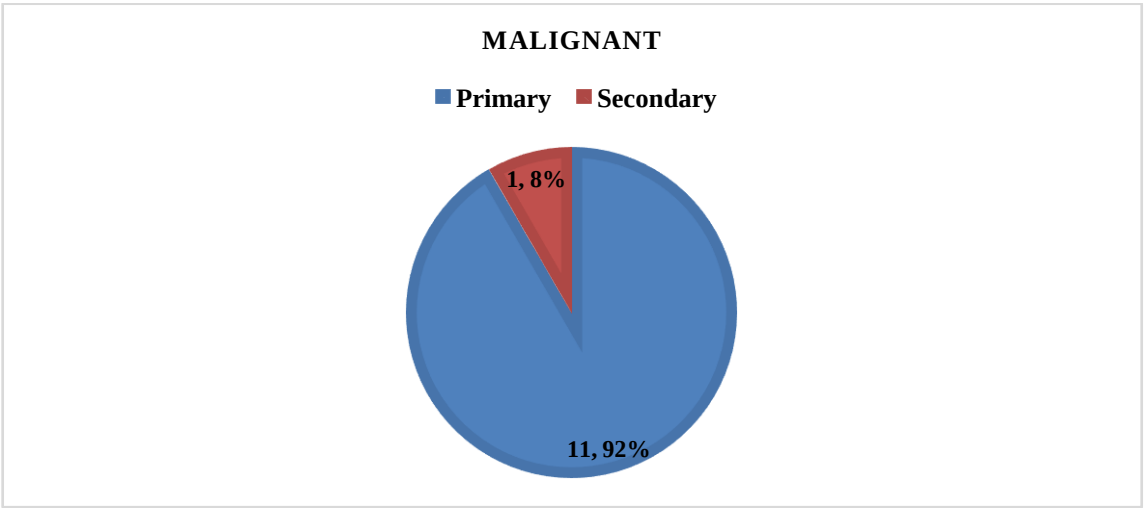

Fig no 2: Malignant type profile

Table no 3: Cross-tabulation between size and site of lesion

Site of lesion * size Crosstabulation

			size		
			Small	Large	Total
Site of lesion	bilateral occipital	Count	1	0	1
		%	9.1%	0.0%	3.3%
	frontal lobe	Count	0	1	1
		%	0.0%	5.3%	3.3%
	interior aspect of right pons	Count	1	0	1
		%	9.1%	0.0%	3.3%
	intra cerebral	Count	0	1	1
		%	0.0%	5.3%	3.3%
	left frontal space	Count	1	0	1
		%	9.1%	0.0%	3.3%
	left high parietal region	Count	1	1	2
		%	9.1%	5.3%	6.7%

	left lateral ventricle	Count	0	1	1
		%	0.0%	5.3%	3.3%
	left parietal lobe	Count	1	0	1
		%	9.1%	0.0%	3.3%
	left sphenoid wing	Count	1	1	2
		%	9.1%	5.3%	6.7%
	left sphenoidal	Count	0	1	1
		%	0.0%	5.3%	3.3%
	left temporal bone	Count	0	1	1
		%	0.0%	5.3%	3.3%
	left temporoparietal	Count	0	1	1
		%	0.0%	5.3%	3.3%
	left temporoparietal region	Count	0	1	1
		%	0.0%	5.3%	3.3%
	left thalamic region	Count	1	0	1
		%	9.1%	0.0%	3.3%
	occipital lobe	Count	1	0	1
		%	9.1%	0.0%	3.3%
	pineal region	Count	0	2	2
		%	0.0%	10.5%	6.7%
	right basal ganglia	Count	0	3	3
		%	0.0%	15.8%	10.0%
	right cerebella pointing angle	Count	1	0	1
		%	9.1%	0.0%	3.3%
	right cerebral	Count	1	0	1
		%	9.1%	0.0%	3.3%
	right frontal bone	Count	0	1	1
		%	0.0%	5.3%	3.3%
	right frontal lobe	Count	1	0	1
		%	9.1%	0.0%	3.3%
	right parietal	Count	0	1	1
		%	0.0%	5.3%	3.3%
	right parietal bone	Count	0	1	1
		%	0.0%	5.3%	3.3%
	right parietal lobe	Count	0	1	1
		%	0.0%	5.3%	3.3%
	right temporal-parietal	Count	0	1	1
		%	0.0%	5.3%	3.3%
Total		Count	11	19	30
		% within size	100.0%	100.0%	100.0%

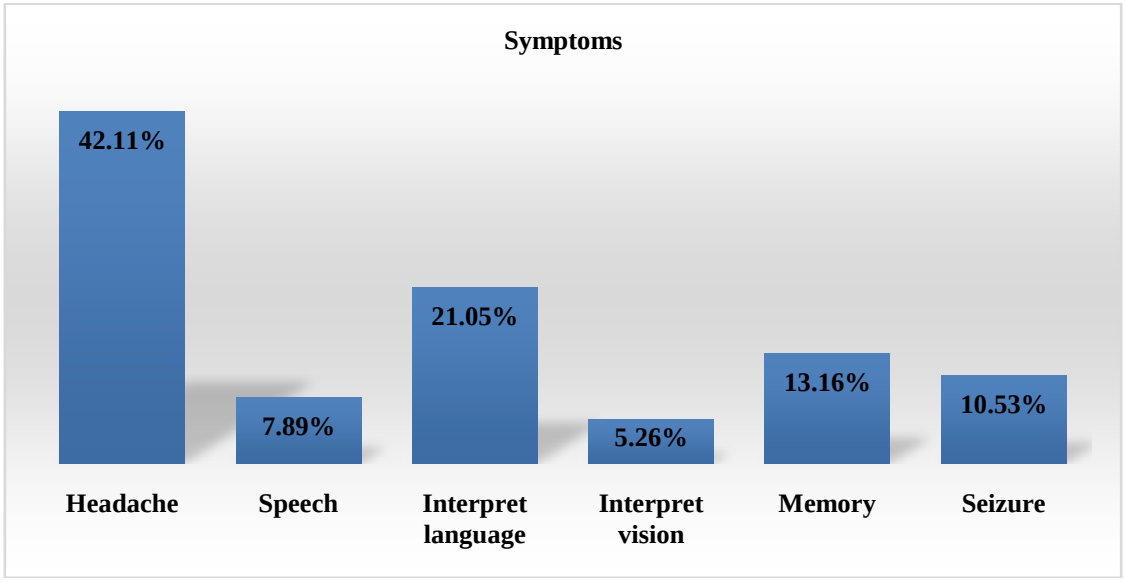

Figure no 3: show symptoms profile

Table no 4: show Diagnostic Findings with tumor types (n= 30)

Diagnostic CT finding		Type of tumor		Total	Sig.
		Malignant	Non-Malignant		
Angioma	Count	1	0	1	0.001
	%	8.3%	0.0%	3.3%	
hematoma	Count	0	3	3	
	%	0.0%	16.7%	10.0%	
lesion	Count	0	3	3	
	%	0.0%	16.7%	10.0%	
mass effect	Count	0	8	8	
	%	0.0%	44.4%	26.7%	
meningioma	Count	8	0	8	
	%	66.7%	0.0%	26.7%	
metastasize	Count	1	0	1	
	%	8.3%	0.0%	3.3%	
neoplasm	Count	0	1	1	
	%	0.0%	5.6%	3.3%	
primary malignant bone tumor	Count	1	0	1	
	%	8.3%	0.0%	3.3%	
soft tissue lesion	Count	1	3	4	
	%	8.3%	16.7%	13.3%	

Table no 5: Diagnostic CT Findings with primary and secondary tumor (n= 30)

Diagnostic CT finding		Malignant		Total	Sig.
		Primary	Secondary		
angioma	Count	1	0	1	0.017
	%	9.1%	0.0%	8.3%	
meningioma	Count	8	0	8	
	%	72.7%	0.0%	66.7%	
metastasize	Count	0	1	1	
	%	0.0%	100.0%	8.3%	
primary malignant bone tumor	Count	1	0	1	
	%	9.1%	0.0%	8.3%	
soft tissue lesion	Count	1	0	1	
	%	9.1%	0.0%	8.3%	

IV. Discussion

In table no1, showed that 60% of patients were males, with only 40% for females. Similar result within this study we found that brain tumors by CT men were more likely than women to develop a brain tumor. However, some specific types of brain tumors, such as meningioma, are more common in women.

Most patients had 40 to 60 years with 43.3%, then 30% for those who have 20 to 40 years old, and 26.7% from patients had 60 to 80 years old (table 1). Compared with Mustaqeem, et al (2012) indicated that the number has been increased to became 300 people per year during the last past decayed and most of them are between age 50 to 70. [6, 7]

It illustrated in the malignancy types, where 60% from cases are non-malignant, compare to 40% were malignant. According to malignant classification, 91.7% were primary type, with only 8.3% from malignant cases are secondary type (Figure no 1and table no 2).

To find out the size of the tumor, as well as the site of the lesion, (Table no 3), showed that size was large in 19 cases, while the rest been a small size of tumors. [7]

The symptoms associated with cases demonstrated in (figure no3) where headache is highest associated symptoms with cases 42.11%, followed by interpreting language with 21.05%, then memory (13.16%), seizure (10.53%), speech (7.89%), and least symptom associated is interpreting vision (5.26%).

(Table no 4)The correlation between the type of tumor and diagnostic findings was obtained since the p-value was less than 0.05, as meningioma was seen highest in malignant cases, compared to mass effect in non-malignant tumors, and so on.

To differentiate between primary and secondary tumors, (Table no 5) illustrated that relationship existed, as primary cases have higher angioma, meningioma, primary malignant bone tumor, and soft tissue lesion. Compared to secondary malignant that all of them found have metastasized.

Nagalkar and Asole (2012) and Lee CH, Jung KW, Yoo H, et al. Stated that the CT-Scan technique is used to observe the damaged sites in the brain. They indicated that those images are presented in forms of grayscale color images. They indicated that the tools for CT-scans can support such a form of image color and this could make the detection of the damaged part in the brain very easy and simple. For instance, Lee CH, Jung KW, Yoo H, et al(2010) claimed that using this technique the parietal section of the head scanned using CT scans, the Cerebrum part is shown in the form of the grayscale color while the veins and arteries in the form of light white color".Then any clotting or darkening appears in the brain which indicates that there is damage and is shown through the CT scan as dark gray.

Another study was done by Dr. Castro and Dr. Pedro Lewenstein, 2014 who concluded brain tumors represent 85 to 90% of all central nervous system tumors. The result concluded that 40 % of brain tumors were malignant type. [8]

A similar study was done by Dr.peter, 2013 Pathological findings in 20 cases of glioblastoma multiform were correlated and compared with clinical histories and computerized tomographic (CT) scans. This was done to define the neoplasm in three stages: before treatment, during remission, and during recurrence. The radiographic central region of low density was a necrotic area, the enhancing rim was a cellular zone of viable neoplasm, and the perilesional low - density area was edema with infiltrating tumor. In these 20 cases, all of the identifiable neoplasms lay within the zone of peritumoral edema or contrast enhancement area, although small anaplastic Cells may have been present in more distant regions. These lesions were accurately localized by CT scan imaging. [9, 10]

V. Conclusion

The objective of the research and analysis of the result that we get the incidence of the disease in both sexes male and female and its impact on any sex, where we found that the event in the category of males more than the category of females To conclude that the age at which the patient gets the disease increase in the period of age of 40 - 60 and here is what has been confirmed from the results One of our most important goals in the research is to identify the diagnosis of the disease by computed tomography The result is clear, where CT is more often seen as more accurate in the brain tumor and give more accurate information and characterization of brain tumors.

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