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Partial seizure disorder co morbidity factors, causes and associated brain structural lesion, hospital based study.

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Abstract

Backgrounds: Partial epilepsy is the most common seizure disorders encountered in patients with epilepsy. Partial seizure was defined as sudden excessive, rapid and localized electrical discharges by gray matter from some part of the brain certain structural & metabolic abnormalities in the brain with predictable and lower the epilepsy those whose seizure threshold are not reached by routine stresses and trauma.
Objectives: To identify the cause of partial seizure and to clarify the association of these causes and age of the patients.
Material and Methods: A prospective cohort study, we take all patient referred for neurological consultation in Al- Kahdemyia Teaching Hospital, Baghdad Teaching Hospital & Al- Yarrnok Teaching Hospital for the period from (November 2013-May 2015).
The patients with partial seizure and partial with seconda1y generalized epilepsy were enrolled in this study. This was secured through a detailed history, elaborate examination, generalized and of the nervous system, 106 patients who presented with partial seizure, the age of them ranged between 6-73 years, 52 males and 54 females.
Result: The abnormal neuroimaging occurred in (61%) of patients. Tumors occurred in about (19.7%) of patients most of them below 40 years of age while infractions is about (25.5%) of patients above this age.
(83.7 %) of CPS patients had temporal lobe foci and (16.2%) in frontal lobe, while (49%) of SPS patients had frontal lobe foci, (22%) frontoparietal and (13%) had partial lobe foci.
(75.4%) of patients with SPS and (35.1%) with CPS had brain lesion.
Conclusion: Infraction is common cause of partial seizure in patients above the age of 40 and below this age was a tumor.
Partial seizure is associating mostly with brain lesion.
Incidence of brain lesion (structural) was decrease in association with long duration of partial epilepsy.

Keywords: Partial epilepsy, partial seizure, SPS, CPS, brain lesion.

Introduction

In contemporary society, the Frequency and impo11ance of epilepsy can hardly overstated.

Epiepsy can be defined as an intermittent derangement of then nervous system due to "an excessive and disorderly discharged of cerebral nervous tissue on muscles". This was postulatein1870, of Hughlings Jackson. [The Eminent British Neurologyist], and modem electro physiology offers no evidence to the contrary.

The word epilepsy was derived from Greek words meanings" To seizure upon" or a" Taking hold of". Our predecessors referred to it as the "Falling sickness" or the falling evil(1).

Partial (focal or localization related) epilepsy the most common seizure disorder encountered in patients with epilepsy. These seizure are focal at onset that is emanating from localized region of the brain. Patient with partial epilepsy may have seizures that are refractory to AED mediation. The financial burden for these patients includes the cost of medical care and often the loss of employment.(2)Seizure is a paroxy small event due to abnormal, excessive, hyper synchronus discharge from an aggregate of central nervous system(CNS) neurons. Approximately 5-10% of population will have atleast one seizure during their lifetime, with highest incidence occurring in early childhood and late adulthood. (3) Epilepsy a group of disorders characterized by recurrent seizure.(4)

Intracellular recordings show bursts of rapid action potential firing, with reduction of the transmembrane potential (Paroxysmal depolarization shift).It is likely that both reduction in inhibitory systems and excessive excitation play a pan in the genesis at seizure activity.

Cells undergoing repetitive epileptic discharges undergo morphological and physiological changes which make them more likely to produce subsequent abnormal discharges (Kindling) (6).

In partial seizure there is paroxysmal depolarization of membrane of a local group of neurons, which correspond stem porally to the finding of a focal spike and wave complex on the EEG. (7-9.)

Focal seizure may spread from one lobe to another or from one hemisphere to another via association and commissural fibers, or it may spread via projection fiber to the thalamus and there by become generalized seizure, the focal symptoms are called an aura and provide evidence of the site of seizure origin (11). Seizure threshold: The point at which a seizure will occur. For every person there is a stimulus or combination of stimuli that may elicit the seizure. People are considered free of epilepsy when there seizure threshold has not reached by routine stresses and trauma. (12) Certain structural and metabolic abnormalities in the brain will predictably lower the epilepsy threshold. (13) The data from several studies suggest that there is a small increase in the incidence of epilepsy in family members patients with partial on set seizure and these are not inherited in a Mandelian fashion. It appears that increase inpa1iialon set seizure be best explained by inheritance of a greater susceptibility to epilepsy. The mechanism of it is not yet known. May be related to alteration in the extent of glial cell proliferation, which respond to cortical injury. (14)

Pathologic Possibilities:

Patients presenting with PSs who are under 20 years of age are not likely to have an anatomically progressive focal lesion (15).Seizures before the age of 20 years are rarely associated with tumours (16). If the patient is between 20-30 y of age the risk of a Progressive lesions goes up slightly (17). From 30 to 60 years, the incidence of primary brain tumor peaks (18)., reaching approximately 15 percent in patients with PSs. After the age of 60, the incidence of tumours starts to fall off again as a vascular cause becomes more likely (19-22).

P.E may represent a clinical sign due to ischemic cerebrovascular disease (23). Incidence of mild brain injuries was 4 times high in patients with PE (23,-25). Approximately 30% of patients with PE have mass lesions like neoplasms or vascularmal formations as the cause of their seizure disorders (26). Aura (the functional onset of seizure activity before an alteration in consciousness) occur in more than 50% of patients with CPS, which may be useful in localizing the onset of seizure (27).Unilateral automatism, head version, tonic phenomena, dystonic posturing, unilateral grimacing, post-ictal paresis and unilateral clonic movements and forced vision manifested by maximal deviation of the head, neck and trunk are a reliable indicators of the lateralization of the onset of seizure in patient with PE (28-31)

The incidence of structural abnormalities was higher with increasing age of the onset of seizure and declined with long duration of hi story of epilepsy (32). About epileptogenic foci, related to the brain lobes, reveal that 22.5%. Frontal, 42.5% central sensori -motor , 27% temporal, 5.6% fronto-temporal and 6.3% parietal and other posterior co11ex (33).The evaluation of the patients with a probable PS includes a variety of diagnostic and clinical evaluation in addition to the history and physical neurological examination. These include EEG and neuro- imaging pictures.

The most common ly used as a diagnostic test in assessment of patients with PE(34,35).A yield between 60 and 93percent has been claimed forth is procedure when multiple recordings are used or when recordings are made after24 hours period of sleep deprivation (41, 42). Sphenoidal electrodes both the anterior and

Posterior ones improve the yield in patients with mesial temporal sclerosis who seroutine EEG are normal (36, 37). Because of the limitation so finterracial EEG recording, prolonged monitoring can be performed and correlated with the video - recorded seizure (38, 39),a normal interictal wake and sleep EEG does not exclude a PS disorders, and may also be false positive.(2)

Patients and Methods

We take all patient referred for neurological consultation in Al- Kahdemyia Teaching Hospital Baghdad Teaching Hospital & Al- Yarrnok Teaching Hospital for the period from (November 20013-May 2015).The patients with partial seizure and partial with seconda1y generalized epilepsy were enrolled in this study; this was secured through a detailed history, elaborate examination, generalized and of the nervous system. All patients were evaluated by an interview questioner from patient them self or their relatives. Those patient were examined, investigated and treated by a senior (neurologist) in the above mentioned centers. The patients were examined clinically to look for any neurological deficits and checking for other systems of the body and define any abnormality specially patients with cerebrovascular disease and tumor. All patients had 16 channel EEG recordings (by use of Nihon Kohden Corporation : 432 l F), some times more than one recording is needed with emphasis on activating procedure like hyperventilation, Each recording is for 20 minutes . Some of the EEGs were done in a private clinics; quality control over the recordings was exercised heavily. All patients had neuroimagings like brain spiral CT (Somatotom Plus 4- Siemens, Version C l OB) with and without contrast when needed. MRI (Gyroscan NT 1.5 tesla power. Philips Medical System) was done in patients with no abnormalities revealed by CT and also for the patients with suspicion of tumours or a11eriovenous malformation. All these nueroimagings were done and reported by radiologists of the centers mentioned above .Other investigations, like blood sugar, blood urea, electrolytes, and complete blood picture were done.

Results

One hundred six patients were collected from those who visited neurological department of Al-Yarmok teaching hospital, Al-Kadhemia teaching hospital /Baghdad Teaching Hospital with symptoms and sign goes with pm1ial epilepsy. The age of the patients ranged between 6-73y. 52 males & 54 females as shown in table below.

Table 1: Demographic data (age, sex) of the patients

Age	Number of the patients	Male	Female
6-15	23	10	13
16-25	22 I	12	10
26-35	20	9	1 I
36-45	8	3	5
46-55	10	6	4
56-65	15	7	8
66-75	8	5	3
Total	106	52	54

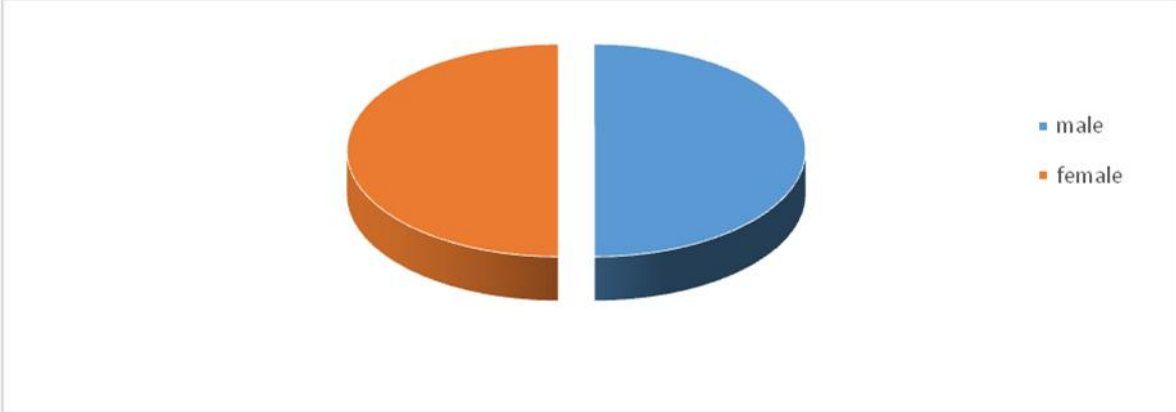

Figure (1) : Demographic data (Sex) of the patients

5patients had abnormal neuro-imaging study & these abnormalities consisted with brain abscess all of them were proved by surgical exploration & histopathological examination. 3 of them at age of 26, 30, 35 age while1patient at 14y of age while other at 55y as showed by table (2) and figure (2).

Table 2Types of lesion in relation to age:

Age	No. of all patient	"brain abscess	Hemorrhaage	.infractions	Temporal Sclerosis	Encephalitis	Tumors	No. Of pt. with Lesion
6-15	23	11		11	11			33
16-25	222			22	33		22	7
26-35	220	33		55	22	11	66	117
36-45	88		11	22			55	88
46-55	110			44		11	22	77
56-65	115	11	11	99			44	115
66-75	88		22	44			22	88
TTotal	1106	55	44	227	6	22	221	665

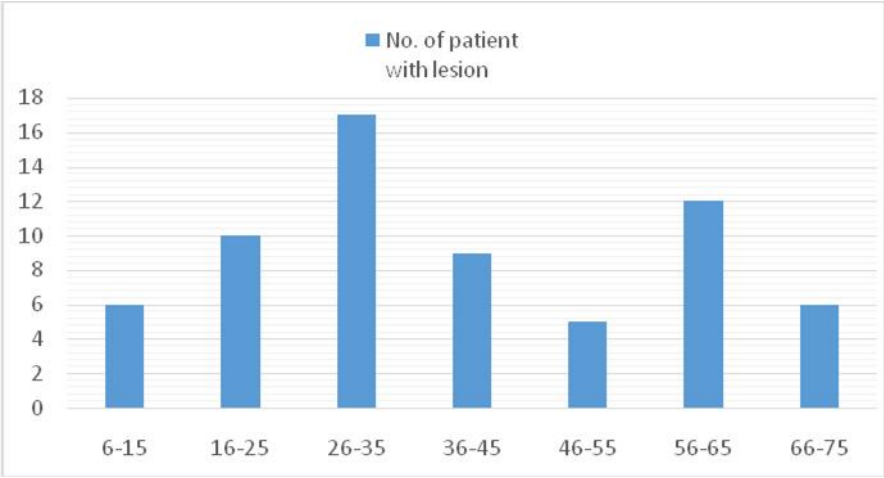

Figure (2) The distribution of patients with lesion according to age

Twenty one patients had abnormalities on CT & MRI revealed neoplasm 3 of them diagnosed as maningioma, 16 patients glioma, 2 patients with cystic tumor mostly astrocytoma. Two of above patients are below age of 25y while the others are above this age. Neuro-imaging study revealed intra-cerebral hemorrhage in 4 of our patients, one patient at age of 40 other at age of 62) ear while 2 patient at 70y of age. We find that 6 patients presented with complex partial. They gave history of febrile convulsions in early childhood. All of them the MRI revealed mesialtemperal sclerosis. One patient at age below 5y 3 patients between 16-25y of age and 2 patients at age of 33 year and 35 year.

About 27 patients. their neuro-imaging revealed infraction, three of them had cortical in fraction with dotts of hemorrhage due to sinus venous thrombosis as a complication of meningitis (TB meningitis confirmed by CSF examination) both of them between the age of 16-25y , while one patient had a history of neurobrucellosis at age of 15y . Nineteen patients with infarction at age above age 45 year, while 5 patients between 26-35y.Two patient , one at age of 25y, the other al age of 50 year complained of abnormal behavior with attack of loss of consciousness and fever CSF go with viral meningitis and MRI revealed area of hyper intense lesion in brain, so those patients were diagnosed as meningo-encephalitis. In 65(61%) patients the neuro-imaging study (MRI & CT) was abnormal , while 41(39%) patients no lesion can be defined as in table (3) and figure (3).From those patients without apperant brain lesion on neuroimaging and no focal signs in examination had a history of head injuries before the onset of seizure at variable times.

Table 3: Neuro-imaging study in 106 patients with partial seizure

Neuroimaging study	Patient No.	%
Abnormal	65	61
Normal	41	39
Total	106	100%

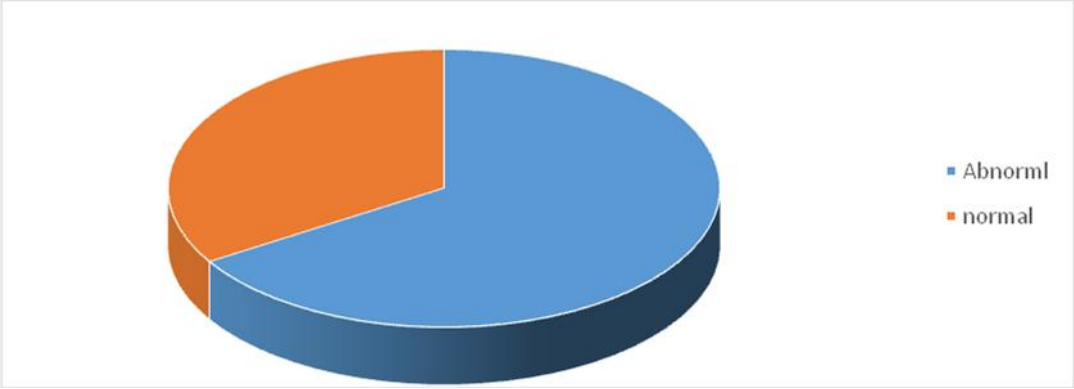

Figure (3): Neuro-imaging study in 106 patients with partial seizure

Sixty five patients with partial epilepsy had lesions that were revealed on MRI & CT 2 1(32%) patients with tumors: 16 patients with glioma, 3 patient, with maningioma, 2 patients with cystic tumor, both of them had astrocytoma. Twenty seven (42%) patients complained of infraction, 4 (6%). patients had intra-cerebral hemorrhage. Other lesion included brain abscess is 5 (8%) patients. Encephalities occurred in 2 (3%) patients, while 6 patients (9%) had mesial temporal sclerosis see table (4) and figure (4).

Table 4: Frequency of lesions in PE.

Lesion	Patient no.	%	% of the lesion from all patients (106)
Infraction	27	42	25.5
Tumor	21	32	19.8
Temporal sclerosis	6	9	5.7
Brain abscess	5	8	4.7
Hemorrhage	4	6	3.8
Encephalitis	2	3	1.9
Total	65	100%	(60.9%)

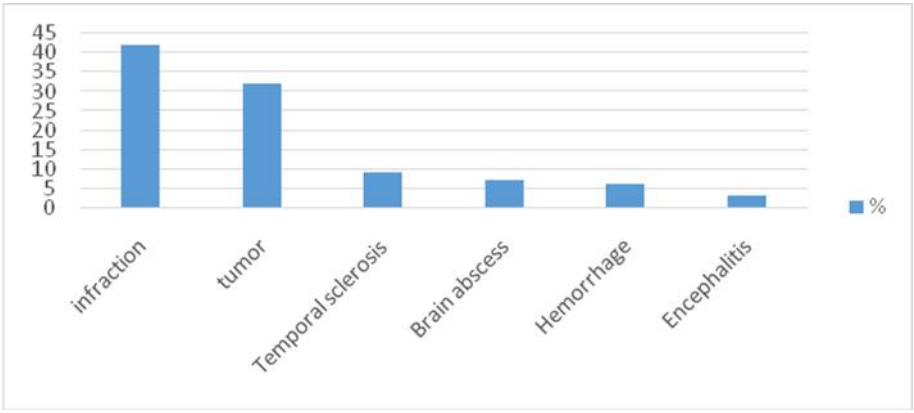

Figure (4) Show the frequency of lesions in PE

The patients that presented with simple partial seizure are 16 (15.1%) while 19 (17.9o/o) patients complained of complex- partial seizure. Secondary Generalization occurred in 71 patients (67%) as shown in table (5) and figure (5). About 56 (52.8%) patients complained of headache especially in patients with space occupying lesion and in those with infection and intracerebral hemorrhage and in patients with temporal epilepsy at the same side of brain lesion.

Table 5: Types of partial seizure

Types of seizure	Number of patient	%
Simple partial	16	15.1
Complex partial	19	179
Secondary G.T.C	71	67
Total	106	

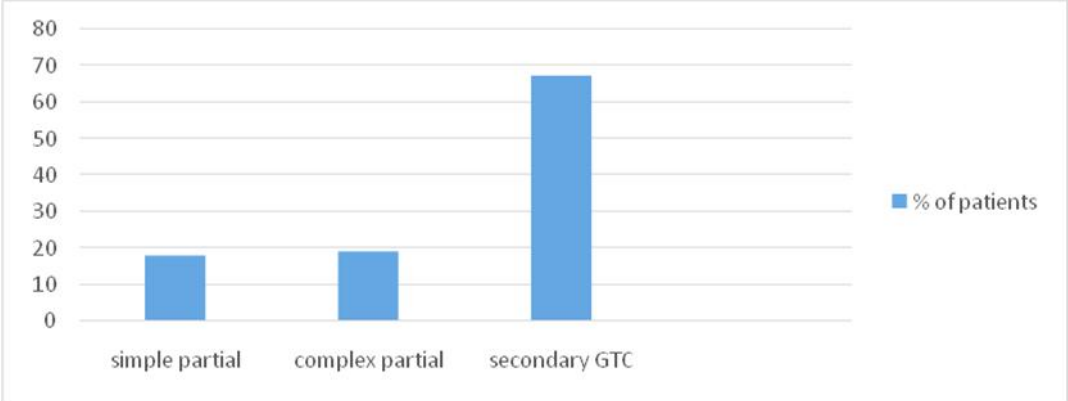

Figure (5) Show the types of partial seizure

In our study we found that there are 19 patients who had a history of febrile convulsions in childhood, 5 (26%) of them had focal area at fronto-parietal area while 14 (74%) patients had focal area of epilepsy at temporal lobe. In those patients focal area of epilepsy at temporal lobe had a changes in MRI go with mesial temporal sclerosis in 6 (32%) patients see table (6) and figure (6).

Table6: febrile convulsion in association with area of partial seizure

Focal lesion	No. of patient with fibrile convulsion	%
Fronto-parietal	5	26.3
Temporal (Mesialsclerosis)	14 (6)	73.6 (32)
Total	19	

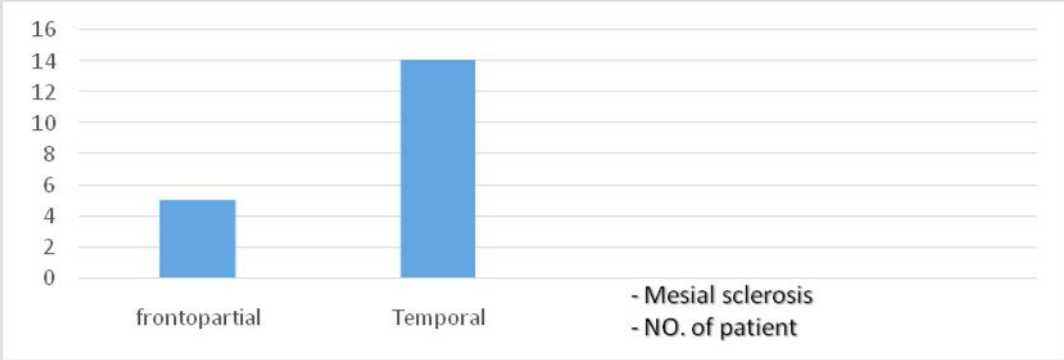

Figure (6) reveal febrile convulsion in association with area of partial seizure

About 30 patients had a history of epilepsy in their family, 18(60%) of patients had family history of G.T.C epilepsy while12 patients (40%) had a history of partial epilepsy in their family. From those patient with family history of epilepsy they had a history of febrile convulsion in 16 (53%) patients.

Table 7: Types of seizure and brain foci

Type of seizure		Brain area of foci	No. of patient	%
Complex partial	37	Temporal	31	83.7
		Frontal	6	16.2
Simple partial	69	Frontal	34	49
		Parietal	13	19
		Pronto-parietal	22	132
Total	106			

The number of patients who have complex partial seizures were 37, in 31 (83.7%) patients the lesions or foci of epilepsy were in temporal lobe while 6(16%) patients had them in frontal lobe, while the number of patients with simple partial epilepsy was 69. In 34 (49%) patients the foci were in frontal lobe and 13 (19%) patients had foci in parietal area while in 22 (32%) patients the foci occur at fronto-parietal area , as shown in table (7) and figure (7 a, b).

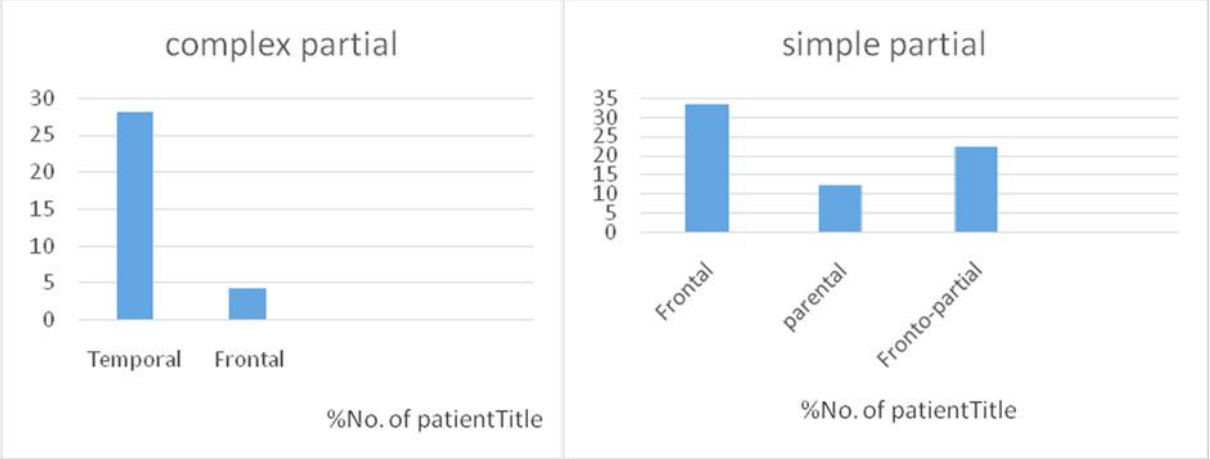

Figure (7a, b) Show types of seizure and brain foci

Association of simple partial seizure and complex partial seizure with brain lesion : neuro-imaging in patients with SPS revealed lesion in about 52 (75.3%) patient from 69 patients, while there are lesions in 13 (35.1%) patients complained from complex partial epilepsy see table (8) and figure (8).

Table 8 : partial seizure and brain structural lesions :

Types of seizure	No. of patient	Associated brain lesion	% of brain lesion
Simple partial	69	52	75.4
Complex partial	37	13	35.1
Total	106	65	

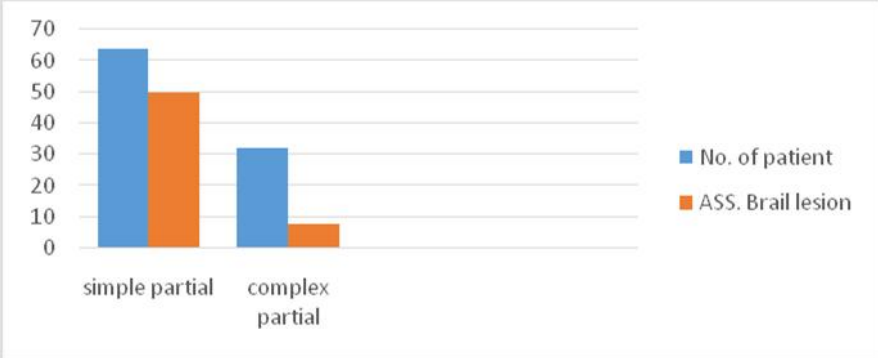

Figure (8) show the partial seizure and brain structural lesion

Relationship between partial seizures duration and abnormal neuro-imaging. We found that when there is a long duration of epilepsy the abnormalities on neuro-imaging or structural brain abnormalities decrease as shown in table (9) and figure (9)

Table 9: Duration of epilepsy andbrain lesions

Duration of epilepsy	No. of patients	Abnormal MRI and *I* or CT	%
Less than 1yr	43	35	81.4
1-2yr	24	17	70.8
3-5yr	16	7	43.8
>5yr.	23	6	26.1
Total	106	65	

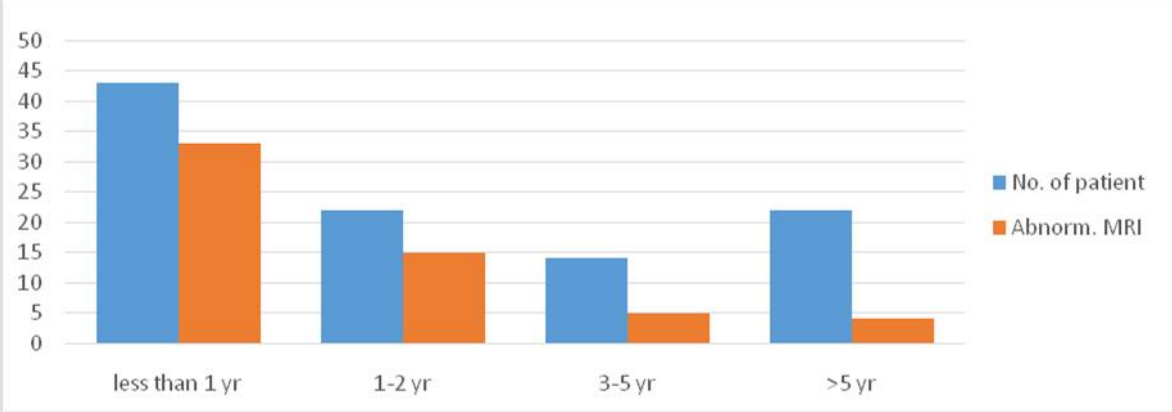

Figure (9) Show the duration of epilepsy and brain lesion

Discussion

In our study there are 65 (61%) patients with partial epilepsy had abnormal neuro-imaging (CT and MRI), while there are no abnormalities in about 41 (39%) patients. These results are slightly more than previous (23-55%) reported studies [40,41].

This may be attributed to that our study was hospital based and more stringent inclusion of patients in this study. Cerebral vascular accidents or diseases as a cause of partial epilepsy was found in about 27 (25.5%) patients and mostly at age above 40 yr. which is more than previous studies [25, 37, 42] which revealed that the percentage of vascular disease as a cause of partial seizure is 18%.While the incidence of tumour as a cause of partial epilepsy was found in about 21 (19.7%) patients and most of them are under the age at 40 years in comparison with 20% in previous reported studies [29, 30, 43] and more than percentage reported in other studies (4-12%) [29, 30, 32, 44].

Which can be explained by the nature of our study which 1s a prospective nature with particular attention to find the cause of the partial epilepsy in our patient and we collected the patient that visited our hospitals complained of partial epilepsy only. We found that the patients complained of simple partial seizure were 69 (65%) while 37 (35%) patients complained of complex partial seizure these results comparable previous reported study [32]

56 (52.8%) patients complained of headache most of them associated brain lesions, and temporal lobe epilepsy in whom occur at the same side of focal area. These results are in keeping with other reported study [49] in which about 47% of PE had (per ictal). headache 2/3 with temporal lobe usually epsilateral and Y2 with extra temporal lobe epilepsy. There is highly association of structural abnormality in brain&SPS occurred in about 52 (75.3%» as opposed to 13(35.1%) pt. CPS , our figures are comparable (48-71%) of previous reports [44, 47, 48].

About febrile convulsion .we found there is increasing m its incidence with temporal epilepsy especially mesial temporal sclerosis (32%) which was less than 48% of previous reports. Which may be attributed to many patient may be misdiagnosed by radiology & there is no relations between a degree of sclerosis & atrophy in MR1 & history of seizure[56]. These changes may occur in individual that never had seizure [50]. In other study, the identification of mesial sclerosis was incidental by MRI & was but significant needs investigation [51].

From our result there is (60%) of patients with SPE & (40%) patients with Complex PE had family history of epilepsy this result also was reported by other several studies [14], that suggest an increase in the incidence of epilepsy in family members of patient with PE. There are 16 (53%) patient had febrile convulsion also had a family history of epilepsy. This result also corresponding to previous reports[15]that genetic propensity for seizure may expressed early by occurrence of febrile convulsion. Most foci in patients with complex partial epilepsy occurred at temporal lobe (92%) & (18%) at Frontal lobe while in patient with SPE most foci are in Frontal (34%) , then fronto- parietal (22%) and last parietal lobe (1 3%) . These result arc comparable with previous reported studies [2] revealed 80% of CPE are of temporal lobe while most extra- temporal epilepsy emenate from the frontal lobe. We noticed that when there is prolonged duration of epilepsy the incidence of structural abnormalities of brain lesions decreased while when there is short duration , neuro-imaging abnormalities will increased these resu1t were corresponding to previous reported study [31, 45, 47]

Conclusion

Most patients with partial seizure are associating with abnormal neuro-imaging study, most causes of partial seizure above age of 40 are cerebral vascular associated while below this age are Tumors.In high percentage or patients with SPE the frontal lobe was responsible for epilepsy while in CPE was temporal lobe.There is association between febrile convulsions & temporal lobe epilepsy especially temporal sclerosis and epilepsy.When there is long duration of epilepsy incidence or brain lesion (structural) was decrease . There is high association between febrile convulsion and family history of epilepsy.

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