

**The Patterns of Clinical Presentation, risk, and predictive Factors of Epilepsy in Early Stroke in adult Sudanese Patients admitted to Neurology Center, Khartoum, Sudan**

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**Abstract:** Background: Seizures and Epilepsy is a common disease in elderly patients particularly if associated with stroke. A High proportion 25% of new seizures occurs in individuals over the age of 65years. The causes and clinical manifestations of seizures and epilepsy differ in the age group and affect the diagnostic approach. Cerebrovascular disease is the most common known cause of epilepsy in elderly representing one third to one half of cases. Aim: To determine the patterns risk and predictive factors of epilepsy in early stroke in adult Sudanese patients. Material and methods: This prospective cross-sectional study had been conducted at the National Center for Neurological Sciences in Khartoum, during the period from June 2009 to June 2011. All the patients with age >16 years attending the NCNS during the above mentioned period and diagnosed as having stroke, were included. Results: The most affected age group with stroke, is ranging between 61-70 years. In the present study the risk factors among the 20 patients with epilepsy in early stroke: hypertension, diabetes mellitus and hyperlipidemia was found in 40%; 30% and 20% respectively. hypokalaemia was found in 11 patients (55%). Conclusions: Early onset seizures are a frequent and important complication in acute stroke, with a poor short-term prognosis. The females were predominating. The most affected age group was ranging between 61-70 years, hypertension was found to be the commonest risk factor. Seizures were encountered mainly in cerebral haemorrhage.

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**Key words:** Epilepsy, elderly, stroke, seizures, Sudan

### Introduction

Seizures and Epilepsy is a common disease in elderly patients particularly if associated with stroke [1, 2]. Hence, comes the importance of handling such problem. A High proportion 25% of new seizures occurs in individuals over the age of 65years [3]. And nearly 25percent of all persons with epilepsy are elderly. The causes and clinical manifestations of seizures and epilepsy differ in the age group and affect the diagnostic approach [4-10]. Treatment issues are complicated in elderly patients. [11]. Finally there are significant implications of a seizure diagnosis in the older people already vulnerable to loss of independence, driving restrictions, impaired self-confidence and risk of falls which result in physical injury and other sequale which contribute to lower health related quality of life compared to seniors without epilepsy [12].

Cerebrovascular disease is the most common known cause of epilepsy in elderly representing one third to one-half of cases [13]. Approximately 35percent of individuals with acute stroke related

seizures will develop post stroke epilepsy compared with an overall 5to9 percent risk of post stroke epilepsy. [13] As proposed by the international League against epilepsy (ILAE) [14] and the international Bureau for Epilepsy (IBE)2005. Epilepsy is defined as a brain disorder characterized by and enduring predisposition to generate epileptic seizures [15] and by the neurobiological cognitive, psychological and social consequences of this condition. [16, 17].

Traditionally, the diagnosis of epilepsy requires the occurrence of at least 2 unprovoked seizures 24 hours apart. [12, 19, 20]. Some clinicians are also diagnosing epilepsy when one unprovoked seizures occur in the setting of interictal discharge. [18--20]. Seizures are the manifestation of abnormal hyper synchronous discharge [20].

The clinical signs or symptoms of seizures depend on the localization of the epileptic discharges in the cortex and the extend and patterns of propagation of the epileptic discharge in the brain. [21] Those seizures are a common, nonspecific

manifestation of neurologic injury and disease should not be surprising because the main function of the brain is the transmission of electrical impulses [22]. The life time likelihood of experiencing at least one epileptic seizure is about 9% and of receiving a diagnosis of epilepsy is almost 3% however, the prevalence of active epilepsy is only about 0.8%. [22].

### Materials and Methods

This is a prospective cross-sectional study, that had been conducted at the National Center for Neurological Sciences at Khartoum, during the period from June 2009 to June 2011. All the patients with age >16 years attending the NCNS during the above mentioned period and diagnosed as having stroke, were included. The total number of admitted patients was 117, 20 of them were presented with seizures as a first time after stroke (SFS), in the first two weeks of the event. Clinical and demographic data were obtained from the patients and their relatives, using structural predesigned questionnaire. The diagnosis was confirmed using brain imaging. CT brain to exclude haemorrhage, MRI brain T1-T2 weighted and fluid attenuated inversion recovery (FLAIR), diffusion weighted image (DWI) to detect early infarction, magnetic resonance angiography MRA, MRV magnetic resonance venography when venous infarction or haemorrhage is suspected. Doppler carotid, ECG and Echocardiography were performed to exclude cardiac causes of stroke. EEG was performed to identify the epileptogenic background activity and types of seizures. Full blood count and electrolytes were done.

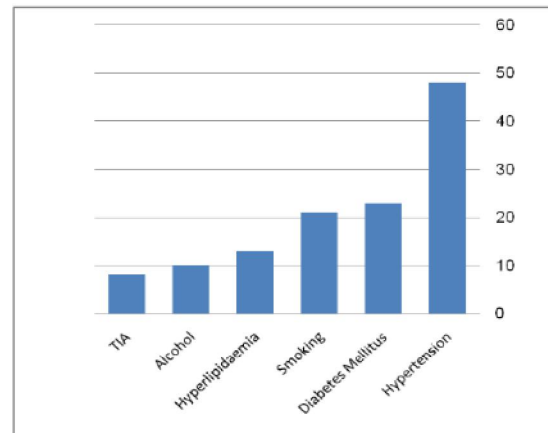
The data was been analysed using statistical package program for social sciences SPSS, with the *P* value of <0.05 was considered statistically significant.

Written and verbal consent from each patient were obtained. Periodically the patients were been under medical care by the senior neurologist at the neurology outpatient clinic. The study was approved by the Ethical committee of the graduate study board of Sudan Medical Speciation Board, Khartoum, Sudan

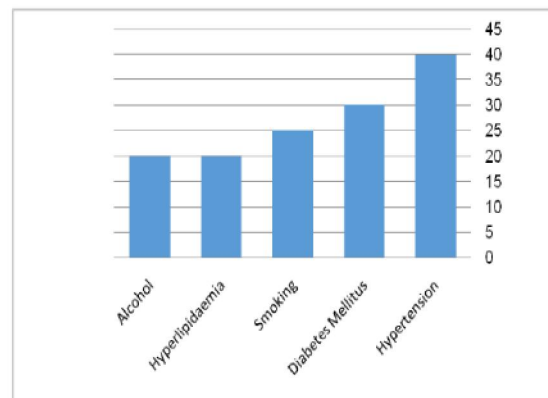
### 3. Results

In the present study, 117 stroke patients were included. Sex distribution of studied material showed that, 58% were female, with female to male ratio is 1.4:1. The most affected age group with stroke, is ranging between 61-70 years, which constituting 32.5%, followed by the age group 71-80 years, in 23.2%. Early onset seizure occurred in 20 patients (17%). The most affected age group of the patients with epilepsy in early stroke was ranging between 61-70 years in 30%. The risk factors amongst 117 patients with stroke were presented in Fig. (1) In the present study the risk factors among the 20 patients

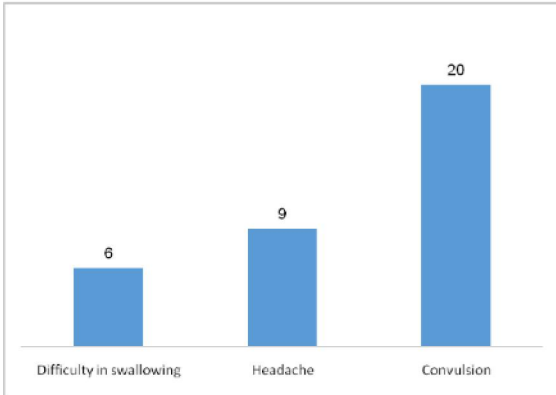
with epilepsy in early stroke: hypertension, diabetes Mellitus and hyperlipidemia was found in 40%; 30% and 20% respectively. Smoking and alcohol was 25% and 20% orderly Fig (2). Speech disorder among the 20 patients with epilepsy in early stroke was observed in 11 patients as follow: Global aphasia was found in 6 patients (30%), Dysarthria was found in 4 patients (20%), motor aphasia was found in 1 patient (5%). The presenting Symptoms of the 20 Sudanese patients with epilepsy in early stroke were displayed in Fig. (3) In addition to this motor dysfunction showed that, Hemiplegia was found in 13 patients (45%), hemiparesis was found in 5 patients (25%), monoplegia was found in 2 patients (10%).



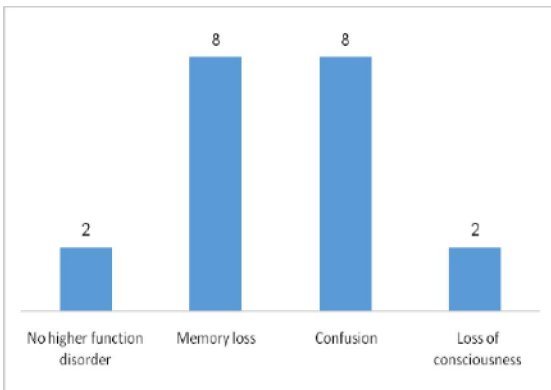
**Fig. 1:** The horizontal line shows the risk factors in patients with stroke, while the vertical line show the percentage, hypertension represent the commonest risk factors with frequency of 55 percent, followed by DM in 30 percent, smoking in 25 percent, hyperlipidaemia, alcohol in 20 percent and past history of TIA in 9 percent.



**Fig. 2:** Shows the risk factors in 20 Sudanese patients with epilepsy in early stroke. The horizontal line shows the risk factors in patients with stroke, while the vertical line show the percentage, hypertension represent the commonest risk factors with frequency of 55 percent, followed by DM in 30 percent, smoking in 25 percent, hyperlipidaemia, alcohol in 20 percent.



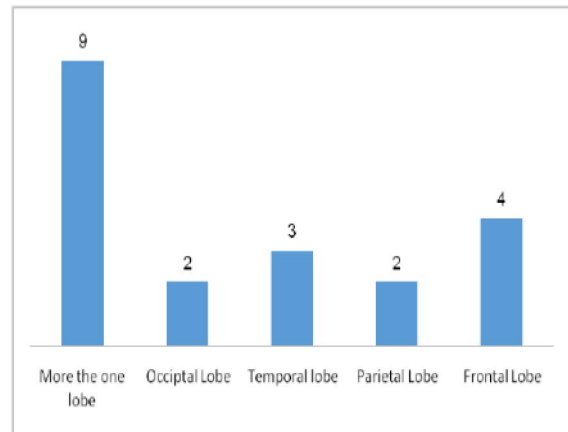
**Fig. 3:** Shows the common presenting symptoms in 20 Sudanese patients with epilepsy in early stroke, the horizontal line show the symptoms and the vertical line shows the number of the patients, convulsions occurs in all patient (20), while headache was found in 9 patients and difficulty in swallowing in 6 patients.



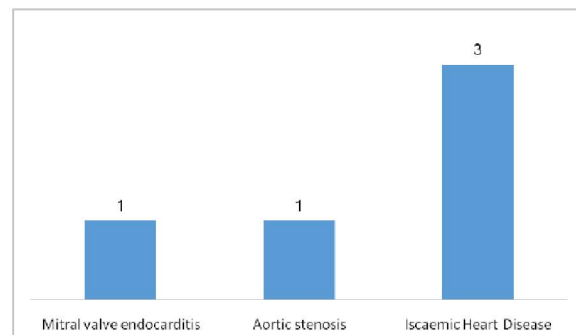
**Fig. 4:** Shows the higher function symptoms in 20 Sudanese patients with epilepsy in early stroke, the horizontal line shows the symptoms and the vertical line shows the number of the patients, confusion and memory loss occurs in 8 patients, loss of consciousness occurs in 2 patients, while normal higher function observed in 2 patients.

The higher function disorder (Confusion, memory loss, and Loss of consciousness) were detected in 40%, 40% and 10% of the patients respectively. Fig. (4) The findings of electrolytes in the 20 Sudanese patients with epilepsy in early stroke revealed that, hypokalaemia was found in 11 patients (55%), hypocalcaemia was found in 3 patients (15%) and hyponatremia was found in 1 patient (5%). In the present study, the results of the brain imaging in the 20 Sudanese patients with epilepsy in early stroke showed that, ischemia was found in 9 patients (45%), Cerebral hemorrhage was found in 11 patients (55%). Site of the lesion showed that, Frontal lobe was detected in 20%, parietal lobe in 10%, temporal lobe in 15%, occipital lobe in 10%, and combined lobes in 45%. Middle cerebral artery affection was found in 4

patients (20%), anterior cerebral artery involvement was found in 2 patients (10%). posterior cerebral artery occlusion was found in 1 patient (5%) with multiple infarctions. According to the type of hemorrhage, extensive hemorrhage was encountered in 40% of the patients. Fig (5) Moreover, generalized tonic clonic was found in 11 patients (55%), Simple partial was found in 6 patients (30%) and Complex partial was found in 3 patients (15%). The Echo finding showed that, ischemic heart disease feature was detected in 3 patients (15%), Aortic stenosis was in 1 patient (5%) patient, Mitral valve endocarditis in 1 patient (5%). Fig. (6) The findings of the ECG changes indicated that the atrial fibrillation, Left ventricular hypertrophy, and Ventricular ectopic was found 10%, 15%, and 15% respectively. Fig (7).



**Fig. 5:** Shows the site of the lesions in MRI brain, the horizontal line show the site of the lesions and the vertical line shows the number of the patients, frontal lobe involvement in four patients, temporal lobe in 3 patients, parietal lobe in 2 patients, occipital in 2 patients and combined lobe affections in 9 patients.



**Fig. 6:** Shows Echocardiographic findings in 20 Sudanese patients with epilepsy in early stroke, the horizontal line show the cardiac abnormalities while the vertical line shows the number of the patients, ischemic heart disease was detected in 3 patients, aortic stenosis in one patient and mitral valve endocarditis in one patient.

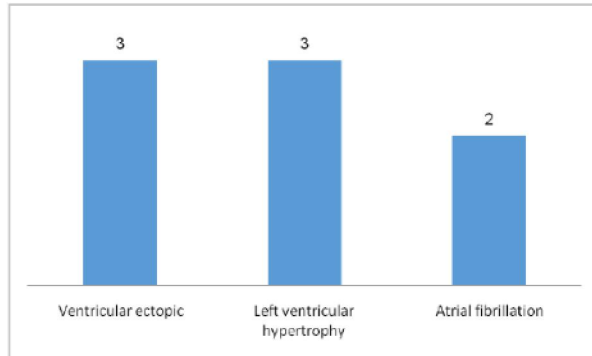


Fig. 7: Shows ECG findings in 20 Sudanese patients with epilepsy in early stroke, the horizontal line show the ECG findings while the vertical line shows the number of the patients, left ventricular hypertrophy and ventricular ectopics occurs in 3 patients for each. While atrial fibrillation in 2 patients.

#### 4. Discussion

This is not the first study to be done in Sudan to identify the patterns of epilepsy in early stroke, there was a previous study done in 2008<sup>(4)</sup> which showed a percentage of 12.7% of post stroke seizure. In this study, epilepsy in early stroke occurred in 17% of patients and this is comparable to study done in Sudan and higher than study done in Turkey (5) which showed 9% of epilepsy in early stroke. Epilepsy and stroke can precede or follow each other. (12) In this study female were found to be predominate in ratio of 1.4:1 in the patients presented with stroke we may attributed this to the high number of female in our population while male were found to predominate in ratio of 1.2:1 in the patients presented with epilepsy in early strokes. This is comparable to study done in Turkey (5) and in Egypt (3) were the male: female ratio was 1.2:1. In this study the most common affected age-group was from (61-70) years (30%) followed by those in the age group (31-40) years and this was comparable to study done in Egypt (3) the median age was 63. The commonest risk factor in this study was hypertension in (40%) followed by DM in (30%), smoking in (25%) hyperlipidemia in (20%) and Alcohol in (20%) these were comparable with study done in Seraivo<sup>(6)</sup> were diabetes found in 55% and in Canada<sup>(7)</sup> they found hypertension in 74%, diabetes in 26% and smoking in 34% but in Canada hyperlipidemia was found in 82% of patients and this may be due to the differences in life style. Stroke sub types in this study were mainly ischemia which found in (79%) and hemorrhage found in (21%) while stroke types in those patients with epilepsy in early stroke was hemorrhage in (55%) which was the commonest in comparison with ischemia (45%) this runs in symmetry with Indian study<sup>(8)</sup>, were hemorrhage occurred in 15.4% and ischemia in 6.5% in patients

with early stroke. In this study headache was found to be the commonest symptom in (45%), followed by difficulty in swallowing in (30%) of patients. Hemiplegia was found to be the commonest motor dysfunction in 13 patients (45%) then hemiparesis in 5 patients (25%) and Monoplegia in two patients (10%).

Speech disorder in the study was observed in 11 patients mainly was global aphasia in 6 patients (30%), then Dysarthria in 4 patients (20%) motor aphasia in 1 patient (5%). In this study Confusion was found in eight patients (40%) and memory loss in eight patients (40%) followed by Loss of consciousness in 2 patients (10%) In addition to this hypokalemia was found to be the commonest electrolyte abnormality found in 11 patients (55%) this was compatible with study done in the USA<sup>(9)</sup> among patients with treated hypertension, those who have hypokalemia are at higher risk for ischemic and hemorrhagic stroke than those with normal serum potassium levels. Although hyponatremia is a known cause the study showed that it occurred in only (5%) of the patients. In this study cerebral hemorrhage represented the most MRI finding in 11 patients (55%) and Ischemia in 9 patients (45%) and this runs in symmetry with UK<sup>(10)</sup> study where hemorrhage was found in 0.6% and ischemia in 8.6%. In this study multiple lobar involvements occur in 45% and the frontal lobe represented the commonest affected lobe in 20% followed by temporal lobe in 15% and usually seizures tend to occur with extensive lobar affection. The findings of this study showed that, the middle cerebral artery was found to be affected in 4(20%) patients followed by anterior cerebral artery in 2(10%) patients and posterior cerebral artery in (5%) one patient. The clinical observations indicated that the generalized type of seizure was found in 11 patients (55%) followed by simple partial in 6 patients (30%) the least commonest was complex partial found in 3 patients (15%). This is comparable to previous study done in Sudan<sup>(4)</sup> and on contrast to study done in Turkey<sup>(5)</sup> in which simple partial seizures was found in 23(23.7%) patients and (2.1 %) had complex partial seizures 68 patients (70.1%) had secondary generalized seizures, 4 patients (4.1 %) had generalized seizures this difference is thought to be due to lack of awareness in Sudanese patients to secondarily generalized type of seizure. ECG findings in the present study were comparable to worldwide studies<sup>11</sup>.

Epilepsy in early stroke predominate in female and the most affected age group of studied material was ranging between 61-70 years, the risk factor, hypertension was found to be the commonest risk factor. Cerebral haemorrhage was encountered in 55% of the patients. Hypokalaemia was associated with ischemia and haemorrhage among treated

hypertensive patients. Combined lobes affection were found to be associated with the occurrence of epilepsy in Sudanese patients, with predominance of frontal lobe affection. The generalized seizures predominate the epilepsy subtypes in Sudanese patients.

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