Original Article

Frequency and Types of Seizures among Patients Presenting with Stroke

Muhammad Abas Khan[1] and Murad Ali[2]

ABSTRACT

Objective: To study the frequency and types of seizures among patients presenting with stroke.
Study Design: Descriptive Cross-sectional study.
Place and Duration of Study: This study was conducted at the Department of Medicine lady Reading Hospital Peshawar from January, 2020 to July, 2020 for a period of six months after approval of synopsis.
Materials and Methods: Data was collected by non-probability consecutive sampling technique. A total of 177 patients were included in the study. Patients with acute ischemic stroke and haemorrhagic stroke both genders and 20 years and above age were included in the study. The major resultant outcome measures were the occurrence of single or recurrent seizures and the occurrence of both early (within 2 weeks) and late (after 2 weeks) seizures were noted. Those patients who already were having history of seizures, those with sub-arachnoid hemorrhage and also those with intra-cerebral bleed were excluded from the study. Data were analysed using SPSS version 23.
Results: Among 177 patients, males were 96 (54.6%) and females were 81 (45.4%). The mean age was 63.47 ±11.62 years. Post stroke seizures were found in 33 (20.2%) patients with acute stroke. Among these, 16 (48.48%) were males and 17 (51.51%) were females, p value 0.276. Out of 177 patients 17(9.6%) had early seizures and 22 patients (12.4%) had late seizures.
Conclusion: post stroke seizures were found with increased frequency in patients with acute stroke

Key Words: Ischemic Stroke, haemorhagic stroke, Seizures, early seizures, late seizures

Citation of article: Khan MA, Ali M. Frequency and Types of Seizures among Patients Presenting with Stroke. Med Forum 2021;32(6):5-9.

INTRODUCTION

Stroke is the major cause of serious disability in adults and the third most common cause of death[1].The stroke burden is highest globally in developing world where urgent cost effective treatments are required[2]. While large population based studies on the incidence of stroke in Pakistan are lacking, it is estimated that each year 350,000 new strokes occur in the country[3]. Worldwide, ischemic stroke is found in 73% to 83% of cases while hemorrhagic stroke accounts for 8% to 18% patients[4]. Stroke is still a major cause of disability in young as well as old patients in Asia, and its mortality rates are rising[5].

Annually it is estimated that about 16 million first-ever strokes are occurring in the world, leading to a total death of 5.7 millions[6].

[1.] Department of Medicine, Mian Rashid Hussain Shaheed memorial Hospital Pabbi Nowshera, KPK.
[2.] Department of Medicine, Bacha Khan Medical College, MTI Mardan Medical Complex Mardan, KPK.

Correspondence: Dr. Muhammad Abas Khan, Medical Officer, Department of Medicine, Mian Rashid Hussain Shaheed memorial Hospital Pabbi Nowshera, KPK.
Contact No: 03439852289
Email: drabbaskhan83@gmail.com

Received: February, 2021
Accepted: March, 2021
Printed: June, 2021

The age-adjusted annual death rate from stroke in the USA is 116 per 100,000 populations and in the UK it is about 200 per 100000[7]. In the elderly population of the European countries, it was estimated as 2.700,000 prevalent cases and 536,000 incident cases every year[8]. Stroke is a global epidemic, and it is not a problem limited to high-income or western countries. Of all stroke deaths about 85% are registered in low- and middle-income countries, which is accounting for 87% of total losses due to stroke in terms of disability-adjusted life years (DALYS), calculated worldwide in 72 million per year[9-13].

According to the largest trial conducted rrecently, in Pakistan the prevalence of stroke is 6.4%[14]. Hypertension is the important and most common risk factor for all types of strokes. Research indicates that across WHO regions about 62% of strokes and 49 per cent of heart attacks are caused by high blood pressure[15]. Recent epidemiological studies from Oxford reveal that the stroke incidence is very similar to ischemic heart disease (IHD), and that contrary to common belief, stroke manifests at an age similar to that of IHD[16].

In addition, brain imaging studies revealed that "silent stroke" is 4-6 times more common as compared to overt stroke in older segments of the population[5]. These lesions are not just an epiphenomenon[6]. They have revealed an increase the risk of subsequent symptomatic stroke[5], and hence lead to cognitive decline[7] and dementia[17,18].

stroke can cause many complications. These complications include chest infection, aspiration pneumonia, dehydration, constipations, urinary ract infection, pulmonary embolism and deep vein thrombosis [19]. One of the many consequences of stroke is the development of post stroke seizures' seizures after stroke can be early or delayed. Early onset seizure is thought to occur due to cellular biochemical dysfunction, which leads to electrically excitable tissue. Late onset seizures are thought to be caused by gliosis. When a region of the brain tissue dies during a stroke, it degenerates into scar tissue which than acts as provocative irritant to the normal neurons leading to precipitation of a seizure[20].

Stroke is noted as the most common cause of seizures in the elderly population[13]. The Oxtordshire community stroke project (OCSP), which has examined the immediate and long term risk of seizures after first ever stroke with a minimal follow-up duration of two years in survivors of stroke, established that 11.5% of patients stroke were at risk of developing post stroke (that is, delayed) seizures by five years[14,] .

It was observed in one of the study that Stroke patients are having an overall 14% risk of seizures out of which 8% are developed within 14 days of stroke and 92% developed seizures after 14 days of Stroke[19]. Electroencephalography (EEG) which is not used in the routine workup of acute stroke, hence now a day latest neurodiagnostic technique for detecting epileptic activity, especially in the patients non-convulsive post-stroke epileptic activity are used [20].

Rationale: The current study has been designed to determine the frequency and types of seizures in our local population presenting with both ischemic and haemmorhegic stroke in contrast to previous study done only in patients presenting with ischemic stroke in lady Reading Hospital Peshawar by Adnan et al. Seizures are most serious complication of stroke and if attention is not paid can carry high morbidity and mortality among stroke patients. This study will definitely highlight the frequency of seizures among stroke population and also of its types whether early or late. we will compare The results of this study with local and internationally available data on seizures following stroke and if found to be significantly high than already available data than this study will provide a valuable reference for general physicians and neurologists to carry out further research on such problem in our local population.

MATERIALS AND METHODS

This descriptive study was being carried out from 5th January 2020 to 5th July 2020 at the Department of Medicine, Lady Reading Hospital (LRH), Peshawar. Non-probability consecutive sampling technique was used for the collection of data. Patients with acute stroke including both haemorrhagic and ischemic stroke of both genders of 20 years and above 20 years of age were included in the study. On the other hand, patients who had been previously diagnosed with epilepsy and those with hyponatremia, hypoglycemia, and hypocalcaemia were excluded. Sample size was 177 patients with acute stroke. It was calculated based on the 13% prevalence of seizures in stroke with 95% confidence level and 5% absolute precision. The study was carried out after approval from hospitals ethical and research committee. All patients who presented with stroke that is focal or global neurological deficit that lasted more than 24 hours and an area of hypo dense lesion (ischemic stroke) or hyper dense lesion (hemorrhagic stroke) revealed on CT brain were enrolled in the study through OPD and ER department and were than admitted for further evaluation in the medical A ward lady Reading Hospital Peshawar. CT scan of brain was done in Lady Reading Hospital Peshawar.All other relevant investigations (blood sugar level, lipid profile, serum creatinine, complete blood count, erythrocyte sedimentation rate and serum electrolytes) were carried out in hospital laboratory of LRH, Peshawar. Seizures was defined as an abnormal electrical discharge in the brain which manifested as episodic impairment in brain activity which can be diagnosed by patients complaining any one of the following. loss of consciousness as diagnosed by history. Abnormal motor phenomena which are noticed in the patient as jerky movements called fits. Sensory disruption of autonomic nervous system which are noted in the patient as paresthesias and flashing of lights in vision, disturbance of atonomic nervous system or hallucinations as noticed by history and clinical examination. Early post stroke seizure was defined as seizures that occurred within 2 weeks of stroke and late post stroke seizure were defined as seizures that occurred after 2 weeks to 3 months duration following stroke for assessing of conscious level Glasgow coma scale was calculated. Examination of motor and sensory systems and cranial nerves were carried out in detail. All the patients were explained the purpose and benefits of the study and a written informed consent was than obtained. Confounders were than excluded to eliminate bias in the study results. All patients were told to immediately report to the OPD When any seizure activity has occurred and also all patients were followed on weekly basis in the OPD to detect seizures. Once detected the type of seizure was also be established as per early or late. All the follow up assessments were done under supervision of consultant physician. All information including name, gender, age and address were noted in a pre-designed proforma. Frequency of seizures were than calculated in enrolled patients. In patients having seizures, along with detailed history, EEGs (when available) and their previous medical records were checked, in order to know whether their seizures were previously diagnosed or not

that is to know whether previously epileptic or not. The time duration of seizures following stroke was determined in those with seizures. It was further grouped as early and late post stroke seizures. Collection of data was done through objective-oriented proforma. Analysis of data was one by using SPSS version 23. To analyse the data descriptive statistics were used. Percentages and frequencies were used for qualitative or categorical variables like frequency of seizures, gender, stroke presentation (first episode or recurrence) and seizures status (known or unknown). Mean and SD were calculated for numerical or quantitative variables like age and seizures duration. Chi square test was than applied for compare the frequency of seizures in both genders and between first episode and recurrent stroke. P value <0.05 was considered significant.

RESULTS

Among 177 patients presenting with acute stroke, there were 96 (54.6%) males and 81 (45.4%) females. Overall, age of the patients was ranging from 23 to 90 years (mean 63.47 ±11.62 years). However, age of the patients who had seizures ranged from 40 to 90 years (mean 66.18 ±11.91 years). Most of patients presenting with seizures were in the age group of 70-79 years followed by 60-69 years and 50-59 years respectively (details in Table 1). Patients presented from various districts of Khyber Pakhtunkhwa including Federally Administered Tribal Areas (FATA). Most of the patients belonged to District Peshawar 50 (28.25%) followed by FATA 40 (22.6%)than by Charsadda 35(19.77%), Nowshera 25(14.12%), Swabi 15(8.48%) and others 22(6.78%).

Table No.1: Types of Seizures

	Partial seizures	generalized tonic clinic seizures	Total
Early seizures <2 weeks	9(52.94%)	8(47.06%)	17(100%)
Late siezures > 2 weeks	15(68.18%)	7(31.8%)	22(100%)

Table No.2: Age wise distribution of patients with seizures in stroke

Age groups (years)	Seizures after stroke		Total
	Yes	No	
<50	3(8.33%)	11 (7.8%)	14 (7.91)
50-59	6 (16.67%)	33 (23.40%)	39 (22%)
60-69	9 (25%)	39 (26.66%)	48 (27.12%)
70-79	13 (36.11)	38 (26.95%)	51(28.81%)
80-89	2 (5.56%)	17(12.06%)	19 (10.73%)
90-99	3 (8.33%)	3 (2.13%)	6 (33.9%)
Total	36(20.3%)	141(79.66%)	177 (100%)

Table No.3: Gender wise distribution of seizures

Gender	Seizures in stroke		Total	P value
	Yes	No		
Male	18(47.22%)	77(55.8%)	95 (53.672%)	
Female	21(52.78%)	61(44.2%)	82 (46.33%)	
Total	39(22%)	138 (78%)	177 (100%)	

In these stroke patients, 28 (22.4%) presented with first episode while 11 (21.15%) patients were having recurrent stroke.

Out of 177 patients with ischemic stroke, seizures were found in 39(22%) cases. Among these, 18(47.22%) were males and 21 (52.78%) were females, with p value 0.276 (Table 2). Frequency of seizures in new onset stroke was 28/39 (71.8%) while in the recurrent stroke it was 11/39 (28.21%), with p value 0.402 (Table 3)

Early Onset Seizures: Out of 200 patients 17(9.6%) patients had early seizures that is seizures were developed in these patients within 2 weeks with no previous history of seizures. 9(52.94%) patients developed partial seizures and 88(47.06%) patients developed generalized tonic clonic seizures.

When followed up in opd 3 of the patients having generalized tonic clonic seizures went to have one or more post stroke seizures.

All the 3 patients were in range of age 30-70 years. They had also some additional risk factors and underlying diseases hyperlipidemia, hypertension, Diabetes mellites. 2 patients with partial seizures were having hyperlipidemia and hypertension while one patient with partial seizures was having mitral stenosis leading to clot in atrium as cause of stroke.

Out of 17 patients with early seizures 6 had posterior circulation infarct. while 2 patients were having lacunar infarcts

Late Onset Seizures: Out of 22(12.4%) patients having late onset seizures. 20 patients had a single fit during their six month follow up while 2 patients had recurrent seizures).

3 patients with early onset seizures also then progressed to have late onset seizures.one patient had 2 late onsets seizures.so overall 4 patients had late onset seizures.

All patients with late onset seizures had infarcts in middle cerebral artery perfusion area none of these patients presented with epileptic seizures. posterior circulation infarct was the risk factor considered for higher frequency of seizures after stroke.

DISCUSSION

Our study was conducted to determine incidence and risk factors for seizures after stroke. overall seizures occurred in 22 percent of patients. The major risk factors identified in our study were middle cerebral artery infarcts and old age and stroke involving large cortical areas.

Our study showed that out of total of 39 patients having seizures. 17 patients had early seizures that is 9.6%.

Adnan et al conducted a trial on 200 patients who suffered from ischemic stroke and found out that 8% of patients had seizures after stroke which is comparatively lower than our study[12]. The possible explanation is that they had included only ischemic stroke patients while our study included both haemorrhagic and ischemic stroke patients.

In a population based study in Rochester 4.8% patients were found to have early onset seizure within 24 hours of cerebral ischemic stroke. The Rochester series had included hemorrhagic stroke patients as well as subjects[21].

Treatment options included carbamazepine, phenytoin, valproic acid and the new antiepileptics. New anti-epileptics can be used to lower the likelihood of drug interactions and adverse effects of anti-epileptic drugs and in treatment failures with the classic anti-epileptic drugs[22].

In our study late onset seizures within 6 months after stroke. patients with large cortical infarcts, middle circulation infarcts and early post stroke seizures were noted to be mainly at risk.

The increased incidence after the middle artery territory infarct may show extensive damage frequently sustained to temporal gyrus [23]

There is increased morbidity associated with early post stroke seizures [24].

CONCLUSION

Seizures were found in 22% of acute ischemic stroke patients. It was more common in older patients. Majority had seizures in the past.

Recommendations: Patients with acute stroke need to be assessed for the presence of seizures. As seizure is the most disabling consequence of stroke, appropriate preventive and therapeutic measures need to be taken against seizures in patients with stroke to reduce associated morbidity and mortality.

Acknowledgements: The author would like to thank Dr Fazal-e-Rabbani as psychiatry department LRH for his support and help in the collection of data.

Author's Contribution:

Concept & Design of Study:	Muhammad Abas Khan
Drafting:	Muhammad Abas Khan, Murad Ali
Data Analysis:	Muhammad Abas Khan, Murad Ali
Revisiting Critically:	Muhammad Abas Khan, Murad Ali
Final Approval of version:	Muhammad Abas Khan, Murad Ali

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Lkolominsky-Rabas PL, Heuschmann PU, Marschall D, Emmert M, Baltzer N, Neundorler B, et al. Lifetime cost of ischemic stroke in Germany:Results and national projections from a poultion-based stroke registry:1 he Erlangen stroke project stroke 2006;37:1179-83.
2. Kim AS, Johnston SC. Global variation in the relative burden of stroke and ischemic heart disease. Circulation 2011;124:314-23.
3. Kamal AK, Khealani BA, Ansari SA, Afridi M, Syed NA. Early ischemic stroke presentation in Pakistan. Can J Neurol Sci 2009;36:181-6.
4. Shiber JR, Fontane E, Adewale A. Stroke registry: hemorrhagic versuss ischemic strokes. Am J Emerg Med 2010;2:331-3.
5. Donnan GA, Fisher M, Macleod M, Davis SM. Stroke. Lancet 2008; 371:1612-23.
6. Strong K, Mathers C, Bonita R. Preventing stroke: saving lives around the world. Lancet Neurol 2007;6:182-7.
7. North American symptomatic carotidend-arterectomy trial collaborators: Beneficial effect of carotidendarterectomy in symptomatic patients with high - grade carotid stenosis. N Engl J Med 1991; 325: 445-53.
8. Launer LJ, Hofman A. Frequency and impact of neurologic diseases in the elderly of Europe: a collaborative study of population-based cohorts. Neurol 2000,54(Suppl5):S1-3.
9. Lopez AD, Mathers CD, Ezzati M, Jamison D1, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet 2006;367:1747-57.
10. Khealani BA, Hameed B, Mapari U. Stroke in Pakistan. J Pak Med Assoc 2008;58(7):40-03.
11. Murwat MA, Hussain M, Khan A. Frequency of complications of stroke. J Med Sci 2010;18: 19-21.
12. A Chiragh S, Irfan M, Shein A. Frequency of seizure and epilepsy after ischemic stroke. J Post Grat Inst 2008;22:124-9.
13. Luhdorf K, Jensen LK, Plesner AM. Etiology of seizures in the elderly. Epilepsia 1986.27458-463.
14. Burn J. Dennis M, Bamford J, et al. Epileptic seizures' after a first stroke: the Oxfordshire community stroke project. BMJ 1997.
15. WHO. Reducing risks, promoting healthy life: World Health Report 2002.Geneva:World Health Organization, 2002.
16. Rao SV, Ohman EM, Granger CB, Armstrong PW, Gibler WB, Christenson RH, et al. Prognostic value of isolated troponin elevation across the spectrum of chest pain syndromes. Am J Cardiol 2003; 91(8): 936-40.
17. Kennedy J, Hill MD, Ryckborst KJ, Eliasziw M, Demchuk AM, Buchan AM; FASTER

Investigators. Fast assessment of stroke and transient ischemic attack to prevent early recurrence (FASTER): a randomised controlled pilot trial. Lancet Neurol 2007; 6(11): 961-9.

18. Dean N, Shuaib A. Transient ischemic attacks: unstable, treatable, neglected. Lancet 2007; 370(9596):1398-400.
19. Khealani BA, Ali S, Baig SM. Post Stroke Seizures: descriptive study from a tertiary care Centre in Pakistan. J Pak Med Assoc 2008;58(7),365-8.
20. Mecarelli O, Pro S, Randi F, Dispenza S, Correnti A, Pulitano P. EEG patterns and epileptic seizures in acute phase stroke. Cerebrovasc 2011;31:191-8.
21. So EL, Annegers JF, Hauser WA, O'Braien PC, Whisnant JP. Population-based study of seizure disorders after cerebral infarction. Neurol 1996; 46: 350-5.
22. Gilad R, Lampl Y, Eschel Y, Sadeh M. Antiepileptic treatment in patients with early postischemic stroke seizures: a retrospective study. Cerebrovasc Dis 2001;12:39–43.
23. Langhorne P, Stott DJ, Robertson L, MacDonald J, Jones L, McAlpine C, et al. Medical complications after stroke: a multicenter study. Stroke 2000; 31(6):1223-9.
24. Ferro JM, Pinto F. Post stroke epilepsy epidmiology, pathophysiology and management. Drugs Aging 2004;21 639-53.