

## THE PREVALENCE OF ACUTE SEIZURE AFTER STROKE AMONG PATIENTS ATTENDING AL SALAM TEACHING HOSPITAL IN MOSUL

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### ABSTRACT:

**Background:** Epilepsy which is developed following a hemorrhagic or ischemic stroke without a prior history of the condition and without the presence of additional factors such as brain anatomical abnormalities or metabolic diseases, is referred to post-stroke epilepsy (PSE) which account for about 30 percent of overall epilepsy cases.

**Objective:** To estimate the prevalence of early-onset seizures in various types of stroke patients in a Al Salam teaching hospital and comparing them concerning age, gender and type of stroke. **Methods:** A hospital-based cross-sectional study. It was from the period of January to June in the year 2024. The study was conducted at Al Salam teaching hospital. The questionnaire, is comprised of two sections. The first section for sociodemographic information, the second section for the final diagnosis results. **Results:** Early onset seizure after stroke is prevalent among 22 (11%) of the study population. Among 200 subjects included in the study; 100 of them having hemorrhagic stroke and 100 having ischemic stroke. The mean age of the study population is  $63 \pm 16.3$  years. Stroke found to be more prevalent with increasing ages. Episode of early seizure after stroke is more prevalent among male patients, those with ischemic stroke and it can affect patients from all ages. **Conclusion:** The overall prevalence of early onset seizure after stroke seems to be low. It is frequently occurred, with more prevalence among patients with ischemic stroke, male gender. No specific age is more liable for early seizure after stroke. Further prospective studies are needed in order to estimate the exact prevalence and risk factors of this topics.

**KEYWORDS:** Early onset seizure after stroke, Prevalence, Mosul, Iraq.

### 1- INTRODUCTION

Epilepsy is a chronic brain condition that has several underlying causes. It's characterized by intermittent, paroxysmal, and recurrent central nervous system (CNS) dysfunction brought on by excessive brain neuronal discharge.<sup>[1-3]</sup> When epilepsy develops following a hemorrhagic or ischemic stroke without a prior history of the condition and without the presence of additional factors such as brain anatomical abnormalities or metabolic diseases, it is referred to as post-stroke epilepsy (PSE).<sup>[4]</sup> Roughly about 30 percent of newly diagnosed cases of epilepsy are caused by PSE.<sup>[5]</sup>

Despite the acknowledged link between epilepsy and stroke, post-stroke epilepsy risk estimates differ significantly between studies. Variations in stroke populations, epilepsy definitions, follow-up, and completeness are some of the factors that could be causing this discrepancy.<sup>[6-8]</sup>

Early epileptic seizure sufferers do not develop a stable epileptic network since the brain is capable of self-healing; thus, the condition is classified as seizures rather than epilepsy. But, late-onset epilepsy develops after a week of stroke, peaking between six and twelve months later.<sup>[9-12]</sup> Patients with late-onset epilepsy are diagnosed with epilepsy because they exhibit distinct epileptogenic foci, a stable epileptic network, and a propensity for recurrent seizures.<sup>[13-14]</sup>

The clinical diagnosis of post-stroke epilepsy is made mostly on the basis of a comprehensive medical history, which is frequently enhanced by information gathered from the patient's relatives.<sup>[15]</sup> Noncontract computed tomography (CT) is carried out initially as an investigation of choice in patients with suspected stroke because its high sensitivity for the diagnosis of acute hemorrhagic stroke.<sup>[16]</sup> While brain MRIs, EEGs, and ECGs are also diagnostic tools, they are not necessarily used. Blood testing for the detection of diseases like diabetes or electrolyte abnormalities.

observational strategy is appropriate if the cause of the seizures is unclear.<sup>[17-18]</sup>

Age, sex, and ethnicity are significant demographic factors that are known to impact the occurrence of stroke globally, with men four times more likely than women to experience a stroke.<sup>[19]</sup> Moreover; the prevalence of seizure after stroke is significantly higher in developing countries like Iraq than in developed countries. It is thought that greater levels of stroke risk factors such as diabetes, dyslipidemias, hypertension, and low socioeconomic status are leading cause of this higher prevalence.<sup>[20]</sup>

This study aims to estimate the prevalence of early-onset seizures in various types of stroke patients in a Al Salam teaching hospital and comparing them concerning age, gender and type of stroke.

**2- PATIENT AND METHODS**

This is a hospital-based cross-sectional study. This study was conducted in Al Salam hospital which is located at the left bank of Mosul city, Iraq, from the period of January to June in the year 2024. A total of 400 study participants were included in the study. Inclusion criteria include Iraqi national, both gender, age between 30-80 years, with acute stroke determined by clinical features and confirmed by CT-scan. Patients with a previous history of ischemic or hemorrhagic stroke, seizure and epilepsy, metabolic disturbance (determined by

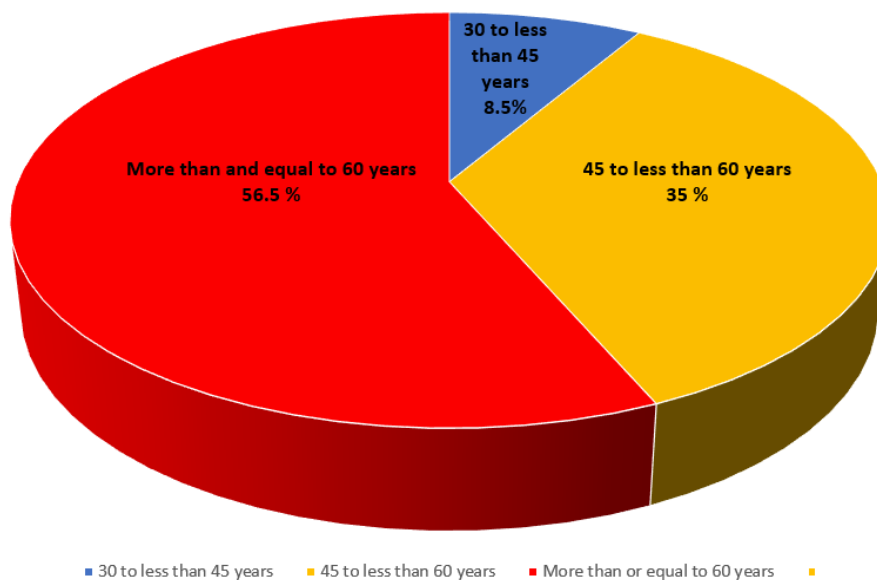
abnormalities in serum electrolytes, blood sugar level, renal function test and acid-base disorders) or brain tumor (determined by CT-Scan) Similarly, patients with subarachnoid hemorrhage, arteriovenous malformations or subdural hematoma evident on CT-scan were excluded from the study. The patients were followed for 7 days for development of early seizure after stroke and all the information was recorded in the questionnaire. Data were collected using structured, self-administered questionnaire, which comprised of two sections. The first section for sociodemographic information. The second section included final diagnosis results. SPSS (Statistical Package for the Social Sciences) version 30 were used to examine the data. The questionnaire information was kept confidential and did not include any information that might be used to identify a specific individual.

**3- RESULTS**

Early onset seizure after stroke is prevalent among 22 (11%) of the study population. The study included 200 subjects; 100 of them having hemorrhagic stroke and 100 having ischemic stroke. The mean age of the study population is 63 ± 16.3 years. Its evidence that stroke is prevalent among the age group of 30 to less than 45 years among 17 (8.5%) of the study population, moreover; the age group of 45 to less than 60 is prevalent among 70 (35%) patients, while the age group of more than or equal to 60 years is prevalent among 113 (56.5%) patients.

**Table 1: Distribution of study population according to age groups.**

Age groups	Male		Female		Total	
	No.	%	No.	%	No.	%
30 to less than 45 years	11	5.5	6	3	17	8.5
45 to less than 60 years	43	21.5	27	26.5	70	35
More than or equal to 60 years	51	25.5	62	31	113	56.5
<b>Total</b>	<b>105</b>	<b>52.5</b>	<b>95</b>	<b>47.5</b>	<b>200</b>	<b>100</b>



**Figure 1: Distribution of patients with stroke according to age groups.**

Table 2 shows prevalence of early seizure after different types of strokes. It's evident that early seizure is prevalent among 9 (9%) of patients with hemorrhagic

stroke, while its prevalent among 13 (13%) of patients with ischemic stroke with total prevalence of (11 %).

**Table 2: Prevalence of early seizure after different types of strokes.**

Type of stroke	Episode of early seizure after stroke		Total Prevalence
	Yes	No	
Hemorrhagic	9	91	9 %
Ischemic	13	87	13 %
<b>Total</b>	<b>22</b>	<b>178</b>	<b>11 %</b>

Table 3 shows distribution of early seizure after stroke according to different age groups. Early seizure after stroke is prevalent among the age group of 30 to less

than 45 years among 2 (11.8%) while the age group of 45 to less than 60 years among 8 (12.9%) and within the age group of more than or equal to 60 years is 11 (10.4%).

**Table 3: Prevalence of early seizure after different types of strokes.**

Age group	Episode of early seizure after stroke		Total Prevalence
	Yes	No	
30 to less than 45 years	2	15	11.8
45 to less than 60 years	8	62	12.9
More than or equal to 60 years	12	103	10.4
<b>Total</b>	<b>22</b>	<b>178</b>	<b>11</b>

Table 4 explains that early seizure after stroke among males is prevalent among 13 (12.38%), while among females it is 9 (9.47%) of the study participants.

**Table 4: Prevalence of early seizure after strokes according to gender.**

Gender	Episode of early seizure after stroke		Total	
	Yes	No	No.	%
Male	13	92	105	12.38
Female	9	84	95	9.47
<b>Total</b>	<b>22</b>	<b>178</b>	<b>200</b>	<b>11</b>

**4- DISCUSSION**

The study finds the prevalence of early onset seizure after epilepsy is 11 % of study population which are distributed equally between hemorrhagic and ischemic stroke, the mean age of the study population is 63 ± 16.3 years. with slight male predominance of male gender. Which comparable to Mads Qvist Buur Ebbesen et al study<sup>[21]</sup> in his Danish nationwide register-based study and Fred Stephen Sarfo et al in his study about the prevalence of post-stroke epilepsy among Ghanaian stroke survivors.<sup>[22]</sup> From the other hand; the prevalence of stroke founded to increase with advancing ages which is runs with Derek King et al study about the future incidence, prevalence and costs of stroke in the UK.<sup>[23]</sup>

Ischemic stroke patients are more liable for early onset seizure than hemorrhagic stroke according to the study findings (13% versus 9%) which is may relate to ion channels, neurotransmitters, proliferation of glial cells, genetics and other factors are involved in the occurrence and development of post stroke seizure. Tadios Lidetu et al found comparable results from Ethiopia.<sup>[24]</sup> Moreover; the study explores that the prevalence of early onset seizure after stroke is comparable within all age groups as it depends on the site and proportion of stroke area. This is runs with Zishan Akhter Wali et al study

findings.<sup>[25]</sup> Lastly; males founded in this study to be more prevalent for early seizure after epilepsy than females which is parallel to Fred Stephen Sarfo et al<sup>[22]</sup> and Mads Qvist Buur Ebbesen et al<sup>[21]</sup> study findings.

The first of the study's limitations is that it is cross-sectional. Second, the study may be limiting findings from other places because it is conducted in Mosul City and not elsewhere. The matched selection of patients between ischemic and hemorrhagic stroke, which allowed for the identification of predictors of early seizure following stroke in Mosul city, is the study's strength despite its limitations.

**5- CONCLUSION AND RECOMMENDATION**

The overall prevalence of early onset seizure after stroke seems to be low. It is frequently occurred, with more prevalence among patients with ischemic stroke, male gender. No specific age is more liable for early seizure after stroke. Further prospective studies are needed in order to estimate the exact prevalence and risk factors of this topics.

**REFERENCES**

1. Manole AM, Sirbu CA, Mititelu MR, Vasiliu O, Lorusso L, Sirbu OM, Ionita Radu F. State of the art

- and challenges in epilepsy—a narrative review. *Journal of Personalized Medicine*, 2023 Apr 1; 13(4): 623.
2. DURING GC. American Clinical Neurophysiology Society (ACNS) 2024 Annual Meeting & Courses. *Journal of Clinical Neurophysiology*, 2024 Sep; 41(6).
  3. Duncan J, Sander J, Alim-Marvasti A, Balestrini S, Baxendale S, Bindman D, Chinthapalli K, Chowdhury F, Diehl B, Eriksson S, Foong J. *Epilepsy and Related Disorders. Neurology: A Queen Square Textbook*, 2024 May 13; 247-318.
  4. Chen J, Ye H, Zhang J, Li A, Ni Y. Pathogenesis of seizures and epilepsy after stroke. *Acta Epileptologica*, 2022 Dec; 4: 1-6.
  5. Phan J, Ramos M, Soares T, Parmar MS. Poststroke seizure and epilepsy: a review of incidence, risk factors, diagnosis, pathophysiology, and pharmacological therapies. *Oxidative medicine and cellular longevity*, 2022; 2022(1): 7692215.
  6. Misra S, Kasner SE, Dawson J, Tanaka T, Zhao Y, Zaveri HP, Eldem E, Vazquez J, Silva LS, Mohidat S, Hickman LB. Outcomes in patients with poststroke seizures: a systematic review and meta-analysis. *JAMA neurology*, 2023 Nov 1; 80(11): 1155-65.
  7. Lahti AM, Huhtakangas J, Juvela S, Bode MK, Tetri S. Increased mortality after post-stroke epilepsy following primary intracerebral hemorrhage. *Epilepsy Research*, 2021 May 1; 172: 106586.
  8. Polat İ, Yiş U, Ayanoglu M, Okur D, Edem P, Paketçi C, Bayram E, Kurul SH. Risk factors of post-stroke epilepsy in children; experience from a tertiary center and a brief review of the literature. *Journal of Stroke and Cerebrovascular Diseases*, 2021 Jan 1; 30(1): 105438.
  9. Zelano J. Poststroke epilepsy: update and future directions. *Therapeutic advances in neurological disorders*, 2016 Sep; 9(5): 424-35.
  10. Sazgar M, Young MG, Sazgar M, Young MG. Seizures and epilepsy. *Absolute epilepsy and EEG rotation review: essentials for trainees*, 2019: 9-46.
  11. García-Peña P, Ramos M, López JM, Martínez-Murillo R, de Arcas G, González-Nieto D. Preclinical examination of early-onset thalamic-cortical seizures after hemispheric stroke. *Epilepsia*, 2023 Sep; 64(9): 2499-514.
  12. Lattanzi S, Canafoglia L, Canevini MP, Casciato S, Irelli EC, Chiesa V, Dainese F, De Maria G, Didato G, Di Gennaro G, Falcicchio G. Brivaracetam as add-on treatment in patients with post-stroke epilepsy: real-world data from the BRIVAracetam add-on First Italian network Study (BRIVAFIRST). *Seizure*, 2022 Apr 1; 97: 37-42.
  13. Punia V, Bhansali S, Tsai C. Late-onset epilepsy clinic: From clinical diagnostics to biomarkers. *Seizure: European Journal of Epilepsy*, 2024 Jun 26.
  14. DiFrancesco JC, Labate A, Romoli M, Chipi E, Salvadori N, Galimberti CA, Perani D, Ferrarese C, Costa C. Clinical and instrumental characterization of patients with late-onset epilepsy. *Frontiers in Neurology*, 2022 Feb 25; 13: 851897.
  15. Phan J, Ramos M, Soares T, Parmar MS. Poststroke seizure and epilepsy: a review of incidence, risk factors, diagnosis, pathophysiology, and pharmacological therapies. *Oxidative medicine and cellular longevity*, 2022; 2022(1): 7692215.
  16. Nishio M, Koyasu S, Noguchi S, Kiguchi T, Nakatsu K, Akasaka T, Yamada H, Itoh K. Automatic detection of acute ischemic stroke using non-contrast computed tomography and two-stage deep learning model. *Computer Methods and Programs in Biomedicine*, 2020 Nov 1; 196: 105711.
  17. Subasi A, Subasi TN, Ozaltin O. Artificial intelligence in diagnosis of neural disorders using biosignals and imaging. In *Advances in Artificial Intelligence 2024* Jan 1 (pp. 523-560). Academic Press.
  18. Van Bohemen SJ. Development of a novel ECG-based metric and device for monitoring changes in cerebral blood flow in stroke and other neurological disorders (Doctoral dissertation).
  19. Avan A, Digaleh H, Di Napoli M, Stranges S, Behrouz R, Shojaeianbabaei G, Amiri A, Tabrizi R, Mokhber N, Spence JD, Azarpazhooh MR. Socioeconomic status and stroke incidence, prevalence, mortality, and worldwide burden: an ecological analysis from the Global Burden of Disease Study 2017. *BMC medicine*, 2019 Dec; 17(1): 1-30.
  20. GBD 2016 Stroke Collaborators. Global, regional, and national burden of stroke, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet. Neurology*, 2019 May; 18(5): 439.
  21. Ebbesen MQ, Dreier JW, Andersen G, Johnsen SP, Christensen J. Stroke and Risk of Epilepsy: A Danish Nationwide Register-Based Study. *Stroke*, 2024 Apr; 55(4): 972-82.
  22. Sarfo FS, Akassi J, Obese V, Adamu S, Agbenorku M, Ovbiagele B. Prevalence and predictors of post-stroke epilepsy among Ghanaian stroke survivors. *Journal of the Neurological Sciences*, 2020 Nov 15; 418: 117138.
  23. King D, Wittenberg R, Patel A, Quayyum Z, Berdunov V, Knapp M. The future incidence, prevalence and costs of stroke in the UK. Age and ageing, 2020 Feb 27; 49(2): 277-82.
  24. Lidetu T, Zewdu D. Incidence and predictors of post stroke seizure among adult stroke patients admitted at Felege Hiwot compressive specialized hospital, Bahir Dar, North West Ethiopia, 2021: a retrospective follow up study. *BMC neurology*, 2023 Jan 25; 23(1): 40.
  25. Wali ZA, Azam N, Farooq H, Arif M, Rafiq U, Zahid M. Prevalence of Early Seizures in Acute Stroke Patients: Prevalence of Early Seizures in Acute Stroke Patients. *Pakistan Journal of Health Sciences (Lahore)*, 2024 Sep 30; 194-7.