



Post-Stroke Seizure in Iranian patients: A systematic review and meta-analysis

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Abstract

Objective: The aim of this systematic review and meta-analysis was to evaluate the prevalence of Post-Stroke Seizure in Iranian patients.

Methods: For findings the related studies, the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal.

Results: Based on the results of random effects model, the Prevalence of Post-Stroke Seizure in Iranian patients in 2910 patients was %04.3(95% confidence interval [CI]: 3.6, 5.1, I = 93.1%).

Conclusion: The prevalence of post-stroke seizures was higher than in previous studies. Which indicates the importance of diagnostic tests for early prevention and treatment.

Keywords: Seizure, Stroke, Risk Factors, prevalence

Introduction

Stroke is one of the main causes of long-term physical, cognitive, emotional, and social disabilities (1). Moreover, in addition to acute neurological disorders, there are rare complications that are commonly ignored (2). These complications have significant effects on the person's quality of life as well as rehabilitation results and likelihood. These complications include post-stroke seizure, dementia, depression, and fatigue (3).

Epileptic seizures have remarkable psychological and social effects on the patients (4). Even in individuals with minor epilepsy that has been satisfactorily controlled, the reports have indicated that the health-related quality of life (especially in terms of social

function) has been significantly lower than normal level of the society (5, 6). The slope of seizure's cumulative incidence curve increases with age; at higher ages, men's risk of suffering from seizure is higher than that of women (7). These findings are especially related to local seizures (8). The pathophysiology of post-stroke seizure is not completely clear. However, some hypothetical mechanisms have been defined. The studies have indicated that in the acute phase of stroke, the occurrence of some changes including cerebral edema, cytotoxic changes in brain cells, and changes in neurotransmitter activities are the predisposing factors of seizure attacks. In addition to effective local factors in brain, the incidence of systemic changes such as acidosis and electrolyte imbalance are also effective in the occurrence of these attacks (9).

In comparison to the other age groups, the incidence rate of seizure is higher in children and the elderly. The studies have indicated that almost 30% of new seizures occur in individuals older than 65 years. The prevalence rate of seizure in individuals older than 70 years is twice than that of the children (10). When the population's mean age increases, there will be a rapid increase in the number of patients with adult and elderly seizures (with cerebrovascular causes), neurodegenerative disease, and brain tumors (11).

Stroke is the most common known cause of frequent seizures. In the elderly, the treatment of seizure is commonly long-term (up to the end of their lives) and calls for high accuracy in selecting the required drugs (12). Moreover, these individuals are more susceptible to complications of antiepileptic drugs. The main cause of this susceptibility is the presence of other concurrent diseases (calling for drug therapy) and age-associated decreased renal and hepatic function in the elderly (13).

The effect of epileptic seizures is not clear in the prognosis of stroke (14). The evident effect of post-stroke seizure on the patients' early death and functional results has been observed over the long term (15). If epileptic seizures worsen the prognosis, the preventive use of anti-seizure drugs is recommended for some patients at risk (16). However, given the common clinical approach, the treatment is required to be initiated only after the second attack. Some studies have indicated that a seizure occurring right after a stroke does not need any kind of treatment (17). In an elderly population, given the improved methods of stroke treatment (resulting in the patients' increased survival rate), it is highly critical to find methods for preventing seizures having significant social and psychological effects on patients' lives (18).

Methods

Eligibility criteria

The method applied for this systematic review was PRISMA guidelines (Moher et al, 2009). Observational studies were included in the present study as well. Moreover, case studies, case reports, clinical trials, and reviews (systematic and narrative reviews) were excluded. The related literature was collected by using medical subject headings (MeSH) and keywords related to seizure in Iran. For findings the related studies, the researchers searched the electronic databases including the international

databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal. The formal screening procedure was conducted by two researchers and based on the eligibility criteria as well as consensus (in case of disagreements). The full texts of the articles were provided for all headings having the required eligibility criteria. Other information was collected from the study, so that all questions regarding the eligibility criteria were responded. The exclusion criteria were recorded. None of the authors of the review had any prejudices about the journals, authors, and institutions related to the study. The data extraction items included the general information (corresponding author, publication year, and province), characteristics of the study (study design, sampling method, data collection tool, research location, sample size, abbreviated heading, characteristics of the questionnaire, and psychometric features), and participants' characteristics (demography and sample size). Hoy et al's risk of bias tool was applied for assessing the quality of the study (Hoy et al, 2012).

Results

Research selection

In total, in the initial search, as many as 242 articles were obtained from different databases. From 242 non-duplicate studies, 211 articles were excluded for having non-related subjects. From the remaining 31 studies, 4 cases had the required legibility criteria. From 6 excluded articles, 2 cases were reviews, two articles were qualitative, 1 cases were letters to the editor, 1 cases were not full texts.

Characteristics of the study

These studies had been conducted on 2910 participants. The main design of the studies was cross sectional. These studies had been conducted only in 4 provinces out of 31 provinces of the country. studies were from Babol, Birjand, Zanzan and Rasht Province. Most of the studies had been conducted in medical centers (n=3). The studies had been conducted with a simple random sampling method and had low likelihood bias (n=3) (figure 1).

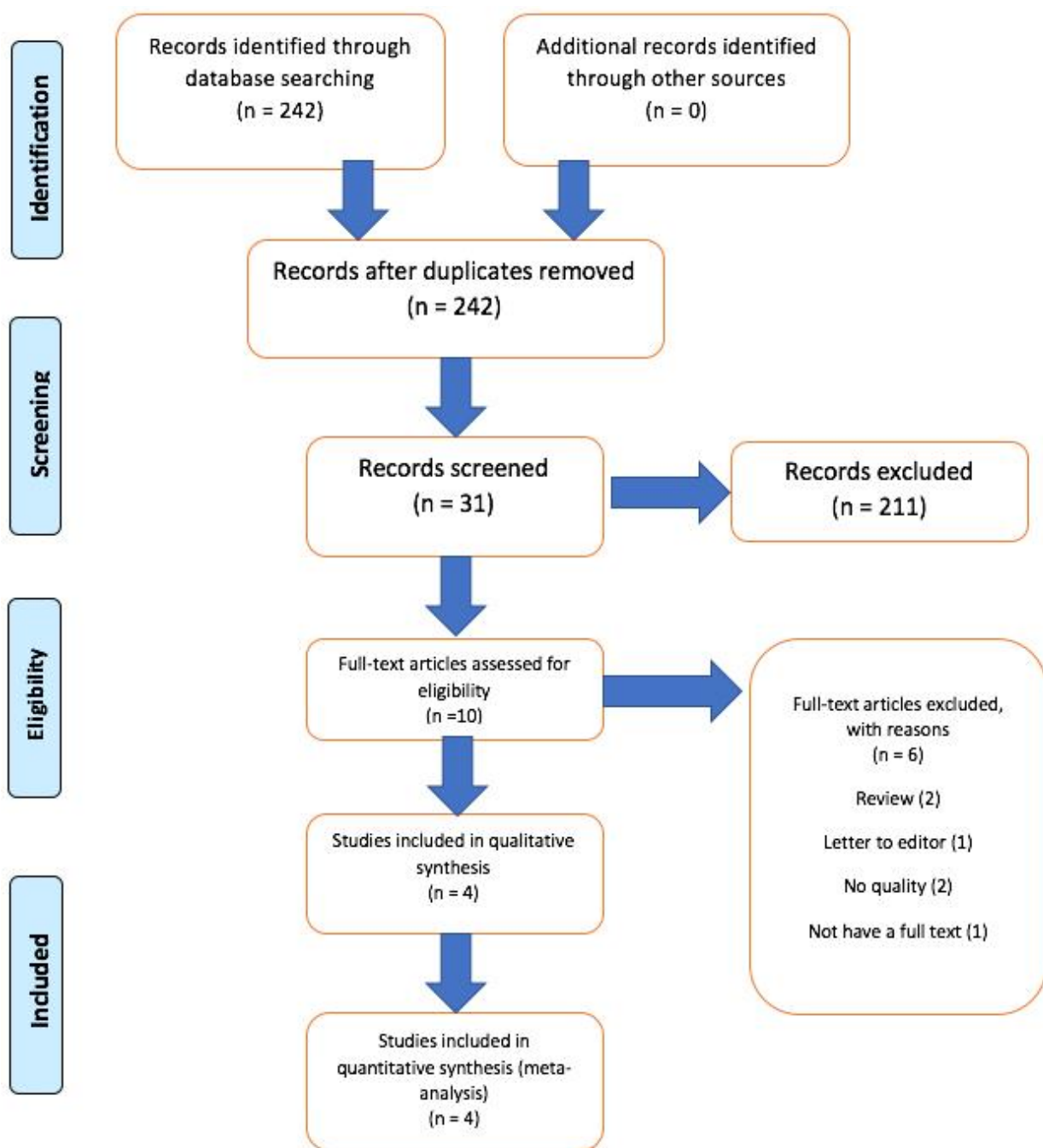


Fig 1.

Table 1: Characteristics of final included studies about Prevalence of Post-Stroke Seizure in Iranian patients

ID	Author	Year	N	Province	Prevalence	Bias
1	Ahmadi	2006	250	Babol	0.17/24	Low
2	Ghandehari	2005	1000	Birjand	0.06/1	Moderate
3	Golipour	2009	404	Zanjan	0.04	Low
4	Saberi	2017	1256	Rasht	0.03/3	Moderate

Meta-analysis Prevalence of Post-Stroke Seizure in Iranian patients

Prevalence of Post-Stroke Seizure in Iranian patients in 2910 patients was %04.3(95% confidence interval [CI]: 3.6, 5.1, I = 93.1%) (table 2) .

Based on the results of random effects model, the

Table 2: Prevalence of Post-Stroke Seizure in Iranian patients

Study	Year	ES	95% conf. Interval		%weight
			Low	Up	
Ahmadi ²⁰	2006	0.17	0.125	0.215	2.53
Ghandehari ²¹	2005	0.06	0.046	0.074	27.34
Golipour ²³	2009	0.04	0.022	0.058	16.54
Saberi ²²	2017	0.03	0.020	0.040	53.59
Pooled ES	-----	0.043	0.036	0.051	100

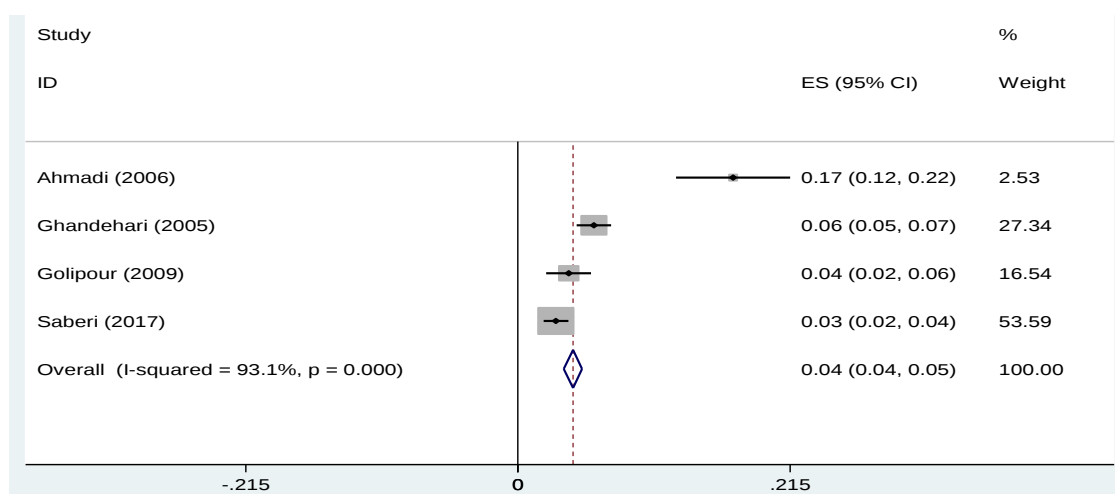


Fig. 2 :The Prevalence of Post-Stroke Seizure in Iranian patients and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the % value and the length of the lines showing the 95% confidence interval in each study.

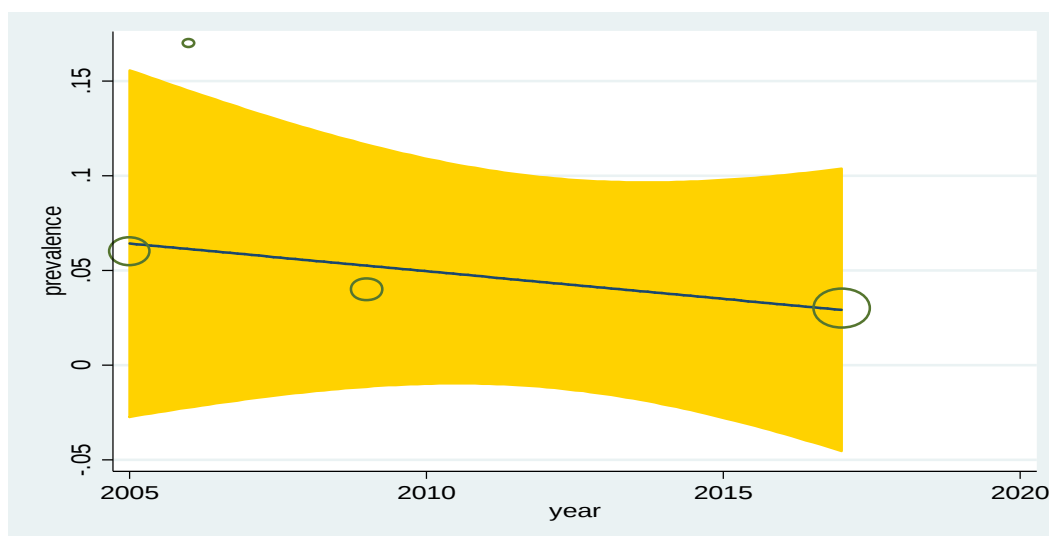


FIG. 3. Meta-regression between Publication (years) and Prevalence of Post-Stroke Seizure in Iranian patients

Discussion

Based on the results of random effects model, the Prevalence of Post-Stroke Seizure in Iranian patients in 2910 patients was %4.3(95% confidence interval [CI]: 3.6, 5.1, I = 93.1%) .The increased mean age of the population results in the increased population of the elderly. In this age group, given the presence of concurrent diseases, the patients are required to use numerous drugs. Thus, neurologists are facing a new challenge for controlling seizure in the elderly (19). The main cause of 32% of seizures is stroke. Moreover, 14% of seizure cases are due to brain tumors, and 25% of them have no clear and definite cause (14). Epilepsy treatment is a long-term process in the elderly and it will continue up to the end of their lives. The first choice is commonly the last one. The frequency of post-stroke seizure attacks has been reported differently in different studies. There are two review studies in this regard. In the study conducted by Camilo et al, it has been reported that the rate of early post-ischemic stroke seizures ranged from 2 to 33%, and the rate of late seizures ranged from 3 to 67% (17).The difference in the frequency rate of post-stroke seizure in different studies is likely due to the differences in the number of patients, follow-up duration, the time range defined for distinguishing early seizures from the late ones, definition of post-stroke seizure attack, and the exclusion of *hemorrhagic cerebrovascular accident* in different studies. However, what is worth noting is that if the follow-up duration increases(i.e. longer post-stroke time), it will not result in the increased incidence of seizure. In other words, if the patient is susceptible to seizure incidence, the seizure commonly occurs a short time after the stroke. If the seizure does not occur shortly after the stroke, it will be less likely to occur in the following years.

Conclusion

The prevalence of post-stroke seizures was higher than in previous studies. Which indicates the importance of diagnostic tests for early prevention and treatment.

References

1. Myint PK, Staufenberg EF, Sabanathan K. Post-stroke seizure and post-stroke epilepsy. Postgraduate Medical Journal. 2006 Sep 1;82(971):568-72.
2. Olsen TS. Post-stroke epilepsy. Current atherosclerosis reports. 2001 Jul 1;3(4):340-4.
3. Benbir G, Ince B, Bozluolcay M. The epidemiology of post-stroke epilepsy according to stroke subtypes. Actaneurologicascandinavica. 2006 Jul;114(1):8-12.
4. Cordonnier C, Henon H, Derambure P, Pasquier F, Leys D. Influence of pre-existing dementia on the risk of post-stroke epileptic seizures. Journal of Neurology, Neurosurgery & Psychiatry. 2005 Dec 1;76(12):1649-53.
5. Khosro Jamebozorgi, Hosein Pormasoumi. (2019). Prevalence of poststroke edementia in Iranian patients: A systematic review and meta-analysis. Int. J. Curr. Res. Biol. Med. 4(1):7-12.
6. Khosro Jamebozorgi, Hosein Pormasoumi. (2018). Frequency of Primary Headache in Iranian Patients with Multiple Sclerosis: A systematic review and metaanalysis. Int. J. Curr. Res. Chem. Pharm. Sci. 5(12): 13-18.
7. Khosro Jamebozorgi. (2018). Association between trigeminal neuralgia and multiple sclerosis in Iranian patients: A ystematic Review and meta-analysis. Int. J. Curr. Res. Med. Sci. 4(12): 40-47.
8. Chen Z, Churilov L, Koome M, Chen Z, Naylor J, Kwan P, Yan B. Post-stroke seizures is associated with low Alberta stroke program early CT score. Cerebrovascular Diseases. 2017;43(5-6):259-65.
9. Kaye L, Newcomer Z, Smith C, Almeida L, Khanna A, Hella M, Eisenschenk S. EEG Predictors of Post-Stroke Seizure (P3. 274).
10. Tanaka T, Yamagami H, Ihara M, Motoyama R, Fukuma K, Miyagi T, Nishimura K, Toyoda K, Nagatsuka K. Seizure outcomes and predictors of recurrent post-stroke seizure: a retrospective observational cohort study. PLoS One. 2015 Aug 26;10(8):e0136200.
11. Tanaka T, Ihara M. Post-stroke epilepsy. Neurochemistry International. 2017 Jul 1;107:219-28.
12. Zou S, Wu X, Zhu B, Yu J, Yang B, Shi J. The pooled incidence of post-stroke seizure in 102 008 patients. Topics in stroke rehabilitation. 2015 Aug 18;22(6):460-7.
13. Bentes C, Martins H, Peralta AR, Casimiro C, Morgado C, Franco AC, Fonseca AC, Geraldés R, Canhão P, e Melo TP, Paiva T. Post-stroke seizures are clinically underestimated. Journal of neurology. 2017 Sep 1;264(9):1978-85.
14. Pande SD, Lwin MT, Kyaw KM, Khine AA, Thant AA, Win MM, Morris J. Post-stroke seizure—Do the locations, types and managements of stroke matter?.Epilepsia open. 2018 Sep;3(3):392-8.

15. Naylor J, Thevathasan A, Churilov L, Guo R, Xiong Y, Koome M, Chen Z, Chen Z, Liu X, Kwan P, Campbell BC. Association between different acute stroke therapies and development of post stroke seizures. BMC neurology. 2018 Dec;18(1):61.
16. Klaas J, Kramer N, Sedova P, Mandrekar J, Brown Jr R. Abstract W P175: Stroke Etiology and the Risk of Post-stroke Seizure: A Long-term Population-based Cohort Study. Stroke. 2015 Feb;46(suppl_1):AWP175-.
17. Moura LM, Smith JR, Blacker D, Vogeli C, Schwamm LH, Hsu J. Medicare Claims Can Identify Post-Stroke Epilepsy. Epilepsy Research. 2019 Feb 8.
18. Claessens D, Bekelaar K, Schreuder FH, de Greef BT, Vlooswijk MC, Staals J, van Oostenbrugge RJ, Rouhl RP. Mortality after primary intracerebral hemorrhage in relation to post-stroke seizures. Journal of neurology. 2017 Sep 1;264(9):1885-91.
19. Brigo F, Lattanzi S, Zelano J, Bragazzi NL, Belcastro V, Nardone R, Trinka E. Randomized controlled trials of antiepileptic drugs for the treatment of post-stroke seizures: A systematic review with network meta-analysis. Seizure. 2018 Aug 3.
20. Ahmadi ahangar A, Hosseini S. Seizure Attacks after Brain Stroke in Patients Admitted to Shahid Yahyanejad Hospital in Babol. 2001-2004.
21. Ghandehari K. Study of early seizures in stroke patients.
22. Saberi, Alia, Kazemnejad A, Nasiri lake E, Kazemi S. Seizure following stroke and its risk factors. Journal of Guilan University of Medical Sciences. 2018 Jan 15;26(104):1-3.
23. Golipour, Arabzade. Prevalence of early seizure in patients with cerebrovascular accidents admitted in the neurology department of Valiasr Hospital in Zanjan from March to September 2005. Zanjan University of Medical Sciences Journal of Zanjan University of Medical Sciences. 2009 May 1;17(66):41-8.

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