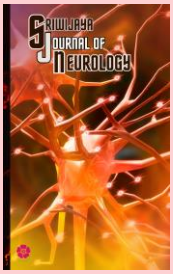

e-ISSN: 2987-1425

Sriwijaya Journal of Neurology (SJN)

Journal website: https://phlox.or.id/index.php/sjn

Bell's Palsy as a Potential Predictor Factor for Stroke: A Systematic Literature Review

Indra Febryan Gosal[1], Nurul Nisa Ulfa[1*], Dewanta Sembiring[1]

[1]EMC Sentul Hospital, Bogor, Indonesia

ARTICLE INFO

Keywords:
Bell's palsy
Herpes zoster virus
Morbidity
Stroke
Varicella zoster virus

***Corresponding author:**
Nurul Nisa Ulfa

E-mail address:
Nurulnisaulfa15@gmail.com

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.59345/sjn.v2i1.98

A B S T R A C T

Introduction: Bell's palsy, which is caused by herpes simplex virus type 1 (HSV-1) and varicella-zoster virus (VZV), can be a marker for stroke. This study aims to identify and explain the potential of Bell's palsy as a predictor factor for stroke. **Methods:** The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding Bell's palsy and stroke. The search was performed using the terms: (1) " Bell's palsy" OR "morbidity" AND (2) "stroke". This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations. **Results:** There are three studies included in this review. A study by Lee et al. stated that there was a significant value in the group of patients aged over 45 years with low socioeconomic status and patients with a history of hypertension, hyperlipidemia, and coronary artery disease ($p < 0.005$). A study by Kim et al. stated that the Bell's Palsy group had a hazard ratio (HR) (1.19-2.02) for the development of stroke in the future. Meanwhile, a study by Lee et al. showed a significantly higher cumulative incidence of ischemic stroke in Bell's palsy ($P < 0.001$) compared with controls, which was different from hemorrhagic stroke ($P = 0.141$). **Conclusion:** Bell's palsy acts as a simple predictor of stroke.

1. Introduction

Bell's palsy is an acute peripheral mononeuropathy of the facial nerve characterized by sudden onset of facial weakness and asymmetry.[1,2] The diagnosis of Bell's palsy can only be confirmed by ruling out other etiologies of unilateral peripheral facial paralysis, such as lyme disease and sarcoidosis. Common symptoms include drooping of the eyelid, inability to close the eye, drawn mouth, change in taste, and muscle twitching. This disease can occur at any age but most often occurs in people aged 15 to 60 years. This symptom is caused by inflammation of the facial nerve due to compression in the narrowest part of the fallopian canal. The etiology is still unclear, but the viral and immunological hypotheses explain that the potential pathophysiological mechanism is caused by the reactivation of latent viruses from the geniculate ganglion, which can cause inflammation.[2-4]

Evidence of the pathogen thought to be the most influential is herpes simplex virus type 1 (HSV-1), which has been detected in facial nerve endoneurial fluid in patients with Bell's palsy, followed by the varicella-zoster virus (VZV), which is widely reported to cause strokes after attacks. herpes zoster since the early 1970s. VZV is also the only known human virus that is even capable of replicating in the cerebral arteries. VZV vasculopathy that occurs in large blood vessels causes the blood vessels involved to be damaged by inflammation caused by the virus, then becomes granulomatous angiitis, which can cause

stroke. In addition, small vessel VZV vasculopathy itself has many nonspecific manifestations, such as fever, headache, seizures, weakness, impaired consciousness, and cognitive disorders known as small vessel encephalitis.[5,6] This review aims to explore Bell's palsy as a predictor of stroke.

2. Methods

The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding Bell's palsy and stroke. The search was performed using the terms: (1) " Bell's palsy" OR "morbidity" AND (2) "stroke". The literature is limited to clinical studies and published in English. The literature selection criteria are articles published in the form of original articles, observational studies, or experimental studies about Bell's palsy and stroke. Studies were conducted in a timeframe from 2012-2022, and the main outcome was morbidity. Meanwhile, the exclusion criteria were studies that were not related to Bell's palsy and stroke, the absence of a control group, and duplication of publications. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations.

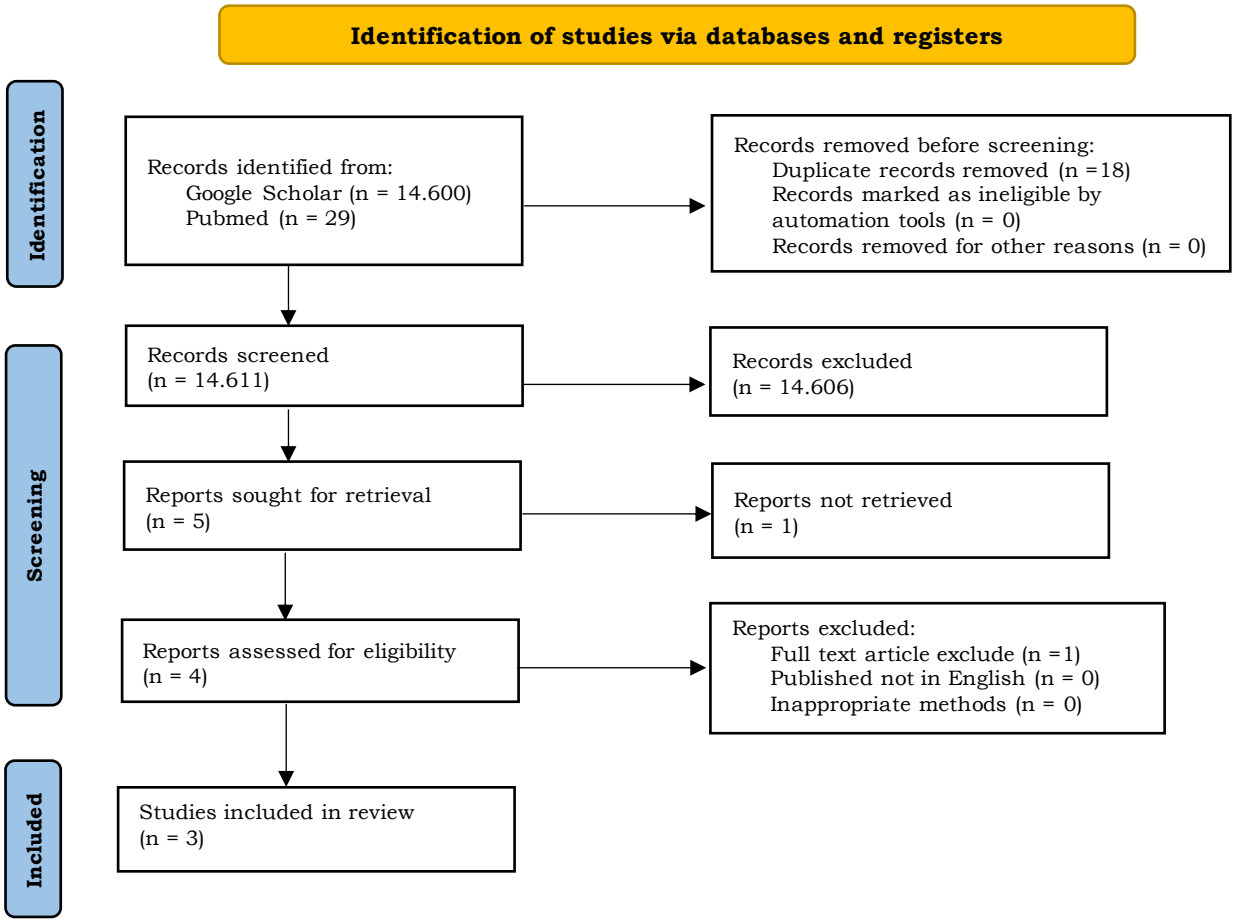

Figure 1. PRISMA flowchart.

3. Results and Discussion

There are three studies included in this review. A study by Lee et al. stated that there was a significant value in the group of patients aged over 45 years with low socioeconomic status and patients with a history of hypertension, hyperlipidemia, and coronary artery disease ($p < 0.005$).[7] A study by Kim et al. stated that the Bell's palsy group had a hazard ratio (HR) (1.19-2.02) for the development of stroke in the future.[8] Based on this research which used Kaplan Meier

analysis, it was also stated that the course of the disease could be seen over a period of between 2.9-12 years. Meanwhile, a study by Lee et al. showed a significantly higher cumulative incidence of ischemic stroke in Bell's palsy (P < 0.001) compared with controls, which was different from hemorrhagic stroke (P = 0.141). However, none of them provided significant value in hemorrhagic stroke patients who also had Bell's palsy.[9]

Table 1. Studies included in the review.

References	Subject	Observation time	Hazard ratio (95% CI)	P-value
Lee et al.[7]	433,218	2.9 years (median)	2.02 (1.42-2.86)	<0.001
Kim et al.[8]	2,190	12 years	Ischemic stroke =1.77 (1.38-2.28)	-
Lee et al.[9]	18,290	3 years (maximum)	Ischemic stroke =1.74 (1.38-2.19) Hemorrhagic stroke=1.19 (0.76-1.87)	<0.001 <0.437

Previous studies suggest that the two herpes viruses, namely HSV-1 and VZV, may participate in the mechanism that triggers autoimmunity, facial neuritis, and Bell's palsy. However, research shows that there is no virus that is directly or independently related to the etiology of Bell's palsy because there are many negative cases in the research sample. The endogenous mechanisms for immune-induced Bell's palsy appear to be complex and occur rapidly. Individual immunity and other yet-unknown factors may influence the acute mechanisms of autoimmunity.[10-13]

In the case of Bell's palsy, this complex mechanism may involve the activation of latent herpes viruses (HSV-1 or VZV) as one of the various etiological mechanisms that play a role in autoimmune neuritis. However, with this complex hypothesis, it seems unlikely that these viruses directly cause Bell's palsy. This can be caused by autologous mechanisms of immune activation when immunity decreases due to viral infection or replication due to acute reactivation of latent herpes viruses.[14,15]

The risk of stroke may also increase in the post-HZ condition, possibly mediated by VZV replication in the cerebral artery walls. The infection spreads along the nerve fibers to the blood vessels and triggers a thrombotic response, resulting in cerebral vasculopathy. This condition can also cause aneurysms, cerebral and subarachnoid hemorrhages, and arterial ectasia. In addition, VZV can also cause peripheral arterial disease. In adults, the exact incidence of VZV vasculopathy is difficult to estimate, but it occurs more often in individuals with weakened immune systems.[15,16] The most widely accepted treatments for Bell palsy patients include corticosteroids (anti-inflammatory agents that can reduce facial nerve swelling) and systemic antiviral agents. Many randomized controlled trials have been conducted and have established the effectiveness of a combination of systemic antiviral agents and corticosteroids in significantly reducing the risk of ischemic stroke in Bell's palsy groups. Most patients have a better prognosis, and the development of vascular persistence is less common. Vaccination for prophylaxis and antiviral therapy immediately after infection should be considered.[16,17]

4. Conclusion

Bell's palsy acts as a simple predictor of stroke.

5. References

1. Varga E, Battamir U, Szegedi I, Hudak L, Kovacs N. Seasonal patterns in the epidemiology of Bell's palsy in Hungary. Front Neurol. 2023; 14: 1188137.
2. Zhang W, Xu L, Luo T, Wu F, Zhao B, Li X. The etiology of Bell's palsy: a review. J Neurol. 2020; 267: 1896–905.
3. Psillas G, Dimas GG, Sarafidou A, Didangelos T, Perifanis V, Caiaphas G, et al. Evaluation of

the effects of diabetes mellitus, hypercholesterolemia, and hypertension on Bell's palsy. J Clin Med. 2021; 10: 2.

4. Greco A, Gallo A, Fusconi M, Marinelli C, Macri GF, de Vincentiis M. Bell's palsy and autoimmunity. Autoimmun Rev. 2012; 12: 323–8.
5. Zhao H, Zhang X, Tang Y, Zhu J, Wang XH, Li ST. Bell's palsy: clinical analysis of 372 cases and review of related literature. Eur Neurol. 2017; 77: 168–72.
6. Khedr EM, Fawi G, Abbas MAA, El-Fetoh NA, Zaki AF, Gamea A. Prevalence of Bell's palsy in Qena Governorate, Egypt. Neurol Res. 2016; 38: 663–8.
7. Lee CC, Su YC, Chien SH, Ho HC, Hung SK, et al. Increased stroke risk in Bell's palsy patients without steroid treatment. Eur J Neurol. 2013; 20(4): 616-22.
8. Kim JY, Kim MS, Kim MH, Kim DK, Yu MS. Bell palsy and the risk of cardio-cerebrovascular disease: a population-based follow-up study. Laryngoscope. 2019; 129(10): 2371-7.
9. Lee SY, Lim JS, Oh DJ, Park B, Park IS. Increased risk of ischemic stroke in patients with Bell's palsy: a longitudinal follow-up study using a national sample cohort. Ausis Nasus Larynx. 2021; 48(2): 194-200.
10. Hsieh RL, Wang LY, Lee WC. Correlation between the incidence and severity of Bell's palsy and seasonal variations in Taiwan. Int J Neurosci. 2013; 123: 459–64.
11. Kim MH, Park SY. Population-based study and a scoping review for the epidemiology and seasonality in and effect of weather on Bell's palsy. Sci Rep. 2021; 11: 16941.
12. Induruwa I, Holland N, Gregory R, Khadjooi K. The impact of misdiagnosing Bell's palsy as acute stroke. Clin Med (Lond). 2019; 19(6): 494-8.
13. Shil RSK, Teir JA. An interesting case of bilateral facial palsy due to granulomatosis with polyangiitis. Case Rep Rheumatol. 2021; 2021; 9963564.
14. Ashour A, Obeidat K, Azrieh B, Alsaud A, Yassin M. An association of varicella-zoster virus, facial palsy, and meningitis in a young immunocompetent male. Case Rep Neurol. 2020; 12(1): 136-9.
15. Teng LY, Lee WQ, Manaf AMBA. Varicella and isolated acute peripheral facial nerve palsy: a systematic review on natural history, prognosis, and treatment. Neurol Asia. 2020; 25(4): 473-84.
16. Stjernquist-Desatnik A, Skoog E, Aurelius E. Detection of herpes simplex and varicella zoster viruses in patients with Bell's palsy by the polymerase chain reaction technique. Annals Otol Rhin Laryng. 2006; 115(4).
17. Pietrzak M, Spiewak-Pokorska M, Pluta M, Marczynska M. Facial nerve palsy in the course of herpes zoster infection-challenges in the treatment and prognosis. Pediatr Pol. 2021; 96(4): 275-80.