AMERICAN JOURNAL OF
SPORTS SCIENCE AND INNOVATION (AJSSI)

VOLUME 1 ISSUE 1 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

American Journal of
Sports Science and Innovation (AJSSI)

Volume 1 Issue 1, Year 2026
ISSN: 3143-4479 (Online)
DOI: https://doi.org/10.54536/ajssi.v1i1.8965
https://journals.e-palli.com/home/index.php/ajssi

Cognitive Impairment among Stroke Patients Attended at a Rehabilitation Centre in Savar, Bangladesh: A Cross-Sectional Study

Sahana Chowdhury[1*], Sumayea Rahman[1], Humaira Kabir Holy[1], Mowmika Zaman[1], Meer Hossain Hero[1], Nusrat Jahan[2], Nishat Tamanna Maliha[3], Md. Moshiwor Rahman[4]

Article Information

Received: August 15, 2026

Accepted: November 02, 2026

Published: November 16, 2026

Keywords

Bangladesh, Cognitive Impairment, Cross-Sectional Study, Rehabilitation Centre, Stroke

ABSTRACT

A common consequence of stroke is cognitive impairment, which can adversely affect a patient's functional recovery, independence, and quality of life. Therefore, the early identification of cognitive deficits is crucial for formulating effective rehabilitation plans. This study aimed to determine the prevalence and severity of cognitive impairment among post-stroke patients undergoing treatment at the Center for the Rehabilitation of the Paralyzed (CRP) in Savar, Bangladesh, and to analyze the relationship between this impairment and the patients' socio-demographic and clinical characteristics. We conducted a cross-sectional study of 154 post-stroke survivors selected through convenience sampling from the Neurology Unit of CRP, Savar. Data were collected using a structured questionnaire, and cognitive function was assessed using the 'Mini-Mental State Examination' (MMSE). We performed descriptive and inferential statistical analyses using SPSS version 20.0. The prevalence of cognitive impairment was 31.5%. Among participants with cognitive impairment, 47% had mild impairment, while 53% had severe impairment. A significant association was observed between cognitive impairment and gender. Similarly, a significant association was found between the risk of dementia and gender. However, no significant association was found between cognitive impairment and other factors such as age, area of residence, physical constitution, type of stroke, and time of stroke onset or other socio-demographic and clinical variables. So, cognitive impairment is a common issue among stroke survivors and a critical factor in the rehabilitation process. Given its potential impact on recovery and quality of life, post-stroke rehabilitation programs should incorporate regular cognitive screening, early detection, and appropriate interventions or treatment to improve patient outcomes.

INTRODUCTION

A stroke is a neurological condition caused by an interruption in blood circulation to the brain. It occurs when a blood vessel supplying the brain becomes blocked or ruptures, thereby obstructing the flow of blood and oxygen to brain tissue. Consequently, brain cells begin to die rapidly due to the lack of oxygen. Strokes are primarily categorized into two main types: ischemic stroke and hemorrhagic stroke. A hemorrhagic stroke results from bleeding caused by a ruptured or torn blood vessel, whereas an ischemic stroke occurs when the flow of blood and oxygen to the brain is obstructed. Ischemic stroke is the most common type, accounting for approximately 85 percent of all stroke cases (Kuriakose & Xiao, 2020).

Ischemic stroke occurs due to the blockage of a major cerebral artery. Thrombosis and embolism are the most common causes of large-artery occlusion; these are frequently associated with atrial fibrillation and other heart diseases. Small ischemic lesions affecting the basal ganglia and subcortical white matter primarily result from obstruction of small arteries and arterioles, a condition commonly referred to as 'small vessel disease.' Conversely, hemorrhagic stroke occurs when a blood vessel ruptures, causing bleeding into the brain parenchyma (intracerebral hemorrhage) or the subarachnoid space (subarachnoid hemorrhage). Hemorrhagic strokes account for approximately 10% to 15% of all stroke cases and carry a significantly higher mortality rate COMPARED to ischemic strokes. The incidence is particularly high in low- and middle-income countries, where mortality can approach 80% (Iadecola, Buckwalter, & Anrather, 2020). Post-stroke cognitive impairment is a common and serious complication and a leading cause of long-term disability (Gong *et al.*, 2020). Stroke is identified as the second most common cause of cognitive decline, ranking immediately after neurodegenerative disorders. Research indicates that the risk of cognitive impairment increases approximately five- to eight-fold following a stroke (Qu *et al.*, 2015). Beyond physical consequences, this cognitive impairment often exerts a more profound negative impact on the patient's quality of life and places a significant burden on family members and informal caregivers (Kalaria, Akinyemi, & Ihara, 2016). Post-stroke cognitive impairment (PSCI) is characterized by deficits or disabilities in one or more cognitive domains, such as executive function, memory, language, visuospatial ability, visuoconstructional ability, and global cognitive function, following the stroke event (Melkas, Jokinen, Hietanen, & Erkinjuntti, 2014). PSCI prevalence ranges

[1] Department of Physiotherapy, CRP Chattogram- A.K. Khan Centre, Chattogram, Bangladesh
[2] Department of Physiotherapy, Bangladesh Health Professions Institute, Dhaka, Bangladesh
[3] Department of Physiotherapy, CRP-Mirpur Centre, Dhaka, Bangladesh
[4] Department of Physiotherapy, CRP Barishal-CARSA Foundation Centre, Barishal, Bangladesh
[*] Corresponding author's e-mail: sahanachowdhurymita06@gmail.com

from 20% to 80%, varying significantly by country, ethnicity, socioeconomic status, occupation, and other demographic and clinical factors (Sun, Tan, & Yu, 2014). A recent systematic review and meta-analysis reported an overall PSCI prevalence of 53.4% and estimated rates of mild and severe cognitive impairment within 1.5 years post-stroke at 36.4–38% and 16%, respectively (Aam *et al.*, 2020). Furthermore, among stroke survivors, approximately 26.5% experience cognitive impairment with dementia, while 38% experience cognitive impairment without dementia during the first year following the stroke (Donnelly *et al.*, 2020).

Despite the profound impact of stroke and its associated cognitive impairments, there is a significant lack of data regarding the prevalence of cognitive impairment among stroke survivors in Bangladesh, particularly within rehabilitation centres. Most existing studies have been conducted in high-income countries; consequently, their findings may not be directly applicable to the Bangladeshi context due to differences in demographic characteristics, healthcare accessibility, socioeconomic status, and rehabilitation services. Furthermore, there is a dearth of information concerning the cognitive status of stroke patients undergoing rehabilitation in Savar and its surrounding peri-urban areas. Therefore, this study aimed to determine the prevalence of cognitive impairment among stroke patients receiving care at a rehabilitation centre in Savar, Bangladesh. The primary objective was to ascertain the proportion of stroke patients suffering from cognitive impairment and to provide baseline evidence to help improve initial screening, rehabilitation planning, and patient treatment outcomes within the local healthcare system.

MATERIALS AND METHODS

Study Design, Setting and Sampling Technique

This cross-sectional study was conducted between January and June 2022 involving stroke patients receiving rehabilitation services at the Centre for the Rehabilitation of the Paralysed (CRP) in Savar, Dhaka (Figure 1). Participants were selected from among the patients visiting the centre who provided written informed consent to participate in the study. Patients of both genders were eligible for inclusion, and no age limit was set. Only patients who had suffered an ischemic stroke were included in the study; conversely, individuals who had experienced a hemorrhagic stroke or a transient ischemic attack (TIA) were excluded. A convenience sampling method was employed to select the participants. Data were collected through direct interviews with the patients; however, when participants were unable to provide the necessary information, their caregivers were interviewed instead.

Study Procedure

To ensure methodological rigor and transparency, this study was conducted and reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines applicable to cross-sectional studies. The study population comprised stroke patients who received rehabilitation services at the CRP following the completion of their acute medical management. Data collection was carried out by trained physiotherapists holding at least a bachelor's degree in physiotherapy. Prior to the commencement of data collection, all data collectors participated in a standardized training program to ensure a uniform and accurate understanding of the study protocol, data collection methods, and ethical considerations.

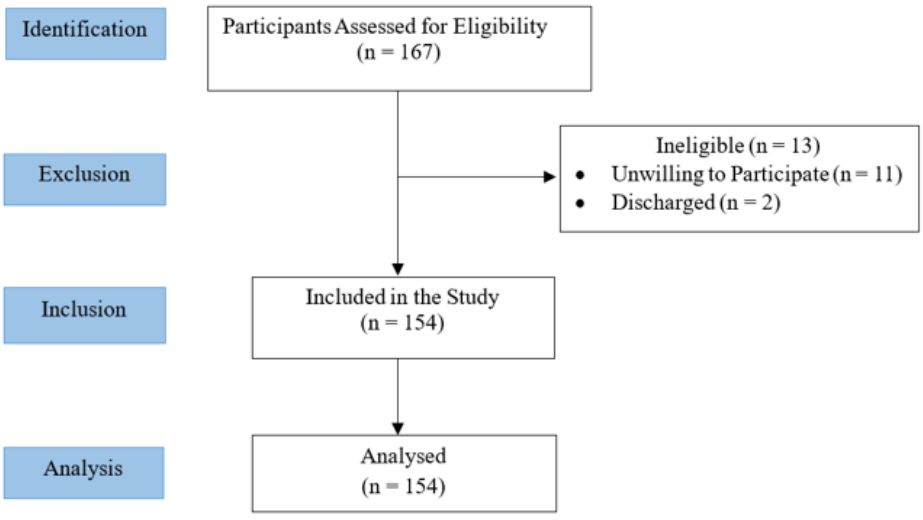


Figure 1: Study Sample Flow Diagram

Sample Size Determination

Assuming a stroke prevalence of 1.14% (p = 0.0114) in Bangladesh (Mondal, Hasan, Khan, & Mohammad, 2022), and considering a 5% margin of error and a 95% confidence level, the sample size was initially determined using the single population proportion formula ($n = Z^2pq/d^2$). This calculation indicated a requirement for a minimum of 30 participants. As this number was relatively low for a cross-sectional study, convenience sampling was subsequently employed to enhance the study's statistical

reliability and representativeness. Consequently, a total of 154 eligible participants were selected and included in the final analysis.

Study Tools

The study collected various socio-economic and demographic data, including age, gender, place of residence, and monthly family income, from participants. Clinical data encompassed Body Mass Index (BMI), the time interval between the onset of stroke symptoms and hospital admission, the presence of comorbidities (such as heart disease, diabetes, and hypertension), the side of the body affected by paralysis (hemiplegia), and family history of stroke. Regarding lifestyle factors, particular emphasis was placed on addictive substances, specifically tobacco use. In the context of Bangladesh, tobacco is consumed primarily through smoking and chewing (e.g., as zarda or gul); therefore, data on both smoking and smokeless tobacco use were gathered. Additionally, the use of other substances such as electronic cigarettes (vaping) and cannabis was assessed. A structured questionnaire consisting mainly of 'close-ended' questions with specific options; was used to collect this information. Data on dietary habits were also recorded as part of the lifestyle analysis; this included the frequency or level of consumption of vegetables, fruits, and high-fat foods.

Cognitive function was assessed using the Mini-Mental State Examination (MMSE), a standardized 30-point screening tool developed by Folstein, Folstein, & McHugh (1975). The MMSE measures seven domains of cognitive ability: orientation, registration, attention and calculation, recall, language, and visuospatial skills. Scores range from 0 to 30, with higher scores indicating better cognitive function. This instrument has demonstrated acceptable internal consistency (Cronbach's alpha = 0.78) and good-to-excellent test-retest reliability (ICC = 0.60–0.93), supporting its use as a reliable tool for assessing cognitive status in clinical and research settings (Wang *et al.*, 2022; Lee, Lee, & Chiu, 2022).

Statistical Analysis

Following data collection, all questionnaires underwent a thorough review and verification process to identify and rectify any inconsistencies, errors, or incomplete responses. The collected data were then entered into the 'Statistical Package for the Social Sciences' (SPSS) version 20.0 for statistical analysis. 'Microsoft Word 2019' was utilized to generate charts and graphical representations of the data. Data analysis employed both descriptive and inferential statistical methods. For descriptive statistics, continuous variables following a normal distribution were presented using mean and standard deviation (SD), while categorical variables were expressed in terms of frequency and percentage. Various graphical representations, including bar charts and pie charts, were used to visualize the data effectively. Inferential statistical analyses were conducted to examine the relationships among socio-demographic characteristics, clinical variables, lifestyle factors, and cognitive impairment. The 'Chi-square test of independence' was applied to assess associations between categorical variables, while 'Pearson's correlation coefficient' was used to determine relationships between continuous variables. 'Odds ratios' (ORs) were calculated to estimate the likelihood of cognitive impairment in relation to selected risk factors. A p-value of less than 0.05 was considered statistically significant for all analyses.

Ethics Approval & Accordance

Ethical approval for this study was obtained from the Ethical Review Committee of the Bangladesh Health Professions Institute (BHPI) prior to the commencement of research activities. Subsequently, permission to conduct data collection was secured from the Department of Physiotherapy. Before participating in the study, all participants were informed about its objectives, goals, and procedures, and their informed consent was obtained. The study was conducted in accordance with the ethical guidelines established by the Declaration of Helsinki. Throughout the research process, strict measures were taken to ensure participant confidentiality, privacy, and anonymity. Personal information was kept confidential and used solely for research purposes.

RESULTS AND DISCUSSION

Sociodemographic Information

Table 1 presents the socio-economic and demographic characteristics of the 154 study participants. The mean age of the participants was 52.33 ± 13.03 years. The majority of participants were male (77.8%, n = 120), while 22.2% (n = 34) were female. Regarding educational attainment, more than half (57.4%, n = 88) were highly educated, followed by those with low education (31.5%, n = 49) and the illiterate (11.1%, n = 17). Most participants were married (96.3%, n = 148), whereas only 3.7% (n = 6) were unmarried. A higher number of participants resided in urban areas (57.4%, n = 88) compared to rural areas (42.6%, n = 66). The majority belonged to nuclear families (68.5%, n = 105), while 31.5% (n = 49) lived in joint families. In terms of occupation, 48.1% (n = 74) fell into the 'other' category, 27.8% (n = 43) were employed, and 24.1% (n = 37) were unemployed. Regarding lifestyle habits, the majority reported having no harmful habits (74.1%, n = 114); conversely, 20.4% (n = 31) were smokers, and 5.6% (n = 9) had other habits.

Physical Characteristics

Table 2 summarizes the physical and clinical characteristics of the participants. The median height and weight were 164.54 cm and 70 kg, respectively, while the mean BMI was 25.07 ± 4.08 kg/m². The majority of participants had a medium body build (68.5%, n = 106), followed by those with a lean (24.1%, n = 37) and obese (7.4%, n = 11) physique. Cognitive impairment was observed in 31.5% (n = 48) of the participants; among them, 53.0% (n = 26) had severe impairment, while 47.0% (n = 22) had mild impairment. A high risk of dementia was identified in

Table 1: Socio-demographic Characteristics of Participants (n = 154)

Demographic	**% (n)**	**Demographic**	**% (n)**
Age		Gender	
Mean ± SD	52.33 ± 13.03	Male	77.8% (120)
		Female	22.2% (34)
Educational qualification		**Occupation**	
Illiterate	11.1% (17)	Unemployed	24.1% (37)
Lower educated	31.5% (49)	Job	27.8% (43)
Higher educated	57.4% (88)	Others	24.1% (74)
Marital status		**Residential area**	
Unmarried	3.7% (6)	Urban	57.4% (88)
Married	96.3% (148)	Rural	42.6% (66)
Family type		**Presence of habits**	
Joint family	31.5% (49)	Smoking	20.4% (31)
Nuclear family	68.5% (105)	None	74.1% (114)
		Others	5.6% (9)

33.3% (n = 51) of the participants. Most participants had suffered an ischemic stroke (85.2%, n = 131), whereas 14.8% (n = 23) had experienced a hemorrhagic stroke. Regarding the stage of the stroke, 38.9% (n = 60) were in the subacute stage, followed by 29.6% (n = 46) in the chronic stage, 24.1% (n = 37) in the early chronic stage, and 7.4% (n = 11) in the acute stage. The vast majority (94.4%, n = 145) received early intervention. A history of Transient Ischemic Attack (TIA) and previous strokes was reported for 31.5% (n = 49) of the participants. Common complications associated with stroke included memory loss (37.0%, n = 57), depression (29.6%, n = 46),

Table 2: Physical Parameters of Participants (n = 154)

Demographic	**%(n)**	**Demographic**	**%(n)**
BMI		**Body Type**	
Height (Median)	164.54 cm	Thin	24.1% (37)
Weight (Median)	70 KG	Fat	7.4% (11)
BMI mean ± SD	25.07 ± 4.08	Medium	68.5% (106)
Presence of cognitive impairment		**Cognitive impairment severity**	
Absent	68.5% (106)	Mild cognitive impairment	47% (72)
Present	31.5% (48)	Severe cognitive impairment	53% (82)
Odds of dementia		**Type of stroke**	
Increased	33.3% (51)	Ischemic	85.2% (131)
Decreased	66.7% (103)	Hemorrhagic	14.8% (23)
Onset of stroke		**Starting time of intervention**	
Acute	7.4% (11)	Early Intervention	94.4% (145)
Subacute	38.9% (60)	Late intervention	5.6% (9)
Early chronic	24.1% (37)		
chronic	29.6%(46)	**TIA**	
History of stroke		Yes	31.5% (49)
Yes	31.5% (49)	No	68.5% (105)
No	68.5% (105)	**Complications of stroke**	
Family history of stroke		Memory loss	37% (57)
Yes	60% (87)	Depression	29.6% (46)
No	40% (67)	Panic disorder	14.8% (23)
	others	18.5% (28)	

Types of comorbidities	
Hypertension	29.6% (46)
Diabetes	22.2% (34)
Kidney disease	35.2% (54)
Heart diseases	13% (20)

panic disorder (14.8%, n = 23), and other complications (18.5%, n = 28). A family history of stroke was frequently observed, with 50.0% (n = 77) of patients reporting a positive family history. Among comorbidities, kidney disease (35.2%, n = 54) was the most prevalent, followed by hypertension (29.6%, n = 46), diabetes (22.2%, n = 34), and heart disease (13.0%, n = 20).

Discussion

The present study examined the socio-demographic, physical, and clinical characteristics; specifically, cognitive impairment and the risk of dementia of 154 stroke survivors. The findings reveal that the majority of participants were middle-aged to elderly (mean age 52.33 ± 13.03 years) and predominantly male (77.8%). This aligns with established epidemiological trends regarding stroke, as stroke incidence is generally higher among men than women, particularly in low- and middle-income countries. Furthermore, the relatively low mean age of the participants may indicate a rising prevalence of stroke among the middle-aged population in South Asia, a region where vascular risk factors are becoming increasingly widespread.

Educational attainment has been identified as a crucial determinant of 'cognitive reserve' (the brain's accumulated cognitive capacity) and cognitive outcomes following a stroke. The current study revealed that 57.4% of the participants were highly educated, while 11.1% were illiterate. Previous research indicates that lower educational attainment is associated with an increased risk of post-stroke cognitive impairment (PSCI) and dementia; this is because limited 'cognitive reserve' can restrict the brain's ability to compensate for damage caused by cerebrovascular injury. A recent systematic review and meta-analysis identified low educational attainment as a significant risk factor for both PSCI and post-stroke dementia (PSD) (Filler, Georgakis, & Dichgans, 2024).

The mean BMI of the participants was 25.07 ± 4.08 kg/m², indicating that many were overweight. High BMI is recognized as a modifiable vascular risk factor that contributes to stroke and subsequent cognitive impairment. Recent studies have shown that excess weight and obesity increase the risk of stroke through mechanisms such as hypertension, diabetes, inflammation, and cerebrovascular dysfunction. The predominance of individuals with a medium body build (68.5%) further underscores the need for lifestyle modifications aimed at weight management as part of comprehensive stroke care (Zhou *et al.*, 2025).

One key observation is that 31.5% of participants had cognitive impairment; severe impairment (53%) was slightly more common than mild impairment (47%). These findings align with growing evidence indicating that cognitive impairment is a common consequence of stroke. A scientific statement by the American Heart Association (AHA) notes that post-stroke cognitive impairment can affect up to 60% of stroke survivors within the first year, with severity ranging from mild deficits to severe dementia. Similarly, a recent meta-analysis found the overall prevalence of post-stroke cognitive impairment (PSCI) to be approximately 46%. The relatively high rate of severe cognitive impairment observed in the current study underscores the importance of routine cognitive screening and prompt neurorehabilitation for stroke survivors (El Husseini *et al.*, 2023; Zhang *et al.*, 2026).

Research has further shown that 33.3 percent of the participants were at a higher risk of dementia. Data from various studies support the strong link between stroke and the future risk of dementia. A systematic review and meta-analysis revealed that stroke is an independent risk factor for all types of dementia; suffering a stroke more than doubles the risk of developing dementia later on. Additionally, the AHA has reported that up to one-third of stroke survivors may develop dementia within five years of the stroke event. These findings underscore the importance of long-term cognitive monitoring for stroke survivors and the need for strategies to prevent dementia (Kuźma *et al.*, 2018).

CONCLUSION

Overall, the findings of this study support existing evidence that stroke survivors face significant cognitive impairment, a risk of dementia, vascular comorbidities, and psychological and social complications. Early detection of cognitive deficits, intensive management of vascular risk factors, and timely multidisciplinary rehabilitation can play a crucial role in improving the cognitive and functional status of post-stroke patients.

REFERENCES

Aam, S., Einstad, M. S., Munthe-Kaas, R., Lydersen, S., Ihle-Hansen, H., Knapskog, A. B., & Saltvedt, I. (2020). Post-stroke cognitive impairment—impact of follow-up time and stroke subtype on severity and cognitive profile: the Nor-COAST study. *Frontiers in Neurology, 11*, 699. https://doi.org/10.3389/fneur.2020.00699

Donnelly, N. A., Sexton, E., Merriman, N. A., Bennett, K. E., Williams, D. J., Horgan, F., & Wren, M. A. (2020). The prevalence of cognitive impairment on admission to nursing home among residents with and without stroke: a cross–sectional survey of nursing

homes in Ireland. *International Journal of Environmental Research and Public Health, 17*(19), 7203. https://doi.org/10.3390/ijerph17197203

El Husseini, N., Katzan, I. L., Rost, N. S., Blake, M. L., Byun, E., Pendlebury, S. T., & American Heart Association Stroke Council; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; Council on Hypertension; and Council on Lifestyle and Cardiometabolic Health. (2023). Cognitive impairment after ischemic and hemorrhagic stroke: a scientific statement from the American Heart Association/American Stroke Association. *Stroke, 54*(6), e272-e291. https://doi.org/10.1161/STR.0000000000000430

Filler, J., Georgakis, M. K., & Dichgans, M. (2024). Risk factors for cognitive impairment and dementia after stroke: a systematic review and meta-analysis. *The Lancet Healthy Longevity, 5*(1), e31-e44. https://doi.org/10.1186/s12877-021-02732-7

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *Journal of psychiatric research, 12*(3), 189-198. https://doi.org/10.1016/0022-3956(75)90026-6

Gong, L., Wang, H., Dong, Q., Zhu, X., Zheng, X., Gu, Y., & Liu, X. (2020). Intracranial atherosclerotic stenosis is related to post-stroke cognitive impairment: a cross-sectional study of minor stroke. *Current Alzheimer Research, 17*(2), 177-184. https://doi.org/10.2174/1567205017666200303141920

Iadecola, C., Buckwalter, M. S., & Anrather, J. (2020). Immune responses to stroke: mechanisms, modulation, and therapeutic potential. *The Journal of clinical investigation, 130*(6), 2777-2788. https://doi.org/10.1172/JCI135530

Kalaria, R. N., Akinyemi, R., & Ihara, M. (2016). Stroke injury, cognitive impairment and vascular dementia. *Biochimica et Biophysica Acta (BBA)-Molecular Basis of Disease, 1862*(5), 915-925. https://doi.org/10.1016/j.bbadis.2016.01.015

Kuriakose, D., & Xiao, Z. (2020). Pathophysiology and treatment of stroke: present status and future perspectives. *International journal of molecular sciences, 21*(20), 7609. https://doi.org/10.3390/ijms21207609

Kuźma, E., Lourida, I., Moore, S. F., Levine, D. A., Ukoumunne, O. C., & Llewellyn, D. J. (2018). Stroke and dementia risk: a systematic review and meta-analysis. *Alzheimer's & Dementia, 14*(11), 1416-1426. https://doi.org/10.1016/j.jalz.2018.06.3061

Lee, Y. C., Lee, S. C., & Chiu, E. C. (2022). Practice effect and test-retest reliability of the Mini-Mental State Examination-2 in people with dementia. *BMC geriatrics, 22*(1), 67. https://doi.org/10.1186/s12877-021-02732-7

Melkas, S., Jokinen, H., Hietanen, M., & Erkinjuntti, T. (2014). Poststroke cognitive impairment and dementia: prevalence, diagnosis, and treatment. *Degenerative neurological and neuromuscular disease, 4*, 21-27. https://doi.org/10.2147/DNND.S37353

Mondal, M. B. A., Hasan, A. H., Khan, N., & Mohammad, Q. D. (2022). Prevalence and risk factors of stroke in Bangladesh: A nationwide population-based survey. *Eneurologicalsci*, *28*, 100414. https://doi.org/10.1016/j.ensci.2022.100414

Qu, Y., Zhuo, L., Li, N., Hu, Y., Chen, W., Zhou, Y., & Zhan, S. (2015). Prevalence of post-stroke cognitive impairment in china: a community-based, cross-sectional study. *PloS one, 10*(4), e0122864. https://doi.org/10.1371/journal.pone.0122864

Sun, J. H., Tan, L., & Yu, J. T. (2014). Post-stroke cognitive impairment: epidemiology, mechanisms and management. *Annals of translational medicine, 2*(8), 80. https://doi.org/10.3978/j.issn.2305-5839.2014.08.05

Wang, G., Estrella, A., Hakim, O., Milazzo, P., Patel, S., Pintagro, C., & Alzheimer's Disease Neuroimaging Initiative. (2022). Mini-mental state examination and Montreal cognitive assessment as tools for following cognitive changes in Alzheimer's disease neuroimaging initiative participants. *Journal of Alzheimer's Disease, 90*(1), 263-270. https://doi.org/10.3233/JAD-220397

Zhang, X., Li, H., Li, Y., Hao, X., Yasen, A., Zheng, X., & Man, Q. (2026). Incidence of cognitive impairment post first stroke: a systematic review and meta-analysis. *Frontiers in Neurology, 17*, 1782749. https://doi.org/10.3389/fneur.2026.1782749

Zhou, H., Han, Y., Xie, D., Zheng, K., Zhou, Z., Zhu, H., & Ji, Y. (2025). Predictors and clinical implications of post-stroke cognitive impairment: a retrospective study. *Scientific Reports, 15*(1), 24198. https://doi.org/10.1038/s41598-025-08048-5