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*Original Article*

# Intrarater Reliability of Catherine Bergego Scale and Albert's Test in Chronic Stroke Patients With Unilateral Spatial Neglect

Maryam Bajwa*[1], Rimsha Tariq[1], Amna Rehan[1], Arooba Pervaiz[1], Aroob Fatima[1], Mahnoor Khalid[1], Muhammad Burhan[2], Fatima Mazher[1]

[1] Hajvery University, Lahore, Pakistan

[2] Farooq Hospital, Lahore, Pakistan

Corresponding author: maryambajwa01@gmail.com

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## Abstract

**Background:** Unilateral spatial neglect (USN) frequently occurs following a right hemisphere stroke, leading to impaired awareness of one side of the body. This condition affects daily activities despite intact motor and sensory functions. The Catherine Bergego Scale (CBS) and Albert's Test are tools used to assess USN severity, but their reliability needs further investigation.

**Objective:** This study aimed to evaluate the intra-rater reliability of the Catherine Bergego Scale and Albert's Test in chronic stroke patients with unilateral spatial neglect.

**Methods:** A cross-sectional study was conducted from November 2023 to March 2024 across three hospitals in Lahore, Pakistan. Using non-probability convenient sampling, 218 chronic stroke patients aged 50 to 80 years were recruited. Participants exhibited signs of USN but had no severe cognitive impairments or concurrent neurological conditions. The CBS and Albert's Test were administered by trained raters in controlled settings. The reliability of these assessments was evaluated using Cronbach's alpha coefficients, and statistical analysis was performed with SPSS version 25.

**Results:** The CBS showed a Cronbach's alpha of 0.737, indicating acceptable reliability. Albert's Test demonstrated a Cronbach's alpha of 0.931, reflecting excellent reliability. These findings support the consistency and dependability of both assessment tools in evaluating USN severity.

**Conclusion:** The study confirmed that the CBS and Albert's Test are reliable tools for assessing USN in chronic stroke patients, facilitating accurate diagnosis and tailored rehabilitation interventions.

## 1 Introduction

Stroke is a prevalent and debilitating neurological condition characterized by a sudden interruption in blood supply to the brain, which can lead to localized neurological deficits lasting more than 24 hours or even result in death. The impact of stroke extends beyond acute symptoms, with many patients experiencing long-term consequences, particularly when the condition progresses to the chronic stage. Chronic stroke, defined as neurological impairment persisting more than six months after the initial episode, poses significant challenges for patients and healthcare providers (1). Common warning signs of stroke include sudden numbness or weakness in the face, arm, or leg, especially on one side of the body, sudden confusion, trouble speaking or understanding speech, sudden vision problems, difficulty walking, dizziness, loss of balance or coordination, and an unexplained severe headache (2). Understanding these signs and symptoms is crucial for timely diagnosis and management, as the rapid recognition and treatment of stroke can significantly impact patient outcomes.

The pathophysiology of stroke involves the occlusion or hemorrhage of blood vessels supplying the brain, leading to ischemic or hemorrhagic events. Various risk factors contribute to stroke, including high blood pressure, elevated homocysteine levels, diabetes, and genetic predispositions, all of which underscore the importance of targeted prevention strategies (3). Epidemiological studies play a critical role in elucidating the mechanisms of stroke and identifying populations at risk, ultimately guiding interventions aimed at reducing stroke incidence, mortality, and disability (4). Stroke remains a major global health issue with profound socioeconomic implications in both developed and developing countries, driving research and policy initiatives aimed at mitigating its impact (5).

A particularly challenging consequence of stroke, especially following right hemisphere strokes, is unilateral spatial neglect (USN). This condition involves a failure to attend to or respond to stimuli on the side opposite the brain injury, independent of sensory or motor

deficits. USN is a multifaceted disorder affecting spatial attention and representation, and it significantly impairs patients' ability to perform activities of daily living (ADLs) independently. Patients with USN may neglect to dress one side of their body, eat only from one side of a plate, or fail to respond to stimuli in the affected spatial field, severely impacting their quality of life and rehabilitation outcomes (6, 7). Left USN, resulting from right hemisphere lesions, is particularly common and debilitating, affecting up to 85% of patients with right hemisphere stroke due to disruptions in the cerebral cortex and associated brain networks (8).

The assessment and management of USN are critical components of stroke rehabilitation, necessitating reliable and valid tools to evaluate the severity and impact of neglect on patients' functional capabilities. Traditional tests such as the Behavioral Inattention Test (BIT), Bells Test, and Albert's Test are commonly used to screen for USN; however, they may not fully capture the condition's impact on ADLs or account for different neglect modalities, such as auditory or proprioceptive neglect (9). The Catherine Bergego Scale (CBS) was developed to address these limitations, offering a comprehensive assessment of ADL difficulties arising from USN with high sensitivity, validity, and reliability, particularly in patients with aphasia or severe motor impairments (10).

Accurate assessment of USN is crucial for tailoring rehabilitation interventions to the specific needs of individual patients, as neglect significantly hinders functional recovery and rehabilitation progress. Reliable tools like the CBS and Albert's Test are essential in guiding clinical practice, enabling clinicians to identify and address the unique challenges posed by USN in stroke survivors (11). Understanding the prevalence, impact, and management of USN among stroke patients is vital for developing effective rehabilitation strategies and improving patient outcomes, highlighting the need for ongoing research and validation of assessment tools in diverse clinical settings (12).

## 2 Material and Methods

This cross-sectional study was conducted from November 2023 to March 2024 at three prominent hospitals in Lahore, Pakistan: Lahore General Hospital (LGH), PSRD Hospital, and Mayo Hospital. The primary aim was to investigate unilateral spatial neglect (USN) in chronic stroke patients. The study employed a non-probability convenient sampling method to recruit a total of 218 participants, all of whom met specific inclusion criteria. Participants were aged between 50 and 80 years and were in the chronic stage of stroke recovery, defined as more than six months post-stroke. They exhibited signs of USN but did not have severe cognitive impairments or concurrent neurological conditions such as transient ischemic attack (TIA) (13, 14, 15). Both male and female participants were included to ensure balanced representation (16).

Informed consent was obtained from all participants, and the study adhered strictly to ethical guidelines as per the Declaration of Helsinki. The research protocol was reviewed and approved by the Institutional Review Board (IRB) of each participating hospital, ensuring compliance with ethical standards and the protection of participants' rights and privacy. Participant confidentiality was maintained throughout the study, with data anonymized and stored securely.

Participants underwent a comprehensive assessment using standardized tools to evaluate the severity and impact of USN. The Catherine Bergego Scale (CBS) and Albert's Test (AT) were administered by trained raters, who underwent rigorous calibration sessions to ensure consistency and reliability in evaluations. The CBS was used to assess activities of daily living affected by USN, while the AT focused on perceptual deficits through tasks involving line-crossing. These assessments were conducted in controlled environments within the hospitals to minimize distractions and ensure participant comfort and concentration.

Data collection spanned multiple sessions to accurately capture the severity and fluctuations of USN over time. Demographic and clinical data, including age, gender, and stroke characteristics, were collected through structured interviews and medical record reviews. The collected data aimed to provide insights into the prevalence and impact of USN among stroke patients in Lahore, contributing to broader understandings of rehabilitation strategies and outcomes in this population.

Statistical analysis was performed using SPSS version 25. Descriptive statistics were used to summarize the demographic and clinical characteristics of the participants. The reliability of the assessment tools was evaluated using Cronbach's alpha to assess internal consistency, with values interpreted according to established guidelines. Additionally, exploratory analyses were conducted to examine associations between demographic or clinical variables and the severity of USN. These analyses aimed to identify potential factors influencing the presentation and impact of USN in the study population. The findings were intended to inform clinical practice and guide the development of targeted rehabilitation interventions for stroke survivors with USN.

## 3 Results

The study included 218 chronic stroke patients exhibiting unilateral spatial neglect (USN), with a mean age of 63 years (SD = 7.51), ranging from 50 to 76 years. The gender distribution was nearly equal, with 51.8% male and 48.2% female participants. The demographic characteristics of the participants are summarized in Table 1.

**Table 1: Demographics of the Participants**

| Characteristic | Frequency | Percent (%) | Mean | SD |
|---|---|---|---|---|
| **Age (years)** | | | 63.00 | 7.51 |
| **Gender** | | | | |
| **Male** | 113 | 51.8 | | |
| **Female** | 105 | 48.2 | | |

The intra-rater reliability of the Catherine Bergego Scale (CBS) and Albert's Test (AT) was assessed using Cronbach's alpha coefficients. The CBS demonstrated acceptable reliability, with a Cronbach's alpha of 0.737, indicating moderate to good internal consistency among its items. In contrast, Albert's Test exhibited excellent reliability, with a Cronbach's alpha of 0.931, reflecting very strong internal consistency for evaluating perceptual deficits related to USN. These reliability statistics are presented in Table 2.

**Table 2: Reliability Statistics for Assessment Tools**

| Scale/Test | Cronbach's Alpha | Number of Items |
|---|---|---|
| **Catherine Bergego Scale (CBS)** | 0.737 | 10 |
| **Albert's Test (AT)** | 0.931 | 1 |

These findings underscore the reliability and consistency of the CBS and AT in assessing USN severity in chronic stroke patients, supporting their use in clinical and research settings to evaluate the impact of USN on daily functioning and guide rehabilitation efforts.

## 4 Discussion

The study evaluated the intra-rater reliability of the Catherine Bergego Scale (CBS) and Albert's Test (AT) in chronic stroke patients with unilateral spatial neglect (USN), revealing crucial insights into the tools' effectiveness in clinical settings. The findings indicated that the CBS displayed acceptable reliability, with a Cronbach's alpha of 0.737, while Albert's Test demonstrated excellent reliability, with a Cronbach's alpha of 0.931. These results suggest that both tools are consistent and reliable for assessing USN, which is crucial for guiding rehabilitation strategies and predicting functional outcomes in stroke survivors.

The study's findings align with previous research that highlighted the importance of reliable assessment tools in the management of USN. The CBS has been noted for its ability to capture the impact of USN on activities of daily living (ADLs), which paper-and-pencil tests may miss (9). Similarly, Albert's Test has been shown to reliably assess perceptual deficits related to spatial neglect (20). This study reinforces these findings, confirming that both CBS and AT provide consistent measures for evaluating the severity of USN, supporting their continued use in both clinical practice and research.

One strength of this study was its rigorous methodology, including the use of standardized tools administered by trained raters, which enhances the validity of the results. The study also ensured a balanced representation of male and female participants, providing a comprehensive overview of USN in chronic stroke patients. However, the study had several limitations. The use of non-probability convenient sampling might have introduced selection bias, potentially limiting the generalizability of the findings. Additionally, the study was conducted in a specific geographic location, which might not reflect the broader population of stroke patients.

The study's results underscore the importance of using reliable assessment tools like CBS and AT to guide rehabilitation interventions. These tools help clinicians accurately identify the presence and severity of USN, facilitating the development of tailored rehabilitation programs aimed at improving patient outcomes. However, further research is needed to explore the inter-rater reliability of these tools, as well as their applicability in different cultural and healthcare settings. Expanding the study to include a larger, more diverse sample could provide additional insights into the generalizability of these findings.

Future research should also consider exploring additional factors that might influence USN presentation and recovery, such as the role of cognitive and environmental variables. Incorporating these elements could enhance the understanding of USN and lead to more effective rehabilitation strategies. Despite its limitations, this study contributes significantly to the field by affirming the reliability of CBS and AT in assessing USN, thereby supporting their continued use in clinical practice to improve the care and outcomes for stroke survivors.

## 5 Conclusion

In conclusion, this study confirmed the intra-rater reliability of the Catherine Bergego Scale (CBS) and Albert's Test (AT) in assessing unilateral spatial neglect (USN) in chronic stroke patients, with CBS showing acceptable reliability and AT exhibiting excellent reliability. These findings highlight the importance of using consistent and dependable assessment tools to accurately diagnose USN and guide targeted rehabilitation interventions. By facilitating the development of tailored treatment strategies, these tools can significantly enhance the quality of care and functional outcomes for stroke survivors, ultimately contributing to improved patient independence and quality of life in human healthcare.

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| Disclaimers | |
|---|---|
| **Author Contributions** | Maryam Bajwa and Rimsha Tariq designed the study and led the data collection process. Amna Rehan and Arooba Pervaiz performed the statistical analysis and interpreted the data. Aroob Fatima, Mahnoor Khalid, and Fatima Mazher contributed to the manuscript drafting. Muhammad Burhan provided clinical insights and reviewed the manuscript. |
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