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Frequency and Demographic Correlates of Post-Stroke Dementia in A Tertiary Care Hospital

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ABSTRACT

Post-stroke dementia (PSD) is a significant yet under-recognized complication following cerebrovascular events, contributing to long-term disability and reduced quality of life. **Objectives:** To determine the frequency and demographic correlates of PSD among stroke survivors admitted at Liaquat University Hospital, Jamshoro. **Methods:** This prospective cohort study was conducted in the Department of Neurology, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro. A total of 143 ischemic stroke patients aged 55–90 years were enrolled using non-probability consecutive sampling. Patients with confounding neurological or psychiatric conditions were excluded. Dementia was assessed six months after stroke onset using the Mini-Mental State Examination (MMSE), with a score <24 indicating post-stroke dementia (PSD). **Results:** The mean age was 69.25 ± 10.11 years. Of the participants, 51.7% were male, 67.8% were urban residents, and 55.9% were unemployed. PSD was observed in 22.4% of patients. Although slightly higher frequencies of PSD were noted among older, urban, and unemployed individuals, none of the demographic factors, including age, gender, employment, residence, education, or family history of dementia, were significantly associated with PSD ($p>0.05$ for all). **Conclusions:** Post-stroke dementia affects a substantial proportion of stroke survivors. Despite the lack of statistically significant demographic correlates, the observed burden warrants routine cognitive assessment and post-stroke rehabilitation strategies, particularly in tertiary care centers in Pakistan.

INTRODUCTION

Post-stroke dementia (PSD) is a common and debilitating complication among stroke survivors, characterized by a decline in cognitive function that adversely affects quality of life, functional independence, and long-term outcomes. It encompasses a spectrum of cognitive impairments occurring after a clinically evident stroke and may present immediately or develop progressively over months [1]. Globally, PSD affects approximately 30% of stroke survivors within one-year post-event, with incidence varying depending on stroke type, location, and associated risk factors [2]. The World Stroke Organization identifies PSD as a significant public health challenge, particularly in low- and middle-income countries where healthcare systems may lack the capacity for long-term neurocognitive monitoring and rehabilitation [3]. In Pakistan, stroke is among the leading causes of adult

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disability, with an estimated incidence of 250 per 100,000 individuals per year, amounting to nearly 350,000 new cases annually [4]. A majority of these patients are younger than 50 years, which contrasts with global trends and suggests a potential for an extended cognitive and socioeconomic burden [5]. However, despite this growing concern, national data on PSD remain scarce, and there is limited integration of routine cognitive assessments in post-stroke care protocols in tertiary settings [6]. Multiple studies have identified demographic variables such as advanced age, low educational attainment, female gender, and unemployment as risk factors significantly associated with PSD [7, 8].Clinical comorbidities, including hypertension, diabetes mellitus, atrial fibrillation, and recurrent strokes, further compound the risk of cognitive decline [9, 10]. A study from 2021 revealed that ischemic strokes are more frequently associated with cognitive impairment when compared to hemorrhagic strokes, though this relationship is complex and multifactorial.The lack of trained personnel, limited access to neuropsychological services, and cultural stigma associated with mental decline pose additional challenges in timely diagnosis and management of dementia/PSD in Pakistani healthcare settings [11, 12].

This study aims to assess the frequency and demographic correlates of PSD at Liaquat University Hospital, Hyderabad/Jamshoro, to bridge the critical knowledge gap and contribute evidence-based insights into the burden and determinants of PSD in a resource-limited context.

METHODS

This prospective cohort study was conducted at the Department of Neurology, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, from March 21, 2022, to September 20, 2022, following the approval of the research synopsis by CPSP (CPSP/REU/NEU-2019-164-581). The sample size was calculated using the WHO sample size calculator based on a previously reported prevalence of post-stroke dementia (PSD) at 20.8% [7], a 7% margin of error, and a 95% confidence level. The estimated sample size was 130; however, accounting for a potential 10% loss to follow-up, the final sample included 143 patients. A non-probability consecutive sampling technique was used for participant recruitment. Participants of either gender with an age of 55-90 years, who presented within one week of acute ischemic stroke, and had a diagnosis established through clinical and radiological findings. Exclusion criteria included patients with other brain lesions (e.g., tumors), those with hepatic or renal dysfunction, individuals with postictal symptoms or known psychiatric disorders, and those already diagnosed with mild cognitive impairment. Patients unable to communicate effectively due to conditions like sensory aphasia or those on cognition-affecting medications such as antipsychotics or antidepressants were also excluded. After obtaining informed consent from a close relative, each patient underwent a thorough clinical history, neuroimaging, and neurological examination. Participants were followed up at intervals, and PSD was evaluated at the six-month mark using the Mini-Mental State Examination (MMSE). A score of less than 24 out of 30 was considered indicative of cognitive impairment. The MMSE is a widely used 30-point screening tool that evaluates five main cognitive domains: orientation, registration, attention and calculation, recall, and language, including visuospatial ability [13]. In the Pakistani context, particularly in Sindh, the MMSE requires cultural and linguistic adaptation to enhance validity. Administration in Urdu and interpretation adjustments based on education level are essential to minimize false positives. For illiterate individuals, a score of ≤21 may suggest impairment, while the traditional cutoff of <24 remains suitable for those with primary or higher education [14]. The MMSE was administered at the six-month, by the first three authors, who were residents at the time of the study and had received adequate training in standardized administration and scoring procedures before data collection. This ensured consistency, cultural appropriateness, and reliability of cognitive assessment across all participants. The secondary variables included demographic factors like Age, Gender, Residential Status, and Family History of Stroke. Data analysis was performed using SPSS version 23.0. Descriptive statistics were computed for both continuous and categorical variables. The Shapiro-Wilk test was used to check data normality. Continuous variables, such as age, were labeled as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Data were stratified by key demographic and clinical variables to assess their effect on the primary outcome, post-stroke dementia. Post-stratification comparisons were made using Chi-square, where appropriate, with a p-value of <0.05 considered statistically significant.

RESULTS

A total of 143 stroke patients were included in the study, with a mean age of 69.25 ± 10.11 years. Males constituted 51.7% (n=74) of the sample, while 48.3% (n=69) were females. Most participants resided in urban areas (67.8%), and amajority were unemployed (55.9%). In terms of education, 41.3% had completed secondary-level education, while only 10.5% had no formal education. A positive family history of dementia was reported in 13.3% of patients (Table 1).

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Table 1: Demographic Statistics of Patients

Variables	n (%)
Mean Age Group (Years)	69.25 ± 10.11
Gender	
Male	74 (51.7%)
Female	69 (48.3%)
Residential Status	
Rural	46 (32.2%)
Urban	97 (67.8%)
Employment Status	
Unemployed	80 (55.9%)
Employed	63 (44.1%)
Educational Status	
No Formal Education	15 (10.5%)
Primary Level Education	25 (17.5%)
Secondary Level Education	59 (41.3%)
Graduate Level Education	27 (18.9%)
Professional Level	17 (11.9%)
Family History of Dementia	
Positive	19 (13.3%)
Negative	124 (86.7%)

Post-stroke dementia (PSD) was present in 32 (22.4%) patients (Figure 1).

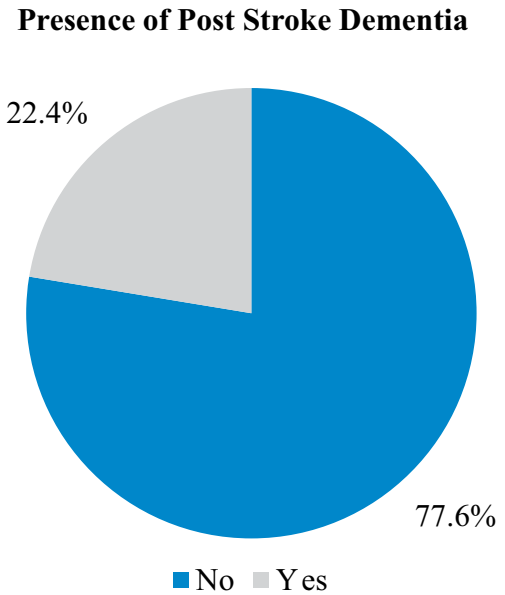

Figure 1: Presence of Post Stroke Dementia

When comparing demographic variables with PSD, no statistically significant associations were observed. Among patients aged 55–70 years, 15 (10.5%) had PSD, while 17 (11.9%) cases were reported in those older than 70 (p=0.592). PSD was found in 19 males (13.3%) and 13 females (9.1%) (p=0.327). Among employed individuals, 16 (11.2%) had PSD, compared to an equal number among the unemployed (p=0.442). Urban residents had a slightly higher frequency of PSD (14.7%) than rural residents (7.7%), though the difference was not significant (p=0.762). Educational status also showed no significant association with PSD (p=0.910), with cases distributed across all levels. Lastly, PSD was found in 5 patients (3.5%) with a positive family history and 27 (18.9%) with a negative family history (p=0.658) (Table 2).

Table 2: Demographic Correlates of Post Stroke Dementia among Stroke Survivors

Variables	Dementia		p-value
	Present	Absent	
Age Group (Years)			
55–70	15 (10.5%)	58 (40.6%)	0.592
>70	17 (11.9%)	53 (37.1%)	
Gender			
Male	19 (13.3%)	55 (38.5%)	0.327
Female	13 (9.1%)	56 (39.2%)	
Employment Status			
Employed	16 (11.2%)	47 (32.9%)	0.442
Unemployed	16 (11.2%)	64 (44.8%)	
Residential Status			
Urban	21 (14.7%)	76 (53.1%)	0.762
Rural	11 (7.7%)	35 (24.5%)	
Educational Status			
No Formal Education	4 (2.8%)	11 (7.7%)	0.910
Primary Level Education	7 (4.9%)	18 (12.6%)	
Secondary Level Education	12 (8.4%)	47 (32.9%)	
Graduate Level Education	5 (3.5%)	22 (15.4%)	
Professional Level	4 (2.8%)	13 (9.1%)	
Family History of Dementia			
Positive	5 (3.5%)	14 (9.8%)	0.658
Negative	27 (18.9%)	97 (67.8%)	

DISCUSSION

The findings of this study indicate that 22.4% of stroke survivors in a tertiary-care setting developed post-stroke dementia (PSD), and none of the demographic factors, age, gender, employment, residence, education, or family history, showed a statistically significant association with PSD. This prevalence is comparable to regional studies; for instance, Egyptian data report a PSD rate of 20.8%, with higher dementia risk among older, illiterate, and unemployed individuals [7]. Similarly, a recent Ugandan study found that 66.4% of stroke survivors experienced cognitive impairment, with low education and increasing age as independent predictors [15]. Although our prevalence is lower than Uganda's, it aligns with the expectation that milder cognitive decline is captured using the MMSE instrument. Contrary to international evidence linking female sex with worse cognitive outcomes post-stroke [16], our study did not identify a significant gender difference (p=0.327), resonating with recent meta-analyses that found no sex-based discrepancy in PSD incidence [17]. Educational attainment, another known predictor [16, 18], also did not demonstrate significance

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(p=0.910), though our sample skewed heavily toward secondary education (41.3%). This suggests that severe educational deprivation, rather than duration alone, may be more critical for predicting PSD. Our results concur with emerging evidence suggesting that in low- and middle-income countries (LMICs), contextual factors like vascular health, stroke severity, and rehabilitation access might outweigh demographic variables [19]. Notably, Pakistan's neurological and geriatric service capacity remains constrained, with a limited number of trained clinicians and few standardized cognitive screening protocols [20]. Additionally, Pakistan's estimated 150,000–200,000 dementia patients represent a rapidly growing public health burden, exacerbated by systemic under diagnosis and stigma [21]. Globally, dementia affects more than 55 million individuals as of 2020, predominantly in LMICs, a number expected to nearly double by 2030 [22]. Stroke-related cognitive decline contributes significantly to this trajectory; cognitive impairment affects up to 64% of stroke survivors worldwide [15].

CONCLUSIONS

It was concluded that 22.4% of stroke survivors at a tertiary care hospital developed post-stroke dementia (PSD) within six months of an acute ischemic stroke. While PSD was more frequent among older, urban, and unemployed individuals, none of the demographic variables, including age, gender, residential status, education, or employment, showed a statistically significant association with PSD.

Authors Contribution

Conceptualization: SK
Methodology: SK, WA, SAN, AHB
Formal analysis: WA, SAN, SHS, AK
Writing review and editing: WA, SAN

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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