FUTURITY
Medicine

Citation article: Vostrotin O., Litovchenko T. Clinical and paraclinical features of psychopathological disorders in right hemisphere stroke. *Futur Med [Internet].* 2023;2(3):29-40. Available from: https://doi.org/10.57125/FEM.2023.09.30.04

Clinical and paraclinical features of psychopathological disorders in right hemisphere stroke

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Abstract

Aims: To investigate correlations between psychopathological disorders, clinical-neurological changes, and stroke severity in right-hemispheric ischemic stroke, considering age and gender influences.

Study design: A descriptive cross-sectional approach was used.

Place and Duration of Study: A group of 171 patients who suffered from right-hemisphere strokes were included in the study. These patients received treatment at the medical and diagnostic department No. 1 of the private company "LORITOM".

Methodology: A pre-tested questionnaire was utilised to gather information from patients who were receiving treatment for right-hemispheric strokes at Treatment and Diagnostic Department No. 1 of the private enterprise "LORITOM." The National Institutes of Health Stroke Scale (NIHSS) was created to assess the seriousness of stroke symptoms. A scale ranging from 0 to 5 was employed to evaluate Muscle Strength, with plegia being a separate category.

Results: Gender distribution among stroke patients was balanced (48% males, 52% females), highlighting equal susceptibility. The age analysis revealed a mean of 70.79 years, with significant differences across the age groups. Prevalence was notably high in the over 70s ($\chi2=57.0877$, $p<0.0001$) and 60-69 age group ($Z=5.3$, $p<0.0001$). Gender differences exist in certain age categories. The stroke severity is associated with patient characteristics but not gender. The muscle strength correlates with the stroke severity ($Z=9.93$, $p<0.05$). The neglect is prevalent (61.91%) and linked to the stroke severity. Right-hemispheric stroke is associated with higher anxiety than depression, with a weakening correlation at severe levels ($R=0.782$, $p=0.00000$).

Conclusion: The comprehensive analysis of stroke patient data underscored the need for gender-specific healthcare strategies, highlighted the age-related prevalence patterns, and emphasised the significance of assessing psychomotional well-being, particularly in individuals with right-hemispheric stroke.

Keywords:

Brain Lesions; Right Hemisphere; Neuropsychiatric Manifestations; Cognitive Impairment; Functional Assessment.

Citation Article:

Received: July 29, 2023

Revised: August 11, 2023

Accepted: September 13, 2023

Published: September 30. 2023

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DOI: https://doi.org/10.57125/FEM.2023.09.30.04

Introduction

The brain's right hemisphere, which is frequently overlooked in comparison to its dominant left hemisphere, plays a crucial role in coordinating a multitude of functions that impact emotional experiences, social cognition, and intricate aspects of perception. From a scientific viewpoint, strokes occurring in the right hemisphere extend far beyond simple neurological incidents; they significantly disturb the intricate balance of the mind, potentially leading to the development of psychopathological disorders. Acknowledge the Importance of Investigating Strokes: Recognizing the scientific importance of delving into the intricacies of strokes, the discerning observations and novel perspectives provided by this study steer the exploration, presenting it not solely as an intellectual endeavour but rather as a voyage into a distinct juncture of neurology and psychiatry. By examining this particular neurological phenomenon, a compelling narrative emerges that reaches beyond the confines of conventional medical literature, presenting profound insights into the origins of psychiatric manifestations subsequent to a right hemisphere stroke. This perspective provides a unique lens to understanding the intricate specifics of the brain's right hemisphere, shedding light on its role not only in biological functions but also in the complex realm of human experience and mental well-being [1]. After a stroke affecting the right hemisphere, the consequences extend beyond neurological functions, delving into intricate disruptions in bodily awareness. Manifestations such as asomatognosia, characterised by emotions of detachment or the inability to recognise a limb as one's own, and somatoparaphrenia, marked by delusional beliefs of disowner ship, underscore the profound impact of these neurological incidents. The disturbances form a crucial part of the narrative, offering a nuanced understanding of the aftermath of right hemisphere strokes. In the intricate interplay between the physiological and psychological consequences, exploring the complexities of bodily awareness post-stroke becomes a compelling avenue for unravelling the broader implications of disruptions within the right hemisphere [2].

Every year, 15 million individuals worldwide grapple with the impact of strokes, a staggering number of which highlights the pervasive nature of this health challenge. The stark reality is that five million of these individuals succumb to the consequences, and another five million find themselves burdened with chronic disabilities, creating ripple effects that strain their families and communities. Although stroke is a relatively uncommon occurrence in people under 40, when it does strike, hypertension frequently stands as the primary culprit. Adding another layer to this complex health landscape, over eight percent of children who grapple with sickle cell disease also find themselves contending with the added burden of stroke. This interconnected chain of statistics underscores the far-reaching implications of strokes on a global scale, emphasising the urgent need for comprehensive strategies to address both prevention and rehabilitation [3]. The incidence reports of Right Hemisphere Damage (RHD) commonly point to strokes as the predominant catalyst. Numerous hospital-based studies consistently highlight that a substantial percentage, ranging from 42% to 49%, of all strokes specifically occur in the right hemisphere. Based on this observation, further research reveals a noteworthy correlation, indicating that between 50% and 78% of individuals diagnosed with RHD also contend with one or more cognitive impairments that significantly impact their communication abilities. This intertwining of stroke prevalence and cognitive challenges underscores the intricate relationship between neurological events and the manifestation of RHD, shedding light on the multifaceted nature of this condition [4]. The mortality rate from stroke witnessed a notable increase, rising from 38.8 per 100,000 individuals in 2020 to 41.1 per 100,000 in 2021. This statistical shift highlights a concerning trend, indicating a rise in the number of fatalities attributed to strokes over a year. Understanding and addressing the factors contributing to this uptick becomes imperative for public health initiatives and medical interventions aimed at mitigating the impact of strokes and improving overall survival rates [5].

Regrettably, the American Heart Association and the National Institutes of Health document a concerning trend, reporting not only an increase in the overall number of stroke cases but also a simultaneous decline in the average age of affected patients. This dual observation underscores the urgency for a comprehensive understanding of the shifting dynamics of stroke incidence, calling for targeted strategies in healthcare and public awareness to address this evolving landscape [6]. The growing burden of stroke is intricately tied to the global increase in life expectancy. This trajectory is compounded by the rising prevalence of risk factors such as diabetes, hypertension, and hyperlipidemia, which, unfortunately, are becoming more common and inadequately managed. As people live longer lives worldwide, the challenge intensifies, emphasising the urgent need for enhanced management and preventative measures against these prominent risk factors to curb the escalating impact of strokes [7]. In the pursuit of informing national health and economic policies, continuous research into illness patterns and their implications for diverse nations remains imperative. Comprehensive insights into health outcomes, accessibility to clinical treatment, and ongoing monitoring of patient characteristics can be invaluable. National clinical stroke registries, serving as reservoirs of vital data, have the potential to significantly enhance our understanding of these facets. To gain a more nuanced comprehension of trends in stroke mortality, well-structured stroke surveillance studies prove indispensable, bridging the gap in both high- and low-income nations and offering crucial data for informed policy making [8].

Depending on which hemisphere of the brain is affected, acute disruptions in the circulation of blood to the brain can be accompanied by specific cognitive impairments. For instance, in the right hemisphere, there may be a condition called hemi-ignorance, while in the left hemisphere, it could lead to aphasia. This distinction may have an impact on patients' and families' knowledge of and ability to recognise symptoms, as well as family doctors' and emergency physicians' evaluation of symptoms and indicators. Furthermore, the majority of stroke measures highlight deficiencies linked to brain injuries in the left hemisphere. Compared to patients with right hemisphere injury, these variables may increase the likelihood that patients with left-hemisphere stroke will be identified sooner and get treated sooner [9].

A right-hemisphere stroke may result in a variety of psychopathological illnesses, which might alter an individual's sense of their own body. These illnesses include somatoparaphrenia (delusional notions of leaving one's own body), hemi-ignorance, and asomatognosia (a sense of not belonging or not recognizing a limb). Numerous brain processes, which need further research to fully comprehend, account for these variations in bodily feeling. Furthermore, these symptoms mean a significant and unresolved therapeutic issue that is linked to worse patient outcomes, extended hospital stays, and inadequate patient adherence to rehabilitation [10].

The complex interaction between the brain and behaviour has been a perennial source of interest in the fields of neuroscience and psychology. With the brain acting as the central hub for cognitive and emotional functioning, it plays a pivotal role in coordinating our thoughts, actions, and emotions. To decipher the enigmas surrounding mental health, comprehending the intricate dynamics between neural structures and behavioural consequences is of paramount importance [11].

The intersection of neurology and psychiatry manifests in the intricate interplay between brain structures and mental health outcomes. Among the various neurological events that can significantly impact psychological well-being, right-hemisphere stroke stands out as a unique contributor to psychopathological disorders. The right hemisphere, often associated with emotion regulation, social cognition, and spatial awareness, plays a vital role in shaping the nuanced landscape of human behavior. When compromised by stroke, this region can give rise to a diverse array of clinical features that extend beyond traditional neurological impairments [12].

Following a right hemisphere stroke, individuals may exhibit a spectrum of clinical features indicative of psychopathological disorders. Emotional disturbances, including flat affect and inappropriate emotional responses, often coexist with social-cognitive impairments, such as impaired social perception and deficits in empathy. Attention and perception may be compromised, leading to neglect syndrome and visual-spatial processing deficits [13].

Communication challenges, including pragmatic language impairments and alterations in prosody, are common, alongside behavioural changes marked by impulsivity and a lack of insight. The complicated clinical is under the influence of cognitive impairments, such as abnormalities in executive function and memory. Mood disorders, including anxiety and depression, might appear, and people may act tenaciously or show a lack of knowledge of their illness. Changes in personality, including shifts in sociability, further contribute to the multifaceted nature of psychopathological disorders following a right hemisphere stroke. Overall, the diverse clinical features highlight the intricate interplay between neurological damage and the emergence of psychiatric symptoms, necessitating comprehensive evaluation and targeted interventions for optimal patient care [14].

Paraclinical features associated with psychopathological disorders following a right hemisphere stroke involve neuroimaging and neurophysiological findings that provide insights into the underlying neural mechanisms. Studies that use neuroimaging, such as computed tomography or magnetic resonance imaging, may identify some abnormalities in the brain, such as lesions or right hemisphere atrophy. Additionally, functional neuroimaging techniques like functional MRI may uncover altered brain activation patterns during tasks related to emotional processing and social cognition [15]. Neurophysiological markers, such as electroencephalography or event-related potentials, can offer further information about the neural dynamics associated with psychopathological symptoms. Integration of these paraclinical findings not only aids in confirming the neurological basis of psychiatric manifestations but also contributes to a more nuanced understanding of the neural circuits and structures implicated in the aftermath of right hemisphere stroke, paving the way for targeted therapeutic approaches and refined diagnostic precision [16].

Research Problem

This study aimed to investigate the complex relationships between psychopathological disorders, clinical-neurological changes, and their impact on the quality of life in patients with right-hemispheric ischemic stroke. The primary objective was to analyse correlations and associations among these factors, taking into account stroke severity, age, and gender as variables of interest. The study explored the demographic distribution of age and gender within the patient population and examined potential connections with stroke severity, muscle strength, and the prevalence of psychopathological disorders, specifically neglect. Furthermore, it aimed to evaluate the severity

of stroke symptoms and muscle strength in relation to age, gender, and psychopathological outcomes. The prevalence of psychopathological disorders, including neglect, were examined, and their association with neurological manifestations were elucidated. Furthermore, the study aimed to evaluate anxiety and depression levels in post-right-hemispheric stroke patients and ascertain their correlation with stroke severity. Ultimately, the research problem cantered on drawing comprehensive conclusions from these analyses and exploring their implications for diagnosis, treatment, and the overall quality of life in right-hemisphere post-stroke patients, highlighting avenues for future research to enhance patient outcomes.

Research Focus

The research focused on unravelling the intricate connections between psychopathological disorders and clinical-neurological changes in individuals with right-hemispheric ischemic stroke. The primary objective was to conduct a comprehensive analysis to discern correlations between psychopathological manifestations and the severity of neurological deficits, considering key factors such as age and gender. The investigation extended to characterise the demographic distribution of the patient cohort, exploring associations with stroke severity, muscle strength, and the prevalence of psychopathological disorders. A crucial aspect involved the assessment of the interrelation among different facets of physical health and their implications for overall well-being. The study also delved into the prevalence and correlates of specific psychopathological disorders, particularly neglect, and evaluated the levels of anxiety and depression in relation to stroke severity. The ultimate aim was to make meaningful conclusions about the complex interactions between the physical and psychological aspects and how these affected the quality of life for individuals who have had a right hemisphere stroke. This will serve as a foundation for future research projects that will improve the diagnostic and therapeutic approaches for this patient population.

Research Aim and Research Questions

Research Aim

This article aimed to foster a more profound comprehension by undertaking a comprehensive exploration backed by rigorous and insightful analysis.

This extensive investigation will delve into diverse facets, encompassing:

- To Conduct a comprehensive analysis to establish correlations between psychopathological disorders and clinical-neurological changes in right-hemispheric ischemic stroke.
- To investigate associations between psychopathological disorders and key factors such as stroke severity, age, and gender to understand the interplay of these elements.
- To characterise the patient population by examining age and gender distribution and their associations with stroke severity, muscle strength, and the prevalence of psychopathological disorders.
- To evaluate the severity of stroke symptoms, including muscle strength, and explore correlations with age, gender, and psychopathological outcomes, particularly neglect.
- To Identify and assess psychopathological disorders, with a focus on neglect, and examine their association with the severity of neurological manifestations. Additionally, to evaluate the anxiety and depression levels using the HADS scale, contributing valuable insights to the intricate interplay in right-hemispheric ischemic stroke.

Research Questions

1. How do psychopathological disorders correlate with clinical-neurological changes in right-hemispheric ischemic stroke, and what are the associations with stroke severity, age, and gender?
2. How are age and gender distributed among right-hemispheric stroke patients, and what associations exist with stroke severity, muscle strength, and the prevalence of psychopathological disorders?
3. How does the severity of stroke symptoms, including muscle strength, vary concerning age, gender, and the presence of psychopathological disorders such as neglect? How are different aspects of physical health interrelated?
4. What is the prevalence of psychopathological disorders, especially neglect, among right-hemispheric stroke patients, and how does it correlate with the severity of neurological manifestations? What is the relationship between anxiety, depression levels, and stroke severity?
5. Based on the study's findings, what conclusions can be drawn regarding the correlations between physical and psychological well-being in right-hemisphere post-stroke patients? How do these findings inform the diagnosis, treatment, and overall quality of life, and what avenues for future research can enhance patient outcomes?

These research questions served as a foundation for the investigation outlined in the objectives, guiding the study toward a comprehensive understanding of the relationships between various factors in right-hemispheric stroke patients.

Research Methodology

General Background

The research on the clinical and paraclinical features of psychopathological disorders in right hemisphere stroke addresses a critical and complex aspect of stroke pathology. Stroke, specifically affecting the right hemisphere of the brain, can lead to a spectrum of cognitive, emotional, and perceptual challenges. Understanding the intricate interplay between clinical and paraclinical features in this context is essential for advancing the knowledge and care of stroke patients. The right hemisphere is known to play a crucial role in various cognitive functions, and disturbances in this region can manifest as psychopathological disorders. The research aimed to delve into the nuances of these disorders, examining their clinical presentation, neurological correlates, and the impact on patients' overall well-being. By exploring the associations between psychopathological features and neurological changes, the study contributed to a more comprehensive understanding of the consequences of right hemisphere stroke, with implications for diagnosis, treatment strategies, and ultimately, the enhancement of patients' post-stroke quality of life.

Sample / Participants / Group

In this research study, a non-random convenient sampling technique was utilised to investigate the correlational relationships between the development of psychopathological disorders and clinical and neurological changes in cerebral infarction. The sample consisted of 171 patients who had experienced right-hemisphere stroke and received treatment at the medical and diagnostic department No. 1 of the private enterprise "LORITOM".

Instrument and Procedures

A pretested questionnaire was used to collect data on patients with right-hemispheric stroke undergoing treatment at therapeutic-diagnostic department No. 1 of the private enterprise "LORITOM." Further utilised tools were as under:

The National Institutes of Health Stroke Scale, or NIHSS, was developed to measure the severity of stroke symptoms. A scale of 0 to 5 points was used for the Muscle Strength Assessment, with plegia being a distinct category. Psychopathological Difficulties Assessment scale aimed to evaluate language difficulties and neglect. Anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS). A total score of at least 11 points on the HADS was supposed to indicate the existence of anxiety or sadness.

Data Analysis

For descriptive Statistics on demographic characteristics, stroke severity, and psychopathological assessments means, standard deviations, percentages, and confidence intervals were calculated. For inferential Statistics chi-square tests ($\chi 2$) was conducted for categorical variables (e.g., gender distribution, age groups, severity distribution). A t-tests and Mann-Whitney U tests were performed for continuous variables (e.g., age, muscle strength) based on the distribution normality. Spearman correlation coefficients was utilized to assess relationships between variables, such as the correlation between HADS and NIHSS scores and between psychopathological disorders and neurological manifestations. A qualitative analysis was employed to interpret the prevalence and absence of psychomotional disorders.

Research Results

Figure 1 shows the gender distribution among stroke patients, revealing a relatively balanced representation, with males accounting for 48% and females for 52% of the cases. This data suggests a near-equitable prevalence of strokes between the two genders, emphasising that both men and women are susceptible to this health condition. The slight majority of female stroke patients may reflect various factors, including hormonal influences, lifestyle differences, or other epidemiological considerations.

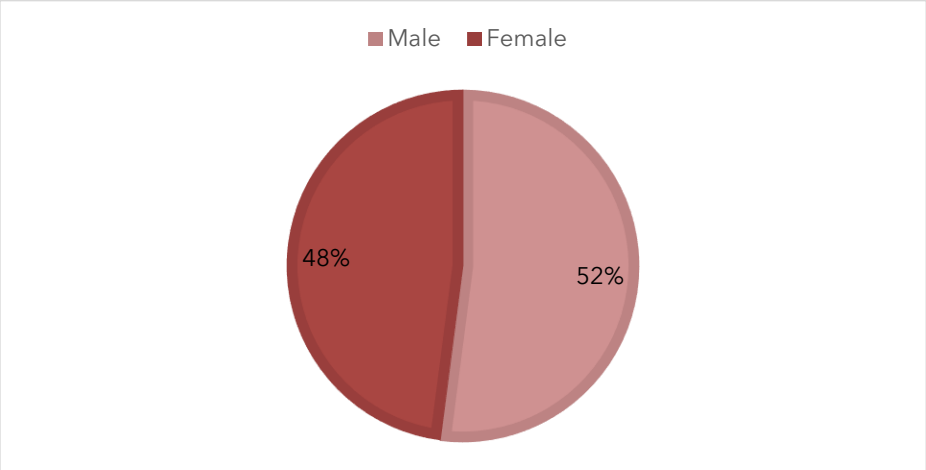

Figure 1. **Gender distribution among stroke patients**

Source: author's development

Understanding the gender distribution in stroke cases is crucial for tailoring healthcare strategies and interventions, ensuring that prevention, treatment, and support measures address the diverse needs of both male and female individuals affected by strokes.

Table 1 illustrates key statistics and results pertaining to age disparity and gender differences among stroke patients. The mean age of the study population is 70.79 years, with a relatively low standard deviation of 0.74 years, suggesting a moderate degree of age consistency. The 95% confidence interval for the mean age ranges from 69.33 to 72.24 years, providing a level of certainty about the true mean. A t-test comparing groups, potentially based on gender, yielded a t-test value of 3.18247, indicating a statistically significant difference in age. The associated p-value of 0.001 further supports this finding, suggesting that the observed age distinctions are unlikely to be due to chance alone.

Table 1. **Age Disparity and Gender Differences among stroke patients.**

Variable	Value
Mean Age	70.79
Standard Deviation	± 0.74 years
CI 95%	69.33 - 72.24
t test	3.18247
p value	0.001

Source: author's development

Collectively, these results highlight significant age variations among stroke patients, potentially linked to gender disparities.

Table 2 shows the statistical analysis of patient prevalence based on age groups reveals significant differences, as indicated by the chi-square ($\chi 2$) and Z statistics. The over 70 years age group demonstrates a notably high prevalence, with a $\chi 2$ value of 57.0877 and a p-value less than 0.0001, signifying a strong association between age over 70 and higher prevalence. Similarly, the 60-69 years age group exhibits significant prevalence, as indicated by a Z statistic of 5.3 and $p<0.0001$. Additionally, the under 60 years age group shows a Z statistic of 4.1 and $p<0.0001$, suggesting a notable prevalence among younger individuals. The gender distribution analysis across age groups indicates a significant difference between men in the under 60 and 60-69 age groups compared to women in the over 70 age group, with a M-L $\chi 2$ value of 10.05340 and a p-value of 0.006.

Table 2. **Prevalence of Patients by Age Groups and Gender Distribution: Statistical Analysis.**

Age Group	Prevalence Statistics	
Over 70 Years	$\chi 2=57.0877$	$p<0.0001$

60-69 Years	Z=5.3	p<0.0001
Under 60 Years	Z=4.1	p<0.0001
Gender Distribution Across Age Groups Under 60 and 60-69 Age Groups (Men) Over 70 Age Group (Women)	M-L χ2=10.05340	p=0.006

Overall, these findings underscore age-related patterns in patient prevalence, with a distinct gender difference in certain age categories.

Table 3 illustrates the distribution of patients based on stroke symptom severity, gender, and age groups, with corresponding statistical analyses. The chi-square test for stroke symptoms severity reveals a statistically significant association (χ2=100.6667, p=0.000), indicating a relationship between the severity of stroke symptoms and patient characteristics. However, when examining the interaction between gender and severity using the M-L chi-square test, the result is not statistically significant (M-L χ2=0.0628, p=0.969), suggesting that there is no apparent association between gender and the severity of stroke symptoms. Similarly, the analysis of age groups and severity using the M-L chi-square test yields a non-significant result (M-L χ2=2.0672, p=0.72341), indicating that there is no significant relationship between age groups and the severity of stroke symptoms.

Table 3. Distribution of Patients by Stroke Symptoms Severity, Gender, and Age Groups.

Variable	Chi-square	p-value
Stroke Symptoms	χ2=100.6667	0.000
Gender and Severity	M-L χ2=0.0628	0.969
Age Groups and Severity	M-L χ2=2.0672	0.72341

Source: author's development

These findings provide valuable insights into the factors influencing stroke symptom severity and underscore the importance of considering patient characteristics in stroke research and clinical management.

Table 4 shows the clinical parameters and their associations in hospitalised patients. The initial muscle strength assessment reveals a median score of 3.0 points, with an interquartile range of [2.0; 4.0]. Plegia is observed in 23 (13.45%) patients, a significantly lower prevalence compared to the total hospitalised population, as indicated by a Z-score of 13.5 and p-value of 0.00000. Muscle strength in patients experiencing moderate or severe stroke symptoms is found to be significantly lower, supported by a Mann-Whitney U test yielding a Z-score of 9.935573 and a p-value of $2.9377^{-23}10–23$, which is less than 0.05. Furthermore, muscle strength demonstrates a high correlation with NIHSS scores, with a Spearman correlation coefficient of –0.927898 and a p-value of 0.00000.

Table 4. Clinical Parameters and Associations in Hospitalised Patients

Parameter	Value
Initial Muscle Strength Assessment	Median: 3.0 points Interquartile Range: [2.0; 4.0]
Plegia Presence	Observed in 23 (13.45%) patients (Significantly lower than total hospitalised population) Z=13.5, p=0.00000
Muscle Strength in Stroke Symptoms	Significantly lower in patients with moderate or severe stroke symptoms (M-W U=317.5, Z=9.935573, $p=2.9377^{-23}10–23$ <0.05)

Muscle Strength Correlation with NIHSS Scores	Highly correlated with NIHSS Scores (Spearman R= –0.927898, p=0.00000)

Source: author's development

These findings collectively suggest the importance of muscle strength assessments in stroke patients, emphasising their potential association with stroke severity and neurological impairment as measured by NIHSS scores. The observed prevalence of plegia also highlights a notable subgroup of patients with distinct clinical characteristics within the hospitalised population.

Table 5 reveals a notable association between psychopathological disorders and stroke severity, as assessed through a comparative analysis. Neglect emerged as a prevalent psychopathological disorder, with a prevalence rate of 61.91% (95% CI: 58.91; 70.92). Moreover, there was a statistically significant association between neglect and stroke severity, as indicated by the M-L $\chi 2$ value of 55.04 ($p < 0.00001$). This association was particularly pronounced in moderate and severe cases, suggesting a higher prevalence of neglect in these more severe instances of stroke. In contrast, language disorders were found to be evenly distributed among mild and moderate stroke severity cases, with no significant association observed (M-L $\chi 2 = 0.83$, $p = 0.36315 > 0.05$).

Table 5. Association Between Psychopathological Disorders and Stroke Severity: A Comparative Analysis.

Psychopathological Disorder	Prevalence (%)	95% CI	Association with Stroke Severity (M-L χ2, p-value)
Neglect	61.91	(58.91; 70.92)	55.04, 0.00000<0.05 (Significant; Higher in moderate and severe cases)
Language Disorders	Evenly distributed among mild and moderate severity	Not applicable	0.83, 0.36315>0.05 (No significant association)

These results provide valuable insights into the differential associations of specific psychopathological disorders with varying degrees of stroke severity, highlighting the importance of considering the interplay between neurological and psychiatric factors in stroke patients.

Table 6 shows the Psychomotional Impact of Right-Hemispheric Stroke was assessed using the Hospital Anxiety and Depression Scale (HADS), focusing on the prevalence of anxiety and depression disorders. The results, derived from a Wilcoxon statistical test, revealed a significant difference in the prevalence of these disorders, with anxiety being notably higher than depression in individuals with right-hemispheric stroke. The statistical analysis (T=1318.5, Z=7.653, p=1.970e-14<0.05) indicated a robust association between the affected hemisphere and psychomotional outcomes. Moreover, a Spearman correlation analysis demonstrated a significant and moderate correlation (R=0.782, p=0.00000) between anxiety (HADS-A) and depression (HADS-D) scores. Interestingly, at higher scores, there was a noticeable weakening in the correlation, suggesting a potential divergence in the psychomotional impact at more severe levels of anxiety and depression in the context of right-hemispheric stroke. These findings underscore the importance of recognizing and addressing Psychomotional well-being in individuals affected by right-hemispheric stroke, with implications for tailored interventions and support. In the qualitative assessment of anxiety and depression, we diagnosed the presence of these disorders with a total HADS score of at least 11 points, confirming the conclusion above about a higher prevalence of anxiety compared to depression in patients with right-hemispheric stroke, showing a significantly higher percentage of clinically pronounced anxiety than clinically pronounced depression, and a significantly higher percentage of the absence of depression (normal level) than absence of anxiety symptoms.

Table 6. Psychomotional Impact of Right-Hemispheric Stroke: HADS Scale Assessment Results.

Aspect	Result
Assessment Tool	HADS scale
Hemisphere Affected	Right
Prevalence of Psychomotional Disorders	Overall, prevalent Anxiety is significantly higher than Depression

Statistical Test Results	Wilcoxon T=1318.5, Z=7.653, p=1.970e-14<0.05
Correlation between HADS-A and HADS-D	Significant moderate correlation (Spearman R=0.782, p=0.00000)
Correlation at High Scores	Noticeable weakening

Correlational analysis of assessments of physical and psychological well-being obtained through various scales and indices was conducted to establish relationships between neurophysiological and clinical-neurological changes in cerebral infarction and their role in changes in quality of life. We observed very strong correlations among almost all assessments of physical health aspects measured by different scales, confirming that all measured components of physical health are closely interrelated, and the deterioration/improvement of one of them obviously determines the corresponding deterioration or improvement of the rest of the components. Among the psychopathological disorders recorded, neglect was the most widespread. Anxiety and depression correlated with the assessment of the neurological status of patients by NIHSS at a moderate level. The study demonstrates the prospect of further research in the field of psychopathological disorders, which will significantly improve the effectiveness of diagnosis and treatment and, as a result, enhance the degree of recovery of impaired functions in right-hemisphere post-stroke patients, their level of social and domestic adaptation, and consequently, the quality of life.

Discussion

The gender distribution of the 171 patients in the sample was statistically similar, indicating no evident difference in the proportion of male and female participants (p=0). The patients had a mean age of 70.79 years, and statistical analysis revealed that women were significantly older than men (p=0.0). There was an unexpected higher prevalence of patients over 70 years old compared to the age group distribution (p<0.0001). Moreover, there were gender-specific differences in age groups, with men being more prevalent in younger age groups, while women were more prevalent in the over-70 age group. These findings suggest a significant relationship between age, gender, and the distribution of patients across different age brackets within the study population. These results align with previous studies that have demonstrated variations in the incidence and consequences of stroke in men and women. For instance, the research indicated that in 2019, women made up 57.1% of stroke fatalities. Stroke accounted for 6.2% of all female deaths and 4.4% of all male deaths [17]. According to another research, men have greater stroke risk factors and are almost three times more likely than women to suffer a stroke at the same age. But when people become older around 85 years old, women have a far higher risk of stroke than men do [18]. The study's conclusions are consistent with other studies on the disparities between genders in stroke incidence and outcomes. Previous research has shown a substantial variation in age distribution based on gender, a smaller proportion in the 60-69 age range, and a preponderance of patients over 70. Men and women vary in their age distribution and stroke risk factors, which emphasises the necessity for specialised preventive and treatment plans that take into account each gender's particular requirements and risk factors.

The majority of patients in the study exhibited a moderate degree of stroke symptoms, as evidenced by a significant chi-square value (p=0.0). This suggests a prevalent moderate severity level among the participants. Importantly, the distribution of patients by stroke severity did not exhibit significant variations based on gender, as indicated by the non-significant result for the gender-related Mantel-Haenszel chi-square test (p=0.9). The non-significant result for the age-related Mantel-Haenszel chi-square test (p=0.7) also suggests that there were no significant changes in the distribution of stroke severity across age groups. This observation implies that the occurrence of stroke severity within the chosen research population remained consistent across different genders and age groups, underscoring the significance of moderate-to-severe stroke symptoms in patients. Several factors, including gender-specific stroke incidence rates and the gender distribution in the general population, may account for the higher representation of male patients in stroke studies compared to registries. Moreover, further investigations have revealed that while women's risk of stroke significantly escalates after reaching the age of 85, men are nearly three times more prone to experiencing a stroke at a younger age than their female counterparts. Furthermore, studies have shown that women have worse treatment results, a worse quality of life, and more pre- and post-stroke problems than males [18,19]. According to further study, women have more stroke events owing to their longer life expectancy and greater incidence of stroke at later ages, while males have age-specific stroke rates that are higher. Moreover, regional variations in stroke outcomes have been noted, indicating the need of national studies concentrating on gender disparities in stroke [20, 21]. In summary, gender-specific stroke incidence rates, disparities in stroke outcomes between men and women, and regional variances in stroke outcomes may all be used to explain the prevalence of male patients in stroke studies as opposed to registries. These elements highlight how crucial it is for stroke research and clinical practice to take gender-specific risk factors and treatment approaches into account.

Upon admission, patients' muscle strength, assessed on a 0-to-5-point scale, showed a median value of 3.0 points with an interquartile range [2.0; 4.0]. Plegia was observed in 23 patients (13.45%), a significantly lower proportion compared to the total hospitalised population (p=0.00000). The muscle strength demonstrated a significant decrease in patients with moderate or severe stroke symptoms, as evidenced by the Mann-Whitney U test (M-W U=317.5, Z=9.935573, p=2.9377^{-23}10–23 <0.05). Additionally, there was a strong negative correlation between muscle strength and NIHSS (National Institutes of Health Stroke Scale) scores (Spearman R= –0.927898, p=0.00000). These findings suggest that muscle strength is closely associated with the severity of stroke symptoms, as reflected in both the prevalence of plegia and the correlation with NIHSS scores, emphasising the importance of early assessment and intervention in managing motor impairments in stroke patients. Studies on the relationship between muscle strength and rehabilitation have shown that post-stroke muscular weakness may be somewhat mitigated by stroke therapy. It has been seen that during stroke therapy, muscular strength, muscle mass, and muscle quality all increase. Activities of daily living (ADLs) and muscle strength have also been reported to improve. These factors are crucial for assessing the effectiveness of stroke rehabilitation. Strength and muscle mass in stroke patients: The association between muscle mass and strength in stroke patients has been called into doubt by recent research, some of which have shown only a minor correlation. This implies that decreased muscle mass alone cannot account for muscular weakness, and that muscle strength should also be taken into account independently while treating stroke victims [22, 23].

The psychopathological disorders in the studied population, encompass various domains such as sensation, perception, attention, thinking, intelligence, emotional-volitional, and motor spheres, as well as consciousness. Notably, neglect emerged as the most prevalent disorder, affecting 61.91% of the patients. Statistical analysis revealed a significant association between neglect and the severity of neurological manifestations of stroke. The prevalence of neglect was notably higher in cases with moderate and severe neurological disorders compared to mild ones. In contrast, language disorders were evenly distributed among patients with mild and moderate stroke severity, indicating no significant association with the severity of neurological manifestations suggesting that neglect, among the assessed psychopathological disorders, is closely linked to the severity of stroke-induced neurological impairments, highlighting its potential significance in clinical assessments and interventions for post-stroke patients. The detrimental impact of neuropsychiatric diseases on stroke survivors' functional recovery, death, and disability was also underlined by another research. The research highlighted the clinical importance of neuropsychiatric conditions as prevalent post-stroke sequelae, such as depression, anxiety, post-traumatic stress disorder, psychosis, and psychotic disorders [24]. According to studies on the relationship between psychiatric comorbidity and stroke severity, individuals who had psychiatric diagnoses at the time of their stroke tended to have worse outcomes overall, as well as a higher incidence of psychiatric problems during the early stages of treatment. This implies that mental comorbidity has a major effect on the severity of stroke and the short-term functional consequences [25].

The assessment of anxiety and depression levels among patients following right-hemispheric stroke, using the HADS scale, revealed that Psychomotional disorders were prevalent in the studied population. Anxiety was found to be significantly higher than depression, as indicated by the Wilcoxon T test. Furthermore, there was a significant moderate correlation between the scores on the HADS Anxiety (HADS-A) and HADS Depression (HADS-D) sub-scales. However, it is noteworthy that the present study observed a noticeable weakening of this correlation at high scores on both sub-scales. This suggests that while anxiety was more prevalent than depression overall, the relationship between anxiety and depression scores became less consistent or predictable at higher levels. These findings underscore the complexity of Psychomotional disorders post-stroke and highlight the need for nuanced assessments and tailored interventions to address both anxiety and depression effectively in this patient population. Another study found that anxiety and depression were both prevalent in stroke patients, with anxiety being as common as depression 4 months after stroke [26]. Similar results were found in another research that used the HADS scale, showing that anxiety and sadness are prevalent in stroke patients. Polymorphism was used to define cognitive deficits in individuals with right hemisphere injuries. These deficits were seen in the mental praxis, speech (with a mostly semantic component), and abstract thinking domains. They are interrelated and have less to do with the location of the ischemic lesion and more to do with the lateralisation of the lesion and underlying neurodegeneration. P300-evoked potential analysis is a useful method for verifying cognitive impairment [27]. The presence of anxiety and depression with a total HADS score of at least 11 points was found in the qualitative assessment of these disorders, supporting the previous finding that patients with right-hemispheric stroke were more likely to experience anxiety than depression. The data also showed a significantly higher percentage of clinically pronounced anxiety than clinically pronounced depression, as well as a significantly higher percentage of absence of depression (normal level) than absence of anxiety symptoms.

In conclusion, the comprehensive analysis of a sample of 171 stroke patients revealed valuable insights into the demographic, clinical, and psychopathological characteristics of the study population. The gender distribution within the sample indicated homogeneity, with a balanced representation of male and female participants. However, significant age-related variations were observed, with women being significantly older on average than men, and a notable prevalence of patients over 70 years old. These findings align with existing research on gender differences

in stroke incidence and outcomes. Notably, the majority of patients exhibited a moderate degree of stroke symptoms, and there were no significant variations in stroke severity based on gender or age group. Muscle strength was closely associated with the severity of stroke symptoms, emphasising the importance of early assessment and intervention in managing motor impairments. Psychopathological disorders, particularly neglect, demonstrated a significant association with the severity of neurological manifestations, highlighting the clinical significance of these disorders in post-stroke assessments. Additionally, the assessment of anxiety and depression levels using the HADS scale revealed a prevalence of psychomotional disorders, with anxiety being more common than depression and a complex relationship between their scores. These findings underscore the multifaceted nature of post-stroke challenges and emphasise the need for tailored interventions addressing the unique characteristics and needs of stroke patients, including gender-specific considerations, age-related variations, and psychopathological complexities.

Conclusions and Implications

1. The study found a gender-homogeneous sample with a higher prevalence of women, who were also older on average, aligning with general trends observed in stroke populations. The age distribution revealed a significant proportion of patients over 70 years, with gender-dependent variations in different age groups.
2. The majority of patients exhibited a moderate degree of stroke symptoms, and muscle strength assessments demonstrated a median score of 3.0 points, with plegia observed in a lower percentage than the total hospitalised population. The muscle strength was notably lower in patients with moderate or severe stroke symptoms, showing a strong correlation with NIHSS scores, emphasising the importance of early assessment and intervention.
3. Neglect emerged as the most widespread psychopathological disorder, significantly associated with the severity of neurological manifestations of stroke. This highlights the need for focused attention on neglect in clinical assessments and interventions for post-stroke patients.
4. Psychomotional disorders, specifically anxiety, were prevalent, with a significantly higher incidence than depression. There was a moderate correlation between anxiety and depression scores, although this correlation weakened at higher scores on both sub-scales. The qualitative assessment confirmed a higher prevalence of anxiety compared to depression, underscoring the need for targeted interventions for these mental health aspects in post-stroke care.
5. Strong correlations among various assessments of physical health aspects indicated their interconnected nature. The study emphasised the importance of considering the holistic well-being of post-stroke patients, recognising the interdependence of different health components.
6. The study suggests the potential for further research in the field of psychopathological disorders, with the aim of improving diagnosis and treatment effectiveness. This, in turn, could enhance the recovery of impaired functions, social and domestic adaptation, and ultimately, the overall quality of life for right-hemisphere post-stroke patients.

Author contributions: All authors have sufficiently contributed to the study and agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Ethical statement: This study does not require IRB approval as it does not involve human subjects/data.

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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