ORIGINAL ARTICLE

SOCIAL PARTICIPATION AND ITS RELATIONSHIPS WITH SENSORIMOTOR AND FUNCTIONAL ASPECTS IN POST-STROKE PATIENTS

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Highlights: (1). The sensory and motor aspects post-stroke are related to social participation. (2). The physical environment is linked to post-stroke social participation. (3) . Post-stroke social participation is connected to age and professional occupation.

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(as accepted)
This is a preliminary, unedited version of a manuscript that has been accepted for publication in Revista Contexto & Saúde. As a service to our readers, we are making this initial version of the manuscript available, as accepted. The article will still be reviewed, formatted and approved by the authors before being published in its final form.

http://dx.doi.org/10.21527/2176-7114.2024.49.14685

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How to cite:
de Araújo DS, Gomes CL de A, Gondim ALM, Dantas ES de M, Pacheco TBF, Cacho R de O. et al. Social participation and its relationships with sensorimotor and functional aspects in post-stroke patients. Rev. Contexto & Saúde, 2024;24(49): e14685

ABSTRACT

Objective: To describe social participation and assess its correlation with sensorimotor impairment and functional independence in patients after a stroke in a region of Northeast Brazil. Methods: A cross-sectional study was conducted with 34 stroke patients, aged 18 years or older, selected for convenience from the institution's health records. Participants were assessed using the following clinical instruments: Assessment of Life Habits 3.1 (LIFE-H 3.1), Functional Independence Measure (FIM), Fugl-Meyer Assessment (FMA) - motor subsection (upper limb-UL and lower limb-LL), and Nottingham Sensory Assessment (NSA). Results: Post-stroke patients exhibited reduced social participation (LIFE-H 3.1), with moderate positive correlations observed between the personal, mobility, and responsibility domains and the total scores of FIM, FIM motor, FMA-motor, and FMA-UL. There was a moderate positive correlation between the total scores of LIFE-H 3.1, FIM, FMA-motor, and FMA-UL. Conclusion: The present study demonstrated a critical loss of social participation in post-stroke subjects, likely attributed to various sensorimotor and functional aspects, in a semi-arid region of Northeast Brazil.
Keywords: Stroke; Social Participation; Functional Independence; Sensory Motor Performance.

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PARTICIPAÇÃO SOCIAL E SUAS RELAÇÕES COM OS ASPECTOS SENSORIOMOTORES E FUNCIONAIS EM PACIENTES PÓS AVC

RESUMO

Objetivo: Descrever a participação social e avaliar se há correlação com o comprometimento sensório-motor e a independência funcional de pacientes após Acidente Vascular Cerebral (AVC) em uma região do Nordeste do Brasil. Métodos:

Estudo transversal realizado com 34 pacientes com AVC, com idade igual ou superior a 18 anos, e selecionados por conveniência dos registros de saúde da instituição. Os participantes foram avaliados usando os seguintes instrumentos clínicos: Avaliação de Hábitos de Vida 3.1 (LIFE-H 3.1), Medida de Independência Funcional (MIF), Avaliação de Fugl-Meyer (FMA), subseção motora (membro superior-MS e membro inferior-MI) e Avaliação Sensorial de Nottingham (NSA). Resultados: Pacientes após AVC apresentaram redução da participação social (LIFE-H 3.1) e correlações positivas moderadas entre os domínios pessoal, mobilidade e responsabilidade com as pontuações da MIF total, MIF motora, FMA-motora e FMA-MS. Houve uma correlação positiva moderada entre as pontuações totais da LIFE-H 3.1, MIF, FMA-motora e FMA-MS. Conclusão: O presente estudo evidenciou perda crítica de participação social em sujeitos pós-AVC, provavelmente devido a diversos aspectos sensório-motores e funcionais, em uma região semi-árida do Nordeste brasileiro.

Palavras-chave: Acidente Vascular Cerebral; Participação social; Independência Funcional; Desempenho Sensório-Motor.

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INTRODUCTION

Stroke is a critical health problem worldwide[1] that causes motor, language, cognitive, and perceptual impairments, depending on extension, affected area, and early hospital care. These four impairments can limit the ability to perform basic activities of daily living or restrict participation in different scenarios.[2] Functional loss and changes in occupational identity (e.g., professional, leisure, or daily activities) are the main complaints of patients after stroke. However, survival and life expectancy increased due to advances in early treatments for stroke, including the support and care provided by family members and therapists, as well as the utilization of assistive tools for enhancing functional activities and daily living.[3,4]

Stroke affects physical, mental, and social aspects and may lead to social isolation, economic and emotional changes, and reduced quality of life and social participation.[5] Social participation is the involvement of an individual in daily living situations, including community, family, work, leisure, social, and civil goals.[6] Social engagement

(e.g., relationship with family and friends) and self-care (e.g., activities of hygiene maintenance) can also determine social participation.[6] It is also believed that the ability of post-stroke survivors to protecting and re-constructing the self, through new skills, are key factors for social participation after a stroke.[7]

Although rehabilitation should be guided by the biopsychosocial model, unfortunately, focus on social participation is still a challenge for rehabilitation professionals, since attention is mainly given to sensorimotor and functional limitations.[8] In addition, variations among countries and regions may hinder the applicability of intervention models.[9] Therefore, comprehending the regional determinants of social participation can enhance the effectiveness of therapeutic interventions and optimize the recovery and well-being of post-stroke patients.

However, to accomplish this, it is imperative to comprehend the personal and environmental factors that influence the degree of participation and engagement among individuals who have experienced a stroke. Environmental factors, including the accessibility of the physical environment, the financial aspects of rehabilitation, and the extent of social support, can significantly affect the engagement and participation of stroke survivors.[10]

This study aimed to describe social participation of post-stroke individuals and assess if there is a correlation with sensorimotor impairment and functional independence of patients after stroke in a region of Northeastern Brazil.

METHODS

This cross-sectional study was conducted between January 2017 and October 2019 at the Integrated Clinic of the Faculty of Health Sciences at Trairi, from Federal University of Rio Grande do Norte (Facisa/UFRN). The study was approved by the research ethics committee of Facisa (no. 2.622.853; CAAE 84951418.8.0000.5568) and performed according to the Declaration of Helsinki. All patients signed the informed consent form.

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Participants

The participants were selected by convenience, from the records of the Physical Therapy Outpatient of Facisa, initially seeking individuals with a clinical diagnosis of stroke. Subsequently, up to three attempts were made to contact them by phone. During the phone call, the researcher explained the study procedure and invited the participant for an initial in-person assessment. Additionally, during this contact, the assessors also asked about visual deficits and age, to prevent unnecessary travel.

Eligible criteria included subjects with clinical diagnosis of stroke aged above 18 years, with Mini-Mental State Examination (MMSE) score of 13 points (illiterate), 18 points (one to seven years of schooling), or 26 points (≥ eight years of schooling).[11] Subjects with uncorrected visual deficits or with aphasia/dysarthria were excluded from the study.

Procedures

One trained therapist assessed the participants using the following clinical measurement instruments:

1) Social Participation

The Assessment of Life Habits 3.1 (LIFE-H 3.1) questionnaire includes 77 items related to 12 domains of life habits and is divided into 37 items of "daily activities" (nutrition, fitness, personal care, communication, housing, and mobility) and 40 items of "social roles" (responsibilities, interpersonal relationships, community life, education, employment, and recreation). Each item ranges from zero (not accomplished) to nine (accomplished with no difficulty and no assistance). Total and subscale scores were calculated using the following equation: $(\Sigma_{scores} \times 10)/(\text{number of applicable items} \times 9)$. Higher scores indicate maximal participation.[12] The LIFE-H 3.1 can be applied both in the form of an interview and self-administered, and in this study we chose the interview form.

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2) Cognition

Cognitive assessment was conducted using MMSE, which assesses seven questions divided into seven dimensions (temporal and spatial orientation, immediate and spatial orientation, immediate and delayed recall, attention, language, and visual and spatial construction). Score ranges from 0 to 30 points, with higher scores indicating good cognitive performance. For this research, MMSE scores were considered according to schooling level of each subject.[11]

3) Functional Independence

The Functional Independence Measure (FIM) assessed the performance in functional activities. It comprises a set of 18 items that assess function in six areas: self-care, sphincter control, transfers, locomotion, communication, and social cognition. Each activity ranges from zero to seven (higher values represent better functional independence), and total score ranges from 18 to 126 points.[13] Dependency levels were classified according to total score: 18 points = complete dependence; 19-60 points = modified dependence (moderate assistance for up to 50% of tasks); 61- 103 points = modified dependence (minimal assistance for up to 25% of tasks); and 104-126 points = complete/modified independence.[13]

4) Motor impairment

The Fugl Meyer Assessment (FMA-motor) scale evaluates motor impairment in two domains (impairment of upper [FMA-UE] and lower [FMA-LE] extremities). Each item is scored on a three-point scale (0 = cannot perform, 1 = performs partially, or 2 = performs fully). Total motor score (100) was the sum of points for upper (maximum of 66 points) and lower extremities (maximum of 34 points).[14]

5) Sensory function

The Nottingham Sensory Assessment (NSA) evaluates sensory function in the upper extremity after stroke using the following subscales: tactile sensation (pressure, light touch, temperature, pinprick, tactile location on both sides of the body, and bilateral

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simultaneous touch), proprioception, stereognosis, and two-point discrimination. Total score for unaffected and affected sides of the body ranges from 0 to 90 points and 0 to 108 points, respectively. Higher values correspond to normal sensitivity.[15]

6) Clinical characteristics

Patients completed a general form including aspects related to clinical history (clinical and functional diagnosis, time of injury, type of stroke, hemiparetic side).

The assessments were performed individually, in a private room, ensuring privacy and no interruptions. The participants attended two sessions of approximately 60 minutes each.

Statistical analysis

Statistical analyses were performed using BioEstat version 5.3. Shapiro-Wilk test verified data normality, and descriptive analyses were presented as median and interquartile range. Spearman's correlation coefficient assessed correlation between functional instruments and sensory motor impairment (FIM [total and motor], FMA [total, EU, and LE]) and function (NSA), and LIFE-H 3.1. Values were interpreted as poor (*rs* = 0.00 to 0.25), weak (*rs* = 0.26 to 0.49), moderate (*rs* = 0.50 to 0 .69), strong (*rs* = 0.70 to 0.89), or very strong (*rs* = 0.90 to 1.00)[16]. A significance level of $p < 0.05$ was adopted.

RESULTS

Fifty seven subjects were initially selected for eligibility, but 15 could not be contacted. Therefore, 42 were recruited for evaluation. Patients who did not attend scheduled evaluations (n = 3), with aphasia or dysarthria (n = 3), or with cognitive deficit according to the MMSE (n = 2) were excluded. Thirty four patients were then included in this study.

Nineteen subjects were male (55.8%), with a median (Q1/Q3) time of lesion of 22.5 (9.25/36.7) months (n=32, 94.1% in the chronic phase) and with a median (Q1/Q3) age of 64.5 (57.5/76.5) years-old. Ischemic stroke (n=25, 73.5%) and the left hemiparetic side (n=19, 55.8%) were most present in this sample.

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Table 1 shows clinical characteristics of the sample.

Table 1. Clinical characteristics of patients (n=34).

Variables	Total Median (Q1-Q3)
MMSE	21.00 (16.25 - 25.75)
FIM (total)	91.00 (76.50 - 118.75)
Motor	67.00 (42.50 - 84.75)
Cognitive	31.00 (28.00 - 34.00)
FMA motor	52.00 (37.50 - 80.50)
Upper extremity	35.00 (19.50 - 53.75)
Lower extremity	18.50 (13.00 - 26.00)
NSA	140.00 (133.00 - 152.75)
LIFE-H 3.1	5.14 (3.40 - 6.38)
Nutrition	5.83(4.16 - 7.50)
Fitness	6.94 (5.62 - 9.65)
Personal care	7.01 (3.36 - 8.19)
Communication	6.66 (3.95 - 8.75)
Housing	3.81 (1.77 - 6.28)
Mobility	4.88 (3.33 - 7.11)
Daily activities subscore	6.08 (3.79 - 7.38)
Responsibilities	5.34 (5.5 - 8.54)
Interpersonal relationship	8.25 (7.14 - 9.84)
Community life	7.63 (5.79 - 9.68)
Education	0.00 (0.00 - 0.00)
Employment	0.00 (0.00 - 0.00)
Recreation	0.00 (0.00 - 2.14)
Social roles subscore	3.93 (3.09 - 5.38)

MMSE: Mini-Mental Status Examination; FIM: Functional Independence Measure; FMA: Fugl-Meyer Assessment; NSA: Nottingham Sensory Assessment; and LIFE-H 3.1: Assessment of Life Habits; 1°Q: first quartile; 3°Q: third quartile. LIFE-H data expressed by: (Σscores × 10)/(number of applicable items × 9).

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Moderate positive correlations were observed between personal care, mobility, and responsibility domains from LIFE-H 3.1 and FIM motor and total scores, FMA-motor, and FMA-UE. Correlations between the housing domain from LIFE-H 3.1 and FMA-motor and FMA-UE were also observed. LIFE-H 3.1 subscores (daily activities and social roles) showed moderate positive correlations with FMA-UE. Moderate positive correlations between LIFE-H 3.1 total score and FIM total score, FMA motor score, and FMA-UE were also found (Table 2).

Table 2. Correlations between clinical measurements and social participation.

Domains of LIFE-H 3.1	FIM total	FIM motor	FMA motor	FMA-UE	FMA-LE	NSA
	rs	*rs*	*rs*	*rs*	*rs*	*rs*
Nutrition	0.42*	0.39*	0.38*	0.49*	0.19	0.39*
Fitness	0.47*	0.43*	0.30	0.31	0.25	0.31
Personal care	0.58*	0.55*	0.63*	0.66*	0.54*	0.39*
Communication	0.23	0.19	0.30	0.35*	0.20	0.22
Housing	0.48*	0.45*	0.61*	0.66*	0.46*	0.34*
Mobility	0.52*	0.51*	0.62*	0.68*	0.46*	0.46*
Responsibility	0.48*	0.52*	0.60*	0.65*	0.49*	0.29
Interpersonal Relationship	0.27	0.27	0.27	0.22	0.34*	-0.00
Community life	0.39*	0.41*	0.43*	0.49*	0.26	0.24
Education	-0.15	-0.17	-0.33	-0.32	-0.34*	0.17
Employment	0.11	0.09	0.21	0.21	0.19	-0.06
Recreation	0.43*	0.42*	0.31	0.34	0.22	0.14
Daily activities subscore	0.46*	0.40*	0.49*	0.52*	0.36*	0.35*
Social roles subscore	0.47*	0.43*	0.48*	0.52*	0.37*	0.23
Total score	0.52*	0.46*	0.55*	0.59*	0.44*	0.30

FIM: Functional Independence Measure; FMA: Fugl-Meyer Assessment; UE: upper extremity; LE: lower extremity; NSA: Nottingham Sensory Assessment; LIFE-H 3.1: Assessment of Life Habits. rs: coefficient of correlation; *$p < 0.05$.

DISCUSSION

Considering that stroke induces changes in the lives of individuals due to loss of autonomy and independence, social participation should be the main goal of therapeutic process.[17] The present study evaluated relationships between social participation and sensorimotor and functional aspects of patients after stroke living in northeastern Brazil.

Elderly and young patients after stroke have different social participation needs, often influenced by age, social status, retirement, and comorbidities.[18] The lack of professional occupation after a stroke in the present study (employment item of Life-H

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3.1) corroborates the study that shows that rates of post-stroke return-to-work varied from 7.3 to 74.5%, of individuals under 65 years of age did not return to work after a stroke.[19] This result may explain the decreased quality of life and increased risk of depression since unemployment due to stroke is usually followed by loss of social status.[19] Moreover, low educational level of participants may worsen employability.

These subjects were mainly employed in manual work, hindering the returning to activities due to sensorimotor and functional limitations after stroke. Also, most of the studied population aged over 60 years, which may decrease work activities due to retirement. Previous studies showed that older adults had more restricted social participation than younger ones after stroke.[20,21]

Social participation needs may vary depending on the professional age of patients. Since our sample was mostly elderly, social participation needs and goals should be focused on other domains, such as recreation. This aspect should be considered since no patient reported participation in artistic and cultural events. Similarly, a study from a large Brazilian metropolis using LIFE-H 3.1 questionnaire in patients after stroke showed restricted social participation in activities outside their house.[22] These results are similar with our data, despite different socioeconomic and demographic profiles found in northeastern Brazil.

A previous study considered the physical environment as a barrier to broad participation in daily living of patients after stroke.[23] This finding corroborates positive and strong correlations found between domains of community life and daily activities and environment. However, positive support may influence social participation more than any other factor.[24] When an individual has someone to interact with or perform recreational activities, social support might become a predictor of social reintegration after stroke,[24] supporting our findings.

Patients presented moderate to severe motor impairment, evaluated using the FMA motor scale. Moderate correlations between FMA-motor and FMA-UE scores with LIFE-H 3.1 subdomains (personal care, housing, mobility, and responsibility) and total score were also observed. Thus, patients after stroke possibly renounce participating in functional activities due to motor impairment caused by the condition, adjusting their lives according to changes in motor skills.[7] Adjustments in lifestyle and social

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participation were described in a study[25] that followed the first 12 months of stroke recovery and observed that patients with mild impairment (measured using the Stroke Levity Scale) had higher social participation scores than those with moderate and severe impairments.[25] Although improvements in social participation after stroke were probably due to recovery of body functions (especially in the first months), they were not limited to gains in body and skill function, especially when individuals with increased initial stroke severity performed rehabilitation to improve social participation.[25]

Balance deficits and impairment of the lower extremities in post-stroke patients increase the risk of falling, limit community walking, and restrict social participation.[24] However, in the present study we found a moderate correlation between the FMA-LE and only the daily activities (personal care) domain of LIFE-H 3.1.

The level of motor independence measured using FIM was moderately correlated with domains of personal care, mobility, responsibility, and total score of social participation measured using LIFE-H 3.1. Functional independence (especially motor independence) was suggested as the best predictor of social participation after stroke, based on the International Classification of Functioning, Disability, and Health.[26] Therefore, we highlight the importance of functional independence to reintegrate patients into society. Patients presented increased restriction to social roles (responsibility, interpersonal relationships, community life, education, work, and recreation), highlighting the importance of rehabilitation professionals to reintegrate patients after stroke into society.

Furthermore, the relationships between sensorimotor and functional aspects and social participation suggest that therapeutic models should prioritize short-term goals aimed at enhancing social participation, which may include activities that promote community integration.[27,28] Also, measurement instruments should be used for different particularities of social participation, such as social contact and contributions to society. However, further research is essential to establish rehabilitation strategies for improving social participation.

This study was conducted in a semi-arid region of northeastern Brazil (Trairi Potiguar region). In this area, the scarcity and irregularity of rainfall have hindered its socioeconomic development. The region is predominantly rural, with approximately one-

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third of the population living in rural areas, totaling an estimated population of 145,990 inhabitants.[29] These regional limitations can be considered as access barriers, such as limited access to leisure facilities, inadequate housing, employment opportunities, insufficient infrastructure, lack of proper public area paving, and limited mobility and social interactions. These barriers can significantly limit social participation and integration into society, especially for individuals who have experienced a stroke.

Despite the limitations found during the development of the present study, based on the observed data, it became possible to identify the main difficulties associated with the social participation of these post-stroke individuals, guiding the development of new treatment strategies and integration of this population in the community.

Final Considerations

The present study showed critical loss of social participation in patients after stroke from northeastern Brazil (Trairi Potiguar region), probably due to several sensorimotor and functional aspects. According to the results found, the factors associated with social participation may be harmed due to physical and functional losses after stroke, requiring greater understating on the subject, so that strategies in favor of social participation and well-being of this population will be developed.

Acknowledgments

The authors thanks the contributions of members from the Motricity and Human Physiology (MOFISH) Research Group of the Federal University of Rio Grande do Norte - Faculty of Health Sciences at Trairi.

Funding source:

This study was carried out with the support of the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Financing Code 001, and with a scientific initiation scholarship (PIBIC) from the National Council for Scientific and Technological Development (CNPq), through the announcement #01/2018 of the Pró-Reitoria de Pesquisa (Propesq) at the Federal University of Rio Grande do Norte (UFRN).

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Submitted: June 21, 2023

Accepted: April 11, 2024

Published: September 18, 2024

PE-PROOF

Authors' Contributions:

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All authors have approved the final version of the text.

Conflict of interest: There are no conflicts of interest.

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Editor: Eliane Roseli Winkelmann. PhD
Editor-in-chief: Adriane Cristina Bernat Kolankiewicz. PhD

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