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ORIGINAL ARTICLE

Impact of early rehabilitation on post-stroke quality of life

Impacto de la rehabilitación temprana en la calidad de vida posterior a un accidente cerebrovascular

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Abstract

Background: *Stroke cerebrovascular accident, is one of the leading causes of disability worldwide. Early rehabilitation has been shown to improve patients' functionality and quality of life (QoL).* **Objective:** *The objective of the study is to compare QOL in patients with ischemic stroke who received early rehabilitation.* **Material and methods:** *A comparative study was conducted in a secondary care hospital. Ninety patients over 18 years of age with ischemic stroke were included in this study. The patients were divided into two groups (with and without early rehabilitation). The stroke-specific quality of life scale-38 score and the modified Rankin Scale were administered at 72 h and 30 days. Descriptive statistics were used, and comparisons were made using the Chi-square test.* **Results:** *55.5% were men, with a mean age of 68 years. 68.8% had at least one risk factor, with high blood pressure being the most common. The predominant sequelae were hemiplegia in 74.4%. At 72 h and 30 days, patients with early rehabilitation had less disability (p = 0.000) and better QoL (p = 0.000).* **Conclusion:** *Early rehabilitation after ischemic stroke significantly improves functionality and QoL. Its early incorporation should be considered a fundamental part of comprehensive stroke management.*

Keywords: *Stroke. Rehabilitation. Quality of life. Recovery of function.*

Resumen

Antecedentes: *El accidente cerebrovascular (ACV) es una de las principales causas de discapacidad a nivel mundial. La rehabilitación temprana ha demostrado mejorar la funcionalidad y calidad de vida (CV) de los pacientes.* **Objetivo:** *Comparar la CV en pacientes con ACV isquémico que recibieron rehabilitación temprana.* **Material y métodos:** *Estudio comparativo en un hospital de segundo nivel. Se incluyeron 90 pacientes mayores de 18 años con ACV isquémico. Se dividió la muestra en 2 grupos (con y sin rehabilitación temprana). Se aplicó la escala ECVI-38 y la escala de Rankin modificada a las 72 horas y 30 días. Se utilizó estadística descriptiva y se realizó una comparación con la prueba de Chi Cuadrada.* **Resultados:** *El 55.5% fueron hombres, con edad media de 68 años. El 68.8% tuvo al menos un factor de riesgo, siendo la hipertensión arterial el más común. La secuela predominante fue la hemiplejía en 74.4%. A las 72 horas y a los 30 días, los pacientes con rehabilitación temprana presentaron menor discapacidad (p = 0.000) y mejor CV (p = 0.000).* **Conclusión:** *La rehabilitación temprana posterior a un ACV isquémico mejora significativamente la funcionalidad y calidad de vida. Su incorporación temprana debe considerarse como parte fundam.ental del manejo integral del ACV.*

Palabras clave: *Accidente cerebral vascular. Rehabilitación. Calidad de vida. Recuperación de la función.*

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Introduction

Stroke, also known as cerebrovascular accident, is a medical emergency characterized by interruption of cerebral blood flow, resulting in permanent or transient involvement of one or more brain regions and affecting one or more blood vessels[1,2].

Globally, stroke is the second leading cause of mortality and the first cause of disability; however, in high-income countries it ranks as the third leading cause of death[3].

In Mexico, the incidence is 2.4 cases/1,000 inhabitants, with a higher frequency in men than in women and a predominance from 65 years of age onward[4].

Stroke is classified as ischemic or hemorrhagic. Ischemic stroke is the most frequent (~80%), caused by occlusion of a cerebral artery due to thrombotic or embolic events, which leads to hypoperfusion, hypoxia, release of inflammatory mediators and free radicals, cellular injury, and apoptosis[5,6]. Hemorrhagic stroke accounts for ~20% of cases and is mainly due to rupture of a blood vessel, resulting in intracerebral or subarachnoid hemorrhage[7].

Risk factors include systemic hypertension (the most important), diabetes mellitus, dyslipidemia, smoking, alcohol use, physical inactivity, obesity, depression, and cardiac disease (history of acute myocardial infarction and atrial fibrillation)[8,9].

Clinical presentation depends on the affected artery or arteries and may include hemiparesis, hemiplegia, hypotonia, hyperreflexia, gait disturbances, sensory deficits, and aphasia, among others[10,11].

Diagnosis is based on clinical manifestations and neuroimaging – computed tomography or magnetic resonance imaging – which are crucial to determine stroke type and location and to enable optimal, timely treatment[12,13].

One of the most important post-stroke issues is disability, which poses a challenge for health systems and families due to the need for prolonged care, rehabilitation, and readaptation[14].

Another relevant aspect is loss of quality of life (QoL) due to post-stroke sequelae, which can negatively affect emotional, cognitive, family, and social domains[15,16].

In this context, early rehabilitation has become central to comprehensive stroke management. Multiple studies and guidelines have shown that early rehabilitation – initiated within 24-72 h after stroke – plays an important role in functional recovery and QoL (mobility, independence, social participation)[17,18].

The objective of the present study was to compare QoL in patients with ischemic stroke who received early rehabilitation.

Material and methods

We conducted a comparative, impact, longitudinal, single-center, homodemic, prospective study at a secondary-level hospital of the Instituto Mexicano del Seguro Social (IMSS) in Puebla, Mexico. Patients ≥ 18 years with ischemic stroke diagnosed by computed tomography were included. Patients with prior stroke and those with other concomitant neurologic diseases were excluded; those who requested withdrawal for any reason or for whom a second evaluation at 30 days could not be performed were removed.

Patients were divided into two groups: group 1 received early rehabilitation (within the first 7 days after stroke) and group 2 did not.

The intervention included physical rehabilitation (mobility and gait, balance, muscle strength), occupational therapy (basic activities of daily living), and speech-language therapy (for aphasia or dysarthria) delivered by physiotherapists, occupational therapists, and communication therapists, either institutionally or privately; sessions lasted 45 min, 3 times/week.

The group without early rehabilitation received standard in-hospital care with active and passive mobilization when possible, as well as patient/caregiver education.

Sociodemographic and clinical data were recorded, including age, sex, risk factors, sequelae, QoL, and rehabilitation.

QoL was assessed at 72 h and 30 days after the event using two instruments. The Stroke-Specific QoL scale (SS-QoL; stroke-specific quality of life scale [ECVI]-38 in Spanish), developed in 2004 and validated in 2008 by Fernández et al., comprises 38 items grouped into 8 domains (cognition, physical state, feelings, emotions, communication, basic activities of daily living, instrumental activities of daily living, and socio-family functioning). Each item uses a Likert-type response (1-5); domain scores range 0-100 (lower scores = better QoL); a total score is obtained by averaging all domain scores. It has a Cronbach's alpha of 0.79-0.95 and an intra-class correlation coefficient of 0.81-0.96[19].

Interpretation[20]:

- < 25: no impairment
- 25 a < 50: mild impairment
- 50 a < 75: moderate impairment
- 75-100: severe impairment

The modified Rankin Scale (mRS) evaluates the degree of dependence after stroke or other neurologic conditions, scoring from 0 (asymptomatic) to 6 (death); higher scores indicate greater disability[21].

Statistical analysis was performed using Statistical Package for the Social Sciences v.25. Descriptive statistics used measures of central tendency and dispersion. The Kolmogorov-Smirnov test assessed the distribution of quantitative variables. To compare QoL by ECVI-38 and mRS between the early-rehabilitation and no-rehabilitation groups at 72 h and 30 days, the Chi-square (χ^2) test was used. A $p < 0.05$ was considered statistically significant.

This study was approved by the IMSS Local Health Research Committee No. 2108. All patients provided informed consent. Information was handled with strict confidentiality and for research purposes only.

Results

A total of 90 patients with ischemic stroke were recruited: 50 (55.5%) men and 40 (44.4%) women, aged 29-96 years (mean 68 years; standard deviation ± 13).

Regarding risk factors, 62 (68.8%) had at least one. Systemic hypertension was most prevalent (57.7%), followed by type 2 diabetes (33%) and heart disease (10%) (Table 1).

As for post-stroke sequelae, the most frequent was hemiplegia in 67 (74.4%), followed by hemiparesis in 37 (41.1%); aphasia and hearing deficits were least frequent, each in 1 (1.1%). The remainder is shown in table 2.

Functional status by mRS showed that at 72 h, severe disability predominated in 50 (55.6%), while only 1 (1.1%) had mild disability. At 30 days, 41 (45.6%) still had severe disability, and 8 (8.9%) had mild or very mild disability. Details are shown in table 3.

QoL by ECVI-38 showed that at 72 h, most patients (47, 52.2%) had severe impairment, and only 13 (14.4%) had mild impairment. At 30 days, severe impairment persisted in 41 (45.6%), and mild impairment increased to 23 (25.6%). Results are detailed in table 3.

A total of 37 (41.1%) patients received early rehabilitation; of these, 18 (48.6%) received institutional rehabilitation, and the remainder private. Additional results are detailed in table 4.

Based on mRS, comparing patients with and without early rehabilitation: at 72 h, a higher proportion without early rehabilitation had severe disability (77.4%) compared with those with early rehabilitation (24.3%). Conversely, the early-rehabilitation group showed predominance of moderately severe (45.9%) and moderate (27.0%) disability. This difference was significant ($p = 0.000$), indicating a substantial impact of early rehabilitation on disability.

At 30 days, differences were accentuated: the no-rehabilitation group predominantly had severe disability (73.6%), whereas the rehabilitation group more frequently had moderate (37.8%), mild (21.6%), and very mild (18.9%) disability. The difference remained statistically significant ($p = 0.000$), suggesting

Table 1. Risk factors

Comorbidity	(n = 90)	%
Systemic arterial hypertension	52	57.7
Type 2 diabetes	29	32.2
Heart disease	9	10.0

Table 2. Post-stroke sequelae

Sequela	(n = 90)	%
Hemiplegia	67	74.4
Hemiparesis	37	41.1
Aphasia	1	1.1
Dysarthria	15	16.6
Dysphagia	12	13.3
Visual impairment	0	0
Hearing impairment	1	1.1

Table 3. Modified rankin scale and ECVI-38

Modified rankin scale	72 h (n = 90) (%)	30 days (n = 90) (%)
Asymptomatic	0 (0.0)	0 (0.0)
Very mild	0 (0.0)	8 (8.9)
Mild	1 (1.1)	8 (8.9)
Moderate	14 (15.6)	17 (18.9)
Moderately severe	25 (27.8)	16 (17.8)
Severe	50 (55.6)	41 (45.6)
Death	0 (0.0)	0 (0.0)
ECVI-38		
No impairment	0 (0.0)	0 (0.0)
Mild	13 (14.4)	23 (25.6)
Moderate	30 (33.3)	26 (28.9)
Severe	47 (52.2)	41 (45.6)

ECVI-38: stroke-specific quality of life scale.

Table 4. Early rehabilitation

Category	n	%
Early rehabilitation (n = 90)		
Early rehabilitation	37	41.1
No rehabilitation	53	58.9
Type of early rehabilitation (n = 37)		
Institutional	18	48.6
Private	19	51.3

Table 5. Modified rankin scale in relation to early rehabilitation

Modified rankin scale	Early rehabilitation (n = 37)		No rehabilitation (n = 53)		Chi square (p)
	n	%	n	%	
72 h					
Asymptomatic	0	0.0	0	0.0	0.000
Very mild	0	0.0	0	0.0	
Mild	1	2.7	0	0.0	
Moderare	10	27.0	4	7.5	
Moderately severe	17	45.9	8	15.1	
Severe	9	24.3	41	77.4	
Death	0	0.0	0	0.0	
30 days					
Asymptomatic	0	0.0	0	0.0	0.000
Very mild	7	18.9	1	1.9	
Mild	8	21.6	0	0.0	
Moderate	14	37.8	3	5.7	
Moderately severe	6	16.2	10	18.9	
Severe	2	5.4	39	73.6	
Death	0	0.0	0	0.0	
ECVI-38					
72 h					
No impairment	0	0.0	0	0.0	0.000
Mild impairment	11	29.7	2	3.8	
Moderate impairment	18	48.6	12	22.6	
Severe impairment	8	21.6	39	73.6	
30 days					
No impairment	0	0.0	0	0.0	0.000
Mild impairment	21	56.8	2	3.8	
Moderate impairment	14	37.8	12	22.6	
Severe impairment	2	5.4	39	73.6	

ECVI-38: stroke-specific quality of life scale.

a positive impact of early rehabilitation on functional recovery. Additional results are in table 5.

ECVI-38 QoL results in relation to early rehabilitation: at 72 h, patients without early rehabilitation predominantly exhibited severe impairment (73.6%) compared with the rehabilitated group (21.6%), while the latter showed higher proportions of moderate (48.6%) and mild (29.7%) impairment. The difference was statistically significant (p = 0.000). At 30 days, results continued to favor the early-rehabilitation group, with mainly mild (56.8%) and moderate (37.8%) impairment, whereas the no-rehabilitation group predominantly showed severe impairment (73.6%). This difference was also statistically significant (p = 0.000), suggesting that early rehabilitation improves QoL (Table 5).

Discussion

Stroke remains a leading cause of disability and mortality worldwide, with rising prevalence across age groups; thus, management strategies have increasingly emphasized early rehabilitation, which has shown a key role in functional outcomes, control of sequelae, and QoL[22].

In this study of 90 ischemic stroke patients, male predominance (55.5%) aligns with Herrera et al. (2023), who also reported male predominance (66.7%)[23].

Ischemic stroke is associated with risk factors such as systemic hypertension, type 2 diabetes, and tobacco/alcohol use[24]. Our findings were largely consistent with hypertension and type 2 diabetes present in both.

Regarding mRS, at 72 h and 30 days, severe disability predominated (55.6% and 45.6%, respectively), differing from a 2023 national study in Veracruz[25] that included 172 patients and reported 49% with mild disability.

For QoL, our study showed a high proportion with severe impairment at both 72 h (52.2%) and 30 days (45.6%), contrasting with international literature[26] reporting predominance of moderate impairment (36.3%) and with national data[25] showing 48.2% without impairment and 37.2% with mild impairment. These discrepancies may reflect demographic characteristics, sociocultural factors, and methodological differences.

Post-stroke sequelae significantly impact QoL; therefore, rehabilitation has become essential. International literature indicates that early rehabilitation (24-72 h post-stroke) benefits these patients[27].

In our cohort, 41.1% received early rehabilitation and, at 30 days, showed lower disability on mRS (p = 0.000) and less impairment on ECVI-38 (p = 0.000) versus those without early rehabilitation – differences that are statistically significant and indicate improved functional status. These results are consistent with national studies[23] showing QoL improvement through the short form-12 (p = 0.02) and improved functional capacity by mRS (p < 0.01).

These findings align with international evidence noting that the immediate post-stroke period exhibits heightened neuroplasticity and better responsiveness; early rehabilitation has therefore yielded improved outcomes across functional domains (reintegration into daily activities) and QoL, as well as reduced psychological impact (post-stroke depression)[28].

Main limitations include a relatively small sample size, lack of standardization in rehabilitation type and duration, and limited follow-up. Future studies addressing these gaps will allow more generalizable results.

Conclusion

Early rehabilitation after ischemic stroke yields significant improvements in functional status and QoL at 30 days. Timely implementation of rehabilitation is an effective strategy within comprehensive patient management.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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