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Neurological Deficit and Recovery in Stroke Patients: A Descriptive Study

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Abstract

Physical activity supports recovery after a stroke, yet 40% of survivors remain inactive after a year. Understanding activity patterns is key to sustaining rehabilitation benefits. Using purposive sampling, a descriptive study assessed neurological deficits and functional recovery among 60 stroke patients in a tertiary care hospital. Tools included socio-demographic data, the National Institute of Health Stroke Scale, and the Modified Barthel Index. Results showed 23.33% had minor strokes, 70.00% had moderate, and 6.67% had moderate-to-severe strokes. Functional recovery scores revealed 56.67% with moderate dependency, 20.00% with mild dependency, and 23.33% with minimal dependency. A moderate positive correlation was found between neurological deficit and functional recovery scores. Early intervention and continuous monitoring are crucial to improving outcomes for stroke survivors.

Keywords: Neurological deficit,Functional recovery,Stroke patients.

INTRODUCTION

Cerebrovasculardisorders, particularly stroke, pose a significant global health concern, being the third leading cause of death and a leading cause of long-term disability. Strokes are classified as ischemic (85%) or haemorrhagic (15%). Ischemic strokes result from vascular occlusion, causing a loss of brain function, while haemorrhagic strokes occur due to bleedinginto brain tissue, often linked to hypertension or aneurysms.Stroke survivors face significant challenges, including physical inactivity, with approximately 40% reporting inactivity one-year post-stroke. This reduced activity contributes to slower recovery and diminished rehabilitation benefits. Understanding physical activity patterns over time is vital to promoting long-term physical engagement, improving outcomes, and enhancing quality of life after stroke. Proactive interventions to maintain physical fitness can help mitigate disability and support sustained recovery in stroke survivors.

BACKGROUND OF THE STUDY

Global Scenario:

Annually, 15 million people suffer from stroke worldwide, with 5 million deaths and 5 million left permanently disabled. In India, stroke accounts for 68.6% of incidence, 70.9% of deaths, and 77.7% of DALYs lost, making it the second leading cause of death. Nearly 1,85,000 strokes occur annually in India, with one stroke every 40 seconds and one death every 4 minutes.

National Scenario:

According to the National Institutes of Health, each year 795,000 Indians were affected by stroke and about 137,000 lose their life.

Tamil Nadu scenario:

The adjusted annual stroke incidence per 100,000 was 135 overall (urban: 135, rural: 138). Rates were 74.8 for ischemic stroke, 10.1 for intracerebral haemorrhage, and 4.2 for subarachnoid haemorrhage.

These findings emphasize the need for timely interventions, rehabilitation, and support systems to reduce disabilities and improve outcomes.

NEED FOR THE STUDY

Stroke is the leading cause of acute hospitalization in neurology, with the first three months being critical for functional recovery. While advancements in stroke care exist, the optimal timing and level of post-stroke physical activity interventions remain unclear. Rehabilitation serves as the cornerstone of stroke care, aiming to enhance the quality of life in the absence of curative therapies.This study addresses key gaps by assessing acute neurological deficits and functional recovery in stroke patients at a tertiary care hospital. It seeks to identify factors influencing outcomes, optimize diagnostic and therapeutic strategies, and develop personalized care plans. The findings aim to improve rehabilitation approaches, enhance patient independence, and inform public health initiatives to reduce stroke burden. By evaluating stroke severity and recovery patterns, the study provides insights into common neurological consequences, enabling early intervention and prevention strategies. Ultimately, this research contributes to improving stroke management, advancing scientific knowledge, and enhancing long-term patient outcomes.

STATEMENT OF THE PROBLEM

“A study to assess the acute neurological deficit and functional recovery of the stroke patients at selected tertiary care hospital”

PRIMARY OBJECTIVE

- To assess the level of neurological deficit and functional recovery among stroke patients.

SECONDARY OBJECTIVES

- To correlate the relationship between Neurological deficit score and functional recovery after stroke.
- To associate the level of neurological deficit with selected demographic variables.
- To associate the level of functional recovery with selected demographic variables.

OPERATIONAL DEFINITIONS

Assess:

This study evaluates stroke patients' neurological deficits and recovery using NIHSS and the Modified Barthel Index (MBI).

Neurological Deficit:

Impaired body function is caused by brain, spinal cord, muscle, or nerve injury.

Functional Recovery:

Regaining lost functions through rehabilitation after brain, spinal cord, muscle, or nerve injury.

Stroke:

Brain damage is caused by blocked blood flow or sudden bleeding, impairing neurological functions.

ASSUMPTIONS

- The study assumes high functional recovery in stroke patients with acute neurological deficits.

HYPOTHESIS

H1: A significant difference exists between neurological deficit and functional recovery in stroke patients.

H2: Neurological deficit and functional recovery are significantly associated with selected demographic variables.

DELIMITATIONS

- The study focused on acute stroke patients over four weeks at a single centre in Chennai.

METHODOLOGY

Research Approach& Design

Quantitative Descriptive study.

Research Setting

Institute of Neurology, RGGGH, Chennai.

Study Population

Patients affected by acute Stroke.

Sample Size

60 Stroke patients

Sampling Technique

Non-randomizedpurposive sampling technique

SAMPLING CRITERIA

Inclusion Criteria:

- Patients with acute neurological disorders diagnosed as stroke.
- Stroke patients aged 40-59 years.
- Stroke patients who can understand or read Tamil/English.

Exclusion Criteria:

- Patients unwilling to participate.
- Critically ill patients during data collection.
- Patients with chronic stroke.

- Patients involved in other research studies.

Data Collection Instruments

- **Demographic Variables**:Age, gender, marital status, education, family structure, residence, socio-economic status, occupation, lifestyle habits, and stroke duration.
- **National Institute of Health Stroke Scale, Modified Barthel Index Scale**

Reliability and Validity

Tool validity was confirmed by nursing and neurology experts. Reliability, assessed via Cronbach's alpha, showed NIHSS (0.82, test-retest 0.93) and Modified Barthel Index (0.84, test-retest 0.94).

ETHICAL CONSIDERATIONS

The study received ethical clearance from the committee, as well as approval from the Dean and Head of the Neurology Department while adhering to all ethical principles.

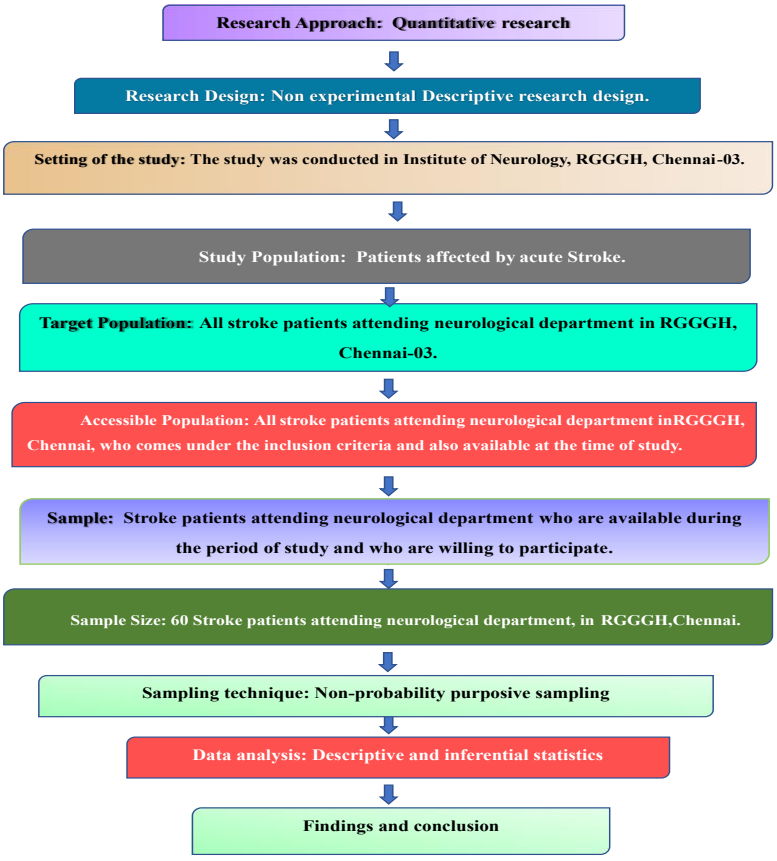

FIG.1. SCHEMATIC PRESENTATION

RESULTS

The study found that 23.33% of stroke patients had minor stroke scores, 70.00% had moderate scores, and 6.67% had moderate-to-severe scores. For functional recovery, 56.67% showed moderate dependency, 20.00% had a mild dependency, and 23.33% had a minimal dependency. A significant positive moderate correlation indicated that as neurological deficit scores decreased, functional recovery scores moderately increased. Patients aged 46–50 years and those with a 2-day stroke duration had higher moderate-to-severe deficits, while males, individuals from low socio-economic backgrounds, and

those with a 6–7-day stroke duration showed more mild-to-minimal dependency. Statistical significance was assessed using the chi-square test.

TABLE 1. LEVEL OF NEUROLOGICAL DEFICIT SCORE

Level of neurologic deficit score	Number of Stroke patients	%
No stroke	0	0.00%
Minor stroke	14	23.33%
Moderate stroke	42	70.00%
Moderate to severe stroke	4	6.67%
Severe stroke	0	0.00%
Total	60	100.0%

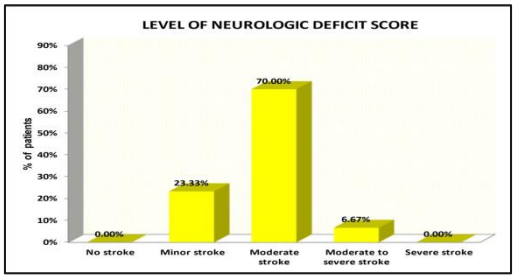

FIG.2.LEVEL OF NEUROLOGICAL DEFICIT SCORE

TABLE 2. LEVEL OF FUNCTIONAL RECOVERY SCORE

Level of score	Number of Stroke patients	Percentage (%)
Total dependency	0	0.00%
Severe dependency	0	0.00%
Moderate dependency	34	56.67%
Mild dependency	12	20.00%
Minimal dependency	14	23.33%
Total	60	100.0%

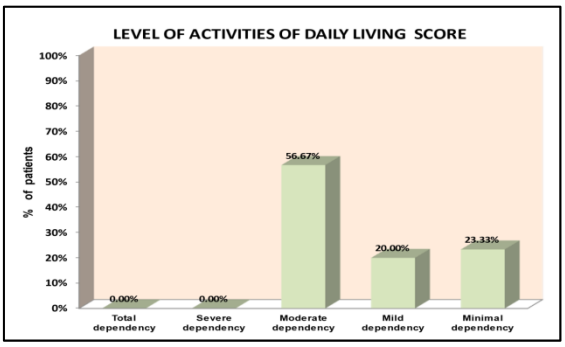

FIG.3.LEVEL OF FUNCTIONAL RECOVERY SCORE

TABLE 3. ASSOCIATION BETWEEN LEVEL OF NEUROLOGIC DEFICIT SCORE AND PATIENT'S DEMOGRAPHIC VARIABLES

Demographic variables		**Neurologic deficit**				**N**	**Chi-square test**
		Minor stroke		**Moderate to severe stroke**			
		N	%	N	%		
Age	40-45 years	1	7.69%	12	92.31%	13	X2=**13.39 p=0.001*** (S)**
	46-50 years	1	4.76%	20	95.24%	21	
	51-59 years	12	46.15%	14	53.85%	26	
Gender	Male	7	25.00%	21	75.00%	28	X2=0.08 p=0.77(NS)
	Female	7	21.88%	25	78.13%	32	
Marital status	Married	14	23.33%	46	76.67%	60	X2=0.00 p=1.00(NS)
	Unmarried	0	0.00%	0	0.00%	0	
	Divorced	0	0.00%	0	0.00%	0	
	Separated	0	0.00%	0	0.00%	0	
Education	No Formal Education	4	40.00%	6	60.00%	10	X2=7.54 p=0.10(NS)
	Primary	6	25.00%	18	75.00%	24	
	Secondary	1	11.11%	8	88.89%	9	
	Higher Secondary	1	7.14%	13	92.86%	14	
	Graduate	0	0.00%	0	0.00%	0	
	Postgraduate	2	66.67%	1	33.33%	3	
Type of family	Nuclear family	3	14.29%	18	85.71%	21	X2=4.44 p=0.11(NS)
	Joined family	10	26.32%	28	73.68%	38	
	Extended Family	1	100.00%	0	0.00%	1	
Residen	Rural	6	35.29%	11	64.71%	17	X2=2.11p=

tial area	Semi-urban	3	23.08%	10	76.92%	13	0.34(NS)
	Urban	5	16.67%	25	83.33%	30	
Socio economic Status	Low	10	32.25%	21	67.75%	31	X2=2.86 p=0.09(NS)
	Medium	4	13.79%	25	86.21%	29	
	High	0	0.00%	0	0.00%	0	
Occupation status	Government Employee	0	0.00%	0	0.00%	0	X2=3.80 p=0.26 (NS)
	Private Employee	8	22.22%	28	77.78%	36	
	Unemployed	3	42.86%	4	57.14%	7	
	Retired	2	40.00%	3	60.00%	5	
	Homemaker	1	8.33%	11	91.67%	12	
	Student	0	0.00%	0	0.00%	0	
Life style habits	Non-smoker & Non-drinker	4	17.39%	19	82.61%	23	X2=1.37 p=0.71(NS)
	Smoker	4	23.53%	13	76.47%	17	
	Drinker	3	25.00%	9	75.00%	12	
	Others	3	37.50%	5	62.50%	8	
Duration of stroke	2 days	2	5.88%	32	94.12%	34	**X^2=15.72 p=0.001*** (S)**
	3-5 days	3	30.00%	7	70.00%	10	
	6-7 days	9	56.25%	7	43.75%	16	

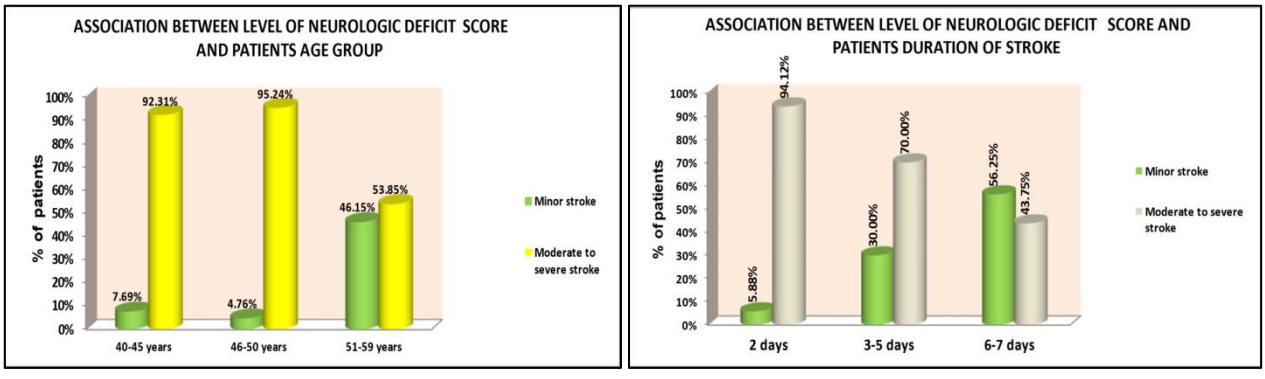

FIG.4.ASSOCIATION BETWEEN THE LEVEL OF NEUROLOGIC DEFICIT SCORE AND PATIENT'S DEMOGRAPHIC VARIABLES

TABLE 4. ASSOCIATION BETWEEN THE FUNCTIONAL RECOVERY SCORE WITH THEIR DEMOGRAPHIC VARIABLES

Demographic variables	**Functional recovery score**		**n**	**Chi-square test**
	Moderate	**Mild to**		

		dependency		minimal dependency			
		N	%	n	%		
Age	40-45 years	8	61.54 %	5	38.46%	13	X2=4.17 p=0.12(NS)
	46-50 years	15	71.43 %	6	28.57%	21	
	51-59 years	11	42.31 %	15	57.69%	26	
Gender	Male	11	39.28 %	17	60.72%	28	X2=6.45 p=0.01**(S)
	Female	23	71.88 %	9	28.12%	32	
Marital status	Married	34	56.67 %	26	43.33%	60	X2=0.00 p=1.00(NS)
	Unmarried	0	0.00%	0	0.00%	0	
	Divorced	0	0.00%	0	0.00%	0	
	Separated	0	0.00%	0	0.00%	0	
Education	No Formal Education	2	20.00 %	8	80.00%	10	X2=10.54 p=0.09(NS)
	Primary	13	54.17 %	11	45.83%	24	
	Secondary	8	88.89 %	1	11.11%	9	
	Higher Secondary	10	71.43 %	4	28.57%	14	
	Graduate	0	0.00%	0	0.00%	0	
	Postgraduate	1	33.33 %	2	66.67%	3	
Type of family	Nuclear family	12	57.14 %	9	42.86%	21	X2=1.33 p=0.51(NS)
	Joined family	22	57.89 %	16	42.11%	38	
	Extended Family	0	0.00%	1	100.00 %	1	
Residential area	Rural	8	47.06 %	9	52.94%	17	X2=0.90p=0.64 (NS)
	Semi-urban	8	61.54 %	5	38.46%	13	
	Urban	18	60.00 %	12	40.00%	30	

Socio economic status	Low	10	32.26 %	21	67.74%	31	X2=15.56 p=0.001***(S)
	Medium	24	82.76 %	5	17.24%	29	
	High	0	0.00%	0	0.00%	0	
Occupation status	Government Employee	0	0.00%	0	0.00%	0	X2=8.91 p=0.07NS)
	Private Employee	18	50.00 %	18	50.00%	36	
	Unemployed	2	28.57 %	5	71.43%	7	
	Retired	3	60.00 %	2	40.00%	5	
	Homemaker	11	91.67 %	1	8.33%	12	
	Student	0	0.00%	0	0.00%	0	
Life style habits	Non-smoker & Non-drinker	18	78.26 %	5	21.74%	23	X2=16.80 p=0.71(NS)
	Smoker	12	70.59 %	5	29.41%	17	
	Drinker	2	16.67 %	10	83.33%	12	
	Others	2	25.00 %	6	75.00%	8	
Duration of stroke	2 days	26	76.47 %	8	23.53%	34	X2=13.10 p=0.001***(S)
	3-5 days	4	40.00 %	6	60.00%	10	
	6-7 days	4	25.00 %	12	75.00%	16	

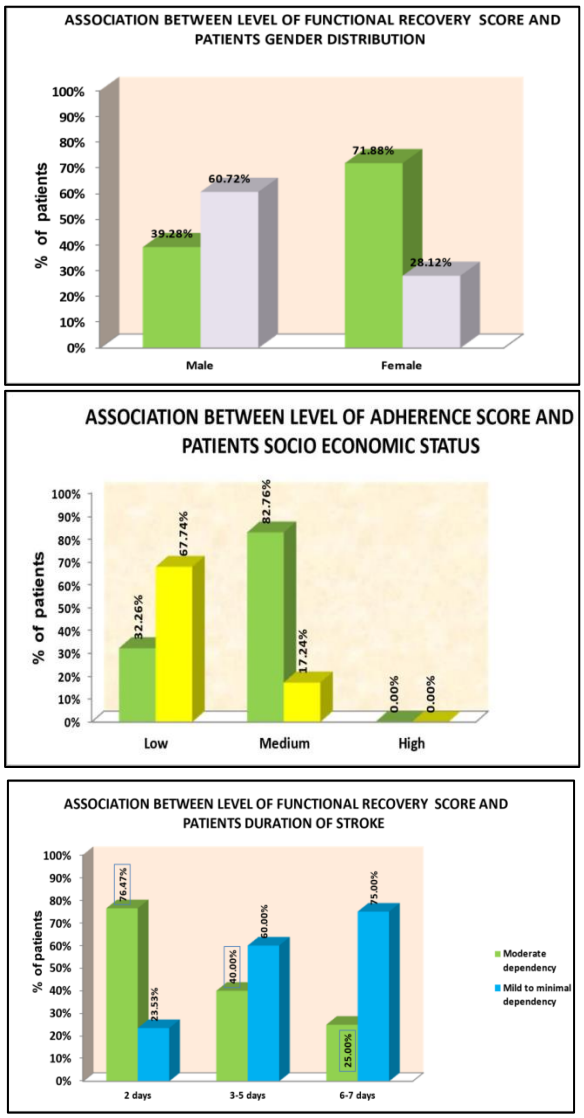

FIG.5.ASSOCIATION BETWEEN THE LEVEL OF FUNCTIONAL RECOVERY SCORE WITH THEIR SELECTED DEMOGRAPHIC VARIABLES

DISCUSSION

This study assessed neurological deficits and functional recovery in stroke patients, focusing on physical activity and demographic variables. The findings showed that 70% of patients had moderate neurological deficits and a positive correlation between deficits and recovery. These results align with **Yong Jin Kim et al. (2022)**, who identified motor weakness and NIHSS scores as key predictors of poor recovery. The study also found a moderate positive correlation between physical activity and recovery, consistent with the study by **Manuel Murie-Fernandez et al. (2020)**, which observed neurological and functional improvements in moderate to severe stroke patients. Furthermore, the study highlighted those demographic factors like age, stroke duration, and socio-economic status influenced outcomes. For instance, patients aged 46-50 with a 2-day stroke duration had more severe deficits, while males with low socio-economic status and longer stroke duration (6-7 days) showed better functional recovery, supporting findings from **Maria Vazquez-Guimaraens et al. (2021)** on pre-stroke independence and recovery.

IMPLICATIONS OF THE STUDY

The researcher suggested implications for nursing practice, nursing administration, nursing education, and nursing research based on the findings.

Nursing Education

- Include hypertension, diabetes, and alternative therapies in the nursing curriculum.
- Focus on relaxation techniques and stroke rehabilitation education.
- Emphasize physical and psychological well-being in nursing training.

Nursing Administration

- Ensure training, resources, and collaboration for stroke care.
- Implement protocols, quality improvement, and performance tracking.
- Promote education, professional growth, and ethical compliance.

Nursing Practice

- Nurses should incorporate yoga and meditation in care.
- Recognize neurological deficits and provide psychosocial support.
- Collaborate with healthcare teams and prevent complications.

Nursing Research

- Use validated assessment tools for accurate data collection in stroke care.
- Research should focus on patient preferences and early mobilization for recovery.
- Conduct studies on telemedicine and realistic lifestyle modifications for stroke patients.

LIMITATIONS

- Sample size was limited to 60 stroke patients only.
- The data collection period was 4 weeks.
- The study needs to be completed in the stipulated time.
- This limits the generalization of the finding to the study sample only.

RECOMMENDATIONS

- Conduct studies with larger samples, varied demographics, and rural-urban comparisons.
- Explore qualitative, longitudinal, and cross-cultural aspects of stroke recovery.
- Replicate research in diverse clinical settings to identify health-related risk factors.

CONCLUSION

The relationship between early stroke deficits and outcomes is time-dependent. In the first few hours' post-onset, deficits are unstable, with the potential for sudden improvement due to recanalization or worsening. Beyond 6-10 hours, most damage is already established, and deficits stabilize with minimal sudden changes.

REFERENCES

1. Arya KN, Pandian S, Joshi AK, Chaudhary N, Agarwal G. Active sensory therapies enhancing upper limb recovery among poststroke subjects: A systematic review. Ann Neurosci.2022;097275312210867.

2. Avan A, Digaleh H, Di Napoli M, et al. Socioeconomic status and stroke incidence, prevalence, mortality, and worldwide burden: an ecological analysis from the Global Burden of Disease Study. BMC Med. 2019;17:1–30.
3. Bernhardt J, Hayward KS, Kwakkel G, Ward NS, Wolf SL, Borschmann K, et al. Agreed definitions and a shared vision for new standards in stroke recovery research: The stroke recovery and rehabilitation roundtable taskforce. Neurorehabil Neural Repair. 2017;31:793–799.
4. Bonkhoff AK, Hope T, Bzdok D, Guggisberg AG, Hawe RL, Dukelow SP, Rehme AK, Fink GR, Grefkes C, Bowman H. Bringing proportional recovery into proportion: Bayesian modelling of post-stroke motor performance. Brain. 2020;63–71.
5. Grefkes C, Fink GR. Recovery from stroke: current concepts and future perspectives. Neurol Res Pract. 2020;2:17.
6. Doumas I, Everard G, Dehem S, Lejeune T. Serious games for upper limb rehabilitation after stroke: a meta-analysis. J Neuroeng Rehabil. 2021;18(1):1–16.
7. Everard G, Luc A, Doumas I, Ajana K, Stoquart G, Edwards MG, Lejeune T. Self-rehabilitation for post-stroke motor function and activity: a systematic review and meta-analysis. Neurorehabil Neural Repair. 2021;35(12):1043–58.
8. Grau-Sanchez J, Munte TF, Altenmuller E, Duarte E, Rodriguez-Fornells A. Potential benefits of music playing in stroke upper limb motor rehabilitation. NeurosciBiobehav Rev. 2020;112:585–599.
9. Hawe RL, Scott SH, Dukelow SP. Taking proportional out of stroke recovery. Stroke. 2018;50:204–211.
10. Hordacre B, McCambridge AB, Ridding MC, Bradnam LV. Can transcranial direct current stimulation enhance poststroke motor recovery: development of a theoretical patient-tailored model. Neurology. 2021;97(4):170–80.
11. Stockbridge MD, Bunker LD. Reversing the ruin: Rehabilitation, recovery, and restoration after stroke. Curr NeurolNeurosci Rep. 2022;22:745–755.
12. Richards LG, Cramer SC. Advances in stroke recovery therapeutics. Stroke. 2022;53(1):260–3.
13. Jones SP. Stroke in India: A systematic review of the incidence, prevalence, and case fatality. Natl Inst Health. 2022;17(2):132–140.
14. Kamalakannan S. Incidence & prevalence of stroke in India: A systematic review. Indian J Med Res. 2017;146(2):175–185.
15. Viale L, Catoira NP, Di Girolamo G, González CD. Pharmacotherapy and motor recovery after stroke. Expert Rev Neurother. 2018;18(1):65–82.

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