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Factors Affecting Functional Recovery in Patients with Stroke Upto 6 Months – A Longitudinal Study

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ABSTRACT

Introduction: Stroke is a major cause of short-term functional impairment in developed countries, in absence of adequate treatment and rehabilitation which can lead to significant long-term functional impairment. Stroke recovery is heterogeneous but usually follows a common pattern, in which the largest regain of function occurs during the first weeks poststroke.
So, objectives were to study the pattern of clinical recovery by using Brunnstrom recovery Stage (BRS) for Upper Limb, Hand and Lower limb, functional recovery by using Rivermead mobility index (RMI), Stroke Rehabilitation Assessment of Movement (STREAM) and factors affecting functional recovery in patients with Stroke upto 6 months.
Methods: 46 patients with acute Stroke were recruited in a longitudinal study. Patient's functionality was assessed using STREAM & RMI over time using different scales and BRS for clinical recovery at Baseline i.e., 0-8 days, 1 month, at 3 Months, at 6 Months after Stroke.
Result: STREAM upper limb (F – 4.84, p-0.003), RMI (F-12.27, p- <0.0001), BRS for Upper limb (F 4.56, p-0.004) showed very significant improvement from baseline to 6 months. STREAM Lower limb and Basic mobility (F- 8.49, p- <0.0001 and F- 13.55, p- <0.0001), BRS for lower limb (F-4.44, p-0.005) showed extremely significant improvement from baseline to 6 months
Conclusion: The study concluded that the Stroke severity, Cognitive ability, age, Gender, Disease awareness about Stroke affects functional recovery upto six months. Rapid recovery was observed during first 4 weeks and was also observed from 3 to 6 months after Stroke, but to a lesser extent.

Keywords: Stroke, Functional Recovery, STREAM, RMI

INTRODUCTION

Stroke is a global health problem that causes morbidity and mortality[(1-2)]. Stroke is a major cause of short-term functional impairment in developed countries without adequate treatment and rehabilitation, it may lead to long-term functional impairment[(3-5)]. Stroke recovery is similar, but generally follows a general schedule where maximal functional recovery occurs in the first weeks after a stroke[(6)].

Longitudinal studies are justified as impaired functional mobility is a major problem resulting in falls and dependency

after stroke. Knowledge of changes following in longitudinal study would also allow more insight into underlying mechanisms of recovery[7].

Most of functional recovery in Longitudinal studies occurs within the first few months after a stroke, and the recovery slope reaches a plateau between 3 and 6 months[8]. Some authors suggested that - recovery tends to plateau around 1month but other note meaningful recovery until 12 weeks. There is lack of evidences that focus on the exact time frame for the functional recovery. There is a need to accurately assess the level of functional recovery over longer periods of time. Better establishing the timeframes in which patients are expected to show greater functional gains will help allocate resources more effectively, providing the basis for better follow-up and treatment.

Longitudinal studies evaluating factors influencing functional recovery, especially physical activity factors, are rare in the literature. There are studies investigating beneficial factors and risk factors related to their effect on functional recovery[9-12].

However, as a physiotherapist you need to understand the behavior of physical activity in terms of tonal disorders, balance, activity limitations and other parameters. Therefore, this study was designed to investigate the pattern of functional recovery in a maximum of 6 months after stroke and to understand how these parameters influence functional recovery. Therefore, the purpose is to study clinical recovery using Brunnstrom stages of recovery for UL, Hand and LL, functional recovery using RMI and STREAM and factors affecting the function of stroke patients up to 6 months.

MATERIALS & METHODS

In the current longitudinal study, 46 acute stroke patients were recruited from Physiotherapy OPD through purposive sampling and sample size was calculated by using proportion formula.

$$n = \frac{Z(1-\alpha/2)^2 \times p\,(1-p)}{d^2}$$

n= Sample size
p=proportion (77/557) = 0.138
α (level of significance) = 0.05%

Patients diagnosed with acute stroke and who were willing to participate were included. Patients with upper and lower limb fractures or recent upper and lower limb surgery, neurological conditions other than stroke, and cardiovascular disease were excluded. Ethical clearance was obtained from the Institutional Ethics Committee of the DVVPF's College of Physiotherapy and informed consent was given.

PROCEDURE

Participants who met the study criteria were included in the study and given informed consent. Clinical and demographic characteristics were assessed at admission. During the initial clinical evaluation, the NIHSS scale was assessed upon admission, then the patient's performance was assessed using various scales and stages of Brunnstrom recovery, at Baseline i.e. 0-8 days, 1 month, 3 months, and 6 months after the stroke using STREAM & Rivermead Mobility Index.

Stroke Recovery Assessment of Movement (STREAM) is an assessment tool designed to provide a quick and simple means of post-movement assessment. NIHSS is a measure of stroke-related symptom severity and is used as a quantitative measure of post-stroke neurological deficit. It is widely used and can be administered quickly after acute admission. The total score ranges from 0 to 42. Higher scores indicate greater severity. A reduction in scores of more than or equal to 4 denotes recovery; whereas a reduction in scores of less than 4 reflects a diminished recovery status. An increase in scores also signals a failure in recovery[13-14]. The current STREAM version contains 30 items divided into 3 subgroups: 10 items for upper extremity voluntary motor ability (UE), 10 items for lower extremity voluntary motor ability, and 10 items for

Basic Mobility. The number of standard scores for STREAM ranges from 0-70[15]. The intraclass correlation coefficient for the total score was 0.96 indicating very high inter-rater reliability[16].

The Rivermead Mobility Index (RMI) is a tool that assesses mobility, an important aspect of function in post-stroke patients. This is a standardized 15-item dichotomous scale that evaluates the patient's ability to perform 15 typical daily activities. Items are scored as 0 if the response is "no" and 1 if "yes", so the total score corresponds to the sum of all points, with the maximum achievable value being 15. Thus, the higher the score obtained, the greater the predictive value of motor function[17]. The figures for reliability are also high between 0.963 and 0.999, with $p<0.001$ we may therefore infer that the data presented good internal consistency[18]. There are 6 stages of Brunnstrom recovery, these stages are different for the upper and lower limb and hand. Patient position was sitting, supine and standing according to each step. The Brunnstrom stage of recovery is used to assess clinical recovery in stroke patients[19].

STATISTICAL ANALYSIS

Data analysis was done using GraphPad Instat 3. Descriptive statistics was used to analyse the Demographic variables of all the participants. Statistical tests multiple linear regression and Pearsons's correlation were used to find out correlation between factors affecting and functional recovery in patients with Stroke. P value < 0.05 was considered statistically significant for this entire test.

RESULT

Table no. 1 the Demographic variables of the 46 Stroke subjects (32 Males, 7 Females) were recruited in the study with mean age 59.13 ± 15.5 years. With respect to type of Stroke 45 subjects had Ischemic lesions and 1 Haemorrhagic lesion with the duration of Stroke 1-8 days.

Table No. 1: Demographic data in Patients with Stroke

Variables		**Mean ±SD or %**
Age (years)		59.13±15.54
Gender	Male	71.73%
	Female	28.26%
Duration of Stroke (Days)		5.52 ±2.19
Type of Stroke	Ischemic	97.82%
	Haemorrhagic	2.18%

Table 2 A, 2G, 2H summarizes Age, Hypertension, Diabetes Mellitus respectively shows negative non-significant correlation with functional recovery. Table 2B summarizes Stroke severity shows negative significant correlation with functional recovery. Table 2C and 2D summarizes MMSE and Disease awareness about Stroke shows positive significant correlation with functional recovery.

Table 3- Changes in scores of STREAM, RMI and BRS from baseline to 1 month, 3 months and 6 months post Stroke shows extremely significant positive correlation with STREAM (Lower Limb, Basic Mobility), Rivermead mobility index and Brunnstrom recovery stage for Lower limb. STREAM UL and BRS for UL shows verry significant positive correlation.

Table 4A summarizes STREAM UL score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months.

Table 4B summarizes STREAM LL score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months.

Table 4C summarizes STREAM BM score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months.

Table 4D summarizes RMI score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months.

Table 4E summarizes BRS for UL score post hoc analysis showing significant

functional recovery between baseline & 1 month.

Table 4F summarizes BRS for LL score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months.

Table 2 - Correlation Between different factors and Functional Recovery at baseline, 1 month, 3months and 6 months.

Very Significant *, Extremely Significant **

Timeline	Functional Recovery scales		Values	Age
Baseline	STREAM	UL	R	0.1
			P	0.4
		LL	R	0.1
			P	0.4
		BM	R	0.05
			P	0.7
	RMI		R	-0.19
			P	0.19
1 Month	STREAM	UL	R	-0.08
			P	0.5
		LL	R	-0.04
			P	0.7
		BM	R	-0.04
			P	0.7
	RMI		R	-0.23
			P	0.1
3 Months	STREAM	UL	R	-0.08
			P	0.5
		LL	R	-0.7
			P	0.4
		BM	R	-0.08
			p	0.5
	RMI		r	-0.24
			p	0.1
6 Months	STREAM	UL	r	-0.07
			p	0.6
		LL	r	-0.08
			p	0.5
		BM	r	-0.07
			p	0.6
	RMI		r	-0.33
			p	0.11

Table 2- A. Correlation between Age and functional recovery assessed by using STREAM & RMI

Timeline	Functional Recovery scales		Values	NIHSS
Baseline	STREAM	UL	r	-0.3
			p	**0.006***
		LL	r	-0.4
			p	**0.0009****
		BM	r	-0.3
			p	**0.01**
	RMI		r	-0.62
			p	**<0.0001****
1 Month	STREAM	UL	r	-0.3
			p	**0.01**
		LL	r	-0.3
			p	**0.007***
		BM	r	-0.3
			p	**0.03**
	RMI		r	-0.56
			p	**<0.0001****
3 Months	STREAM	UL	r	-0.2
			p	0.1
		LL	r	-0.2
			p	0.1
		BM	r	-0.1
			p	0.2
	RMI		r	-0.57
			p	**<0.0001****
6 Months	STREAM	UL	r	-0.1
			p	0.2
		LL	r	-0.1
			p	0.2
		BM	r	-0.1
			p	0.4
	RMI		r	-0.66
			p	**<0.0001****

Table 2- B. Correlation between Stroke Severity and functional recovery assessed by using STREAM & RMI

Timeline	Functional Recovery scales		Values	MMSE
Baseline	STREAM	UL	r	0.1
			p	0.2
		LL	r	0.2
			p	0.1
		BM	r	0.1
			p	0.2
	RMI		r	0.29
			p	**0.046**
1 Month	STREAM	UL	r	0.1
			p	0.3
		LL	r	0.2
			p	0.1
		BM	r	0.09
			p	0.5
	RMI		r	0.38
			p	**0.0084***
3 Months	STREAM	UL	r	-0.08
			p	0.5
		LL	r	-0.05
			p	0.7
		BM	r	-0.1
			p	0.3
	RMI		r	0.44
			p	**0.002***
6 Months	STREAM	UL	r	-0.2
			p	0.1
		LL	r	-0.1
			p	0.1
		BM	r	-0.2
			p	0.1
	RMI		r	0.64
			p	**0.0006****

Table 2- C. Correlation between MMSE and functional recovery assessed by using STREAM & RMI

Timeline	Functional Recovery scales		Values	Disease awareness
Baseline	STREAM	UL	r	0.3
			p	**0.01**
		LL	r	0.4
			p	**0.002***
		BM	r	0.4
			p	**0.001***
	RMI		r	0.17
			p	0.26
1 Month	STREAM	UL	r	0.4
			p	**0.004***
		LL	r	0.4
			p	**0.001***
		BM	r	0.4
			p	**0.002***
	RMI		r	0.23
			p	0.12
3 Months	STREAM	UL	r	0.3
			p	**0.02**
		LL	r	0.3
			p	**0.02**
		BM	r	0.3
			p	**0.02**
	RMI		r	0.23
			p	0.11
6 Months	STREAM	UL	r	0.3
			p	**0.01**
		LL	r	0.3
			p	**0.007***
		BM	r	0.3
			p	**0.01**
	RMI		r	0.29
			p	0.16

Table 2- D. Correlation between Disease awareness and functional recovery assessed by using STREAM & RMI

Table 2- E. Correlation between Health care access and functional recovery assessed by using STREAM & RMI

Timeline	Functional Recovery scales		Values	**Hypertension**
Baseline	STREAM	UL	r	-0.1
			p	0.5
		LL	r	-0.02
			p	0.8
		BM	r	-0.03
			p	0.8
	RMI		r	0.01
			p	0.9
1 Month	STREAM	UL	r	-0.05
			p	0.7
		LL	r	-0.04
			p	0.7
		BM	r	0.03
			p	0.8
	RMI		r	0.009
			p	0.9
3 Months	STREAM	UL	r	0.1
			p	0.3
		LL	r	0.1
			p	0.2
		BM	r	0.1
			p	0.3
	RMI		r	-0.02
			p	0.8
6 Months	STREAM	UL	r	0.02
			p	0.8
		LL	r	0.01
			p	0.9
		BM	r	0.01
			p	0.9
	RMI		r	-0.1
			p	0.4

Table 2- F. Correlation between Gender and functional recovery assessed by using STREAM & RMI

Timeline	Functional Recovery scales		Values	**Diabetes Mellitus**
Baseline	STREAM	UL	r	-0.1
			p	0.3
		LL	r	-0.1
			p	0.3
		BM	r	0.1
			p	0.3
	RMI		r	-0.05
			p	0.7
1 Month	STREAM	UL	r	-0.04
			p	0.7
		LL	r	-0.09
			p	0.5
		BM	r	0.08
			p	0.5
	RMI		r	0.006
			p	0.5
3 Months	STREAM	UL	r	0.06
			p	0.6
		LL	r	0.04
			p	0.7
		BM	r	0.1
			p	0.3
	RMI		r	-0.1
			p	0.3
6 Months	STREAM	UL	r	0.09
			p	0.5
		LL	r	0.1
			p	0.4
		BM	r	0.2
			p	0.1
	RMI		r	-0.06
			p	0.6

Table 2- G. Correlation between Hypertension and functional recovery assessed by using STREAM & RMI

Table 2- H. Correlation between Diabetes mellitus and functional recovery assessed by using STREAM & RMI

Table 3- Changes in scores of STREAM, RMI and BRS from baseline to 1 month, 3 months and 6 months post Stroke

Variables		Baseline	1month	3 Month	6 Month	F value	P value
STREAM	Upper Limb	5.17±7.4	9.06±7.2	10.74±7.2	12.40±7.54	4.84	**0.003***
	Lower Limb	4.82±7.3	9.73±6.9	12.25±±6.9	13.07±7.7	8.49	< **0.0001****
	Basic Mobility	6.54±8.5	14.24±9.59	19.10±10.4	20.53±11.7	13.55	< **0.0001****
RMI		2.57±3.73	6.82±4.14	6.85±4.19	12.9±2.6	12.27	< **0.0001****
BRS	Upper limb	1.91±1.68	3.17±1.75	4.24±1.45	4.80±1.20	4.56	**0.004***
	Hand	1.76±1.66	2.56±2.12	3.10±1.89	3.80±1.93	1.81	0.14
	Lower Limb	1.95±1.69	3.14±1.60	4.41±1.35	5.04±1.1	4.44	**0.005****

Very Significant *, Extremely Significant ** (Repeated Measure analysis done using ANOVA)

Table 4 – Post hoc analysis of functional recovery measured using STREAM UL, LL & BM, RMI, BRS for UL & LL indicating specific period of recovery

t0- Baseline, t1- 1 month, t2- 3 months, t3- 6 months

Scale	Comparison	Mean difference	q	P value	
STREAM UL	**t 0 vs t 1**	-3.69	5.07	**<0.01**	**
	t 0 vs t 2	-3.00	4.11	**<**0.05	*
	t 0 vs t 3	-2.10	2.89	>0.05	NS
	t 1 vs t 2	0.69	0.95	> 0.05	NS
	t 1 vs t 3	1.58	2.17	> 0.05	NS
	t 2 vs t 3	0.89	1.22	> 0.05	NS

Significant *, Very Significant **, Extremely significant ***

Table 4A- STREAM UL score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months

Scale	Comparison	Mean difference	q	P value	
STREAM LL	**t 0 vs t 1**	-4.69	6.30	<0.001	***
	t 0 vs t 2	-4.50	6.04	<0.001	***
	t 0 vs t 3	-3.13	4.20	<0.05	*
	t 1 vs t 2	0.19	0.26	>0.05	NS
	t 1 vs t 3	1.56	2.10	>0.05	NS
	t 2 vs t 3	1.37	1.84	>0.05	NS

Significant *, Very Significant **, Extremely significant **

Table 4B- STREAM LL score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months

Scale	Comparison	Mean difference	q	P value	
STREAM BM	**t 0 vs t 1**	-7.39	7.43	<0.001	***
	t 0 vs t 2	-8.00	8.04	<0.001	***
	t 0 vs t 3	-5.95	5.99	<0.001	***
	t 1 vs t 2	-0.60	0.61	>0.05	NS
	t 1 vs t 3	1.43	1.44	>0.05	NS
	t 2 vs t 3	2.04	2.05	>0.05	NS

Significant *, Very Significant **, Extremely significant ***

Table 4C- STREAM BM score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months

Scale	Comparison	Mean difference	q	P value	
RMI	**t 0 vs t 1**	-3.41	7.18	<0.001	***
	t 0 vs t 2	-3.43	7.23	<0.001	***
	t 0 vs t 3	-3.08	6.50	<0.001	***
	t 1 vs t 2	-0.02	0.04	>0.05	NS
	t 1 vs t 3	0.32	0.68	>0.05	NS
	t 2 vs t 3	0.34	0.73	>0.05	NS

Significant *, Very Significant **, Extremely significant ***

Table 4D- RMI score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months

Scale	Comparison	Mean difference	Q	P value	
BRS UL	t 0 vs t 1	-0.91	4.35	<0.05	*
	t 0 vs t 2	-0.76	3.63	>0.05	NS
	t 0 vs t 3	-0.15	0.72	>0.05	NS
	t 1 vs t 2	0.15	0.72	>0.05	NS
	t 1 vs t 3	0.76	3.63	>0.05	NS
	t 2 vs t 3	0.60	2.90	>0.05	NS

Significant *, Very Significant **, Extremely significant ***

Table 4E- BRS for UL score post hoc analysis showing significant functional recovery between baseline & 1 month.

SCALE	COMPARISON	MEAN DIFFERENCE	Q	P value	
BRS LL	t 0 vs t 1	-0.847	4.15	<0.05	*
	t 0 vs t 2	-0.82	4.05	<0.05	*
	t 0 vs t 3	-0.21	1.06	>0.05	NS
	t 1 vs t 2	0.02	0.10	>0.05	NS
	t 1 vs t 3	0.63	3.09	>0.05	NS
	t 2 vs t 3	0.60	2.98	>0.05	NS

Significant *, Very Significant **, Extremely significant **

Table 4F- BRS for LL score post hoc analysis showing significant functional recovery between baseline & 1 month, baseline & 3 months & baseline & 6 months

DISCUSSION

The present study was carried out to see the factors affecting functional recovery in Stroke patients and the pattern of functional recovery in Stroke patients. 46 patients (32 Males, 7 females) were recruited in the study; with the mean age of 59.13 ± 15.5 years, were predominantly male (71.73%), supporting the findings of other authors who found that men are more likely to have Strokes than women, although they do have a higher degree of disability.

Branco JP et al.[3] and Lee et al. [20] Henk T. Hendricks et al [21] MEDICA et al [22] found that overall improvement in motor functions occurred within first month after Stroke although some degree of motor recovery continued in some patients up to 6 months and late recovery may occur even several months after Stroke. Karen N. Borschmann et al[23] showed that the highest recovery rate occurred based on the first monthly post Stroke. This window is considered to be a period of increased neural plasticity that represents a critical period for robust behavioral testing.

Dongni Buvarp et al [7] mentioned that in patients with moderate stroke had a maximum rate of improvement in functional mobility occurs during the first 3 months after stroke and then declined significantly at 1 year. He found that the younger patients had better functional mobility[24-25].

The STREAM scale was adopted in this study because it is frequently used in clinical practice. STREAM was developed

as an outcome measure that could be used to monitor the re-emergence of voluntary movement and basic mobility. STREAM contains 30 items divided among 3 subscales: 10 items for voluntary motor ability of the upper extremity (UE), 10 items for voluntary motor ability of the lower extremity (LE), and 10 items for basic mobility. The ability to predict discharge destination and functional ability in individuals with Stroke admitted to an acute care hospital allows prompt discharge planning, which may minimize hospital length of stay. The STREAM showed a usefulness comparable to that of the Barthel Index for predicting discharge destination from an acute care hospital. STREAM showed significant improvement from baseline to six months after Stroke with better improvement in between baseline to one month after Stroke. Basic mobility recovers faster as compared to Lower limb and Lower limb recovered faster as compared to upper limb.

The clinical recovery model was assessed using the Brunnstrom stage of recovery for upper limbs, lower limbs and hands in stroke patients. He found that the lower limb was placed first, then the upper limb, and lastly the hand. According to Raut A. et al [(26)] Upper limb recovery is slow and seen in less than 50% of population. About 30-66% of patients with Stroke fails to regain complete hand function 6 months post Stroke[(27)]. As previously reported by Duncan et al [(28)], LL motion recovers faster and more completely than UL motion. These beliefs may be based on clinical experience and literature reports. For example, according to Kwakkel et al[(29)] most stroke survivors regain the ability to walk, only between 30 and 66% of stroke survivors can use their affected arm. The most important limitation for patients after stroke is probably the functional use of UL at the level of activity. For UL, a more demanding performance is required in terms of speed, precision and coordination, and therefore the performance seems to be less satisfactory than for LL with the same disability. Paci M et al[(30)] reported that LL motor function showed greater recovery than UL motor function in the TACI group. TACI subtype frequently has an infarct in the middle cerebral artery territory in which the UL is more severely involved than the LL.

Previous studies have identified various factors that affect functional recovery in stroke patients, including stroke severity, age, gender, awareness of the disease, access to health care, and any comorbidities. In the current study, gender affects stroke recovery, with men having more strokes than women and showing a non-significant correlation with STREAM and RMI. Kakkad et al[(31)] supports the recovery of daily life activities and physical function in women after stroke. Ali Alawieh et al[(32)] found that women are less likely to achieve full functional independence and/or become disabled than men after a stroke. The underlying causes of these gender differences are not fully understood, but women may be more likely to experience depressive symptoms and fatigue, which may indirectly affect recovery. Kim JS et al[(33)] Female patients have more difficulty recovering from disability after acute stroke than male patients. Poor functional outcomes, baseline functional status, and poor social support among women were more common among women than among widowed and single men. Another reason for poorer functional outcomes in women is the higher prevalence of post-stroke depression. Poststroke depression can slow recovery.

A non-significant positive association was observed between patient age and a negative association between initial RMI and functional recovery by STREAM. A non-significant negative relationship was observed between age and functional recovery, i.e. STREAM & RMI at 1 month, 3 months and 6 months. Dušica SP et al[(34)] found a negative relationship between the age of patients and functional gain after rehabilitation therapy. Nazzal ME et al[(35)] Functional recovery may not be directly

related to age, but the need for long-term institutional care is greater in older people. Few previous study found that functional improvement with rehabilitation was better in the stroke patients who were younger age and had shorter CVA durations and moderate functional disturbance[36-37].

Stroke severity showed a significant and negative correlation with RMI, but a significant and negative correlation with STREAM for upper limbs, a significant and negative correlation with STREAM for lower limbs, and a significant and negative correlation with Core Movement. At 1 month, STREAM showed significant and negative correlations for upper limb, lower limb and core movements. Significant and negative correlations were shown for UL, LL, BM at 3 and 6 months. Murie-Fernandez et al[38] showed that patients with moderate to severe ischemic stroke improved consistently over 3 months. This improvement was more pronounced among patients with more severe strokes, i.e., NIHSS sbcores of 10 to 14, than among those with more severe strokes.

Cognitive ability showed a positive and significant correlation, highly significant and non-significant with RMI at 1M, 3M and 6M after stroke. Non-significant and positive correlation with STREAM, 1 month for UL, LL, BM. STREAM is significantly and negatively correlated with UL and LL, but positively correlated with Core Activities at 3 months and 6 months. Synhaeve NE et al[39] found that patients with more cognitive impairment after stroke were at higher risk of functional impairment.

Stroke awareness showed a significant positive correlation with STREAM UL, LL, BM and a significant positive correlation with RMI at baseline, 1 month, 3 months, and 6 months.

Patients using health services consistently showed a positive and significant relationship with STREAM and RMI. The presence of hypertension and diabetes showed a negative significant relationship with STREAM and RMI at baseline 1M, 3M and 6M. According to Maïer B et al[40], hypertension is one of the pre-stroke vascular risk factor in patients suffering from acute IS or complicates the timing of stroke during the acute phase. It affects clinical outcomes by reducing brain plasticity. Hypertension leads to neuronal loss, decreased dendritic spines and cholinergic neurotransmission, impaired neurogenesis, and consequently, altered neural plasticity[41]. Yao M et al[42] reported better recovery prospects after AIS from people with diabetes, with an independent and adverse effect of FBG administration only in the subgroup of non-diabetic stroke patients, but not in diabetic patients, our group and other previous studies. Evidences suggested that hyperglycemia adversely affects clinical and morphological outcomes after AIS. Post-Stroke hyperglycemia results in increased in infarct volume, higher risk of secondary hemorrhagic transformation and reduced recanalization rates after intravenous thrombolysis[43-44]. Karatepe AG[45] found that comorbidities are negatively associated with functional results and functional gain in patients after stroke. Future studies should be conducted to assess functional recovery, especially caregiver dependence, and the role of orthosis in patients' functional recovery.

CONCLUSION

The study concluded that the severity of the stroke, cognitive ability, age, gender, and awareness of the stroke affect the functioning of stroke survivors up to six months. Rapid recovery occurs during the first 4 weeks after stroke, and recovery was observed 3-6 months after stroke, but at a lower rate, have been reported.

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