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Effect of Rehabilitation Program on Functional Abilities, Psychological condition, and Disability Level of Patients with Neurological Diseases in Kingdom of Saudi Arabia

Jehan Y.ElRazkey*, Raid S. Al-Baradie, Amal A. AlOtaibi,**& Jazzi S.AlOtaibi***
*Nursing department,** Medical Laboratory department,

ABSTRACT

Introduction: Cerebrovascular accident victims suffer from permanent disability and handicaps, motor and sensory losses, loss of functional abilities, inability to carry out ADL, and depression. So, rehabilitation is the corner stone of management of post-cerebrovascular accident patients. **Methodology**: A randomized controlled trial had been carried out, 40adults' post-cerebrovascular accident patients at Out Patient and Rehabilitation unit of King Khaled Hospital, Majmaah, Kingdom of Saudi Arabia had been equally assigned to control group maintained on standard hospital treatment protocol and a study Group received standard hospital treatment protocol in addition to the rehabilitation program. Both groups were monitored using Barthel index, State Trait Anxiety Inventory (STAI), and The Berg Balance Scale (BBS).**Results:** The study group had achieved more significant improvement than the control group, as the mean score of improvement of Barthel Index (BI) in the exercise group was 39.0±13.80, while it was 10.0±8.91 for the control group. On the same hand, there was significant improvement of the mean score of Berg Balance scale in the exercise group 12.03±4.84 than the control group 5.0 ± 3.53. Moreover, significant improvement of the mean State Trait Anxiety inventory (STAI) of the exercise group 21.40± 8.15 if compared to that of the control group 7.47±3.43.**Conclusion:** Rehabilitation program had significantly improved functional abilities, psychological condition, and disability level of post-cerebrovascular accident patients.

Key words: rehabilitation, functional abilities, psychological condition, disability

Introduction:

Cerebrovascular accident is becoming an important cause of illness and deaths in Saudi Arabia. However, compared with the developed countries, research regarding the incidence, prevalence of stroke is still insufficient due to lack of appropriate studies being conducted in these specified areas **Robert & Zamzami (2014)**.

Recently in Saudi Arabia, **Al-Eithan, Amin & Robert (2011)**reported that for post-stroke patients with left hemiplegia/hemiparesis the mean Hospital Length of Stay HLoS was 43.5 days, whereas patients with right hemiplegia/hemiparesis showed a HLoS value of 47.3 days. Compared with only stroke, patients suffering with stroke combined with diabetes mellitus and hypertension showed a significantly higher HLoS in patients with right and left hemiplegia/hemiparesis**Al-Jadid & Robert (2010).**

Many cerebrovascular accident patients fail to resume full lives, and a major negative

impact of cerebrovascular accident on family functioning is not an infrequent phenomenon **Hamad, Siddiqui, Al-Mansoor, Al-Senani & Sinha (2011)**. Therefore, cerebrovascular accident rehabilitation has been widely recognized as being essential in management of cerebrovascular accident **Tarasova, Necasova & Mikulík (2007)**. With ongoing rehabilitation, however, improvements in functional status are possible and contribute to increase QOL for cerebrovascular accident survivors.

Cerebrovascular accident Unit Trialists Collaboration (2002) reported a reduction of mortality rates, length of inpatient stay and improved independence in activities of daily living (ADL) have been demonstrated for post-stroke patients who are engaged in cerebrovascular accident rehabilitation program**Hankey & Warlow(1999), Langhorne & Duncan (2001)**. These benefits have been attributed to an integrated approach in which acute care is linked with early mobilization and early initiation of rehabilitation plans, as well as the comprehensive assessment of impairments and disabilities and skilled nursing care **Langhorne& Pollock (2002)**.

In the absence of any curative therapy, rehabilitation constitutes the main mode of therapy to improve quality of life following cerebrovascular accident**Gresham, Duncan & Statson(1995)**and is considered a corner stone of multidisciplinary cerebrovascular accident care. Rehabilitation prevents deterioration in seven of every 100 patients residing in the community**Gresham, Duncan& Statson(1995)**. Rehabilitation is directed to the restoration of motor control in gait and gait-related activities, improvement of upper extremity function, teaching the patient to cope with existing deficits in ADL and enhancement of participation in general.

Greater levels of adherence to post-acute cerebrovascular accident rehabilitation guidelines are associated with improved patient outcomes, functional abilities, mood stability, and quality of life **Duncan, Horner& Reker (2002)** and patient satisfaction **Reker, Duncan & Horner (2002), Newman, Gottdiener & McBurnie (2001), Carlson, Ostir, Black, Markides & Rudkin (1999)**.

Recent studies reported that there is a great demand for more rehabilitation centers, rehabilitation nurses and a team of rehabilitation professionals in the Kingdom of Saudi Arabia **Al Jadid (2011), Al-Jadid(2013), Robert & Zamzami (2013), Al Khathaami, Algahtani , Alwabel , Alosherey, Kojan et al (2011)**.

Several studies showed that traditional treatment approaches induce improvements that are confined to impairment level only and do not generalize to a functional improvement level **Kollen1, Kwakkel & Lindeman (2006)**. Still, a gap remains between prognostic research and rehabilitation practice.

Significance of the problem:

According to reported global estimates, 15million people suffer from a cerebrovascular accident each year, resulting in 5.5 million deaths and 5 million left permanently disabled **Mackay & Mensah (2004)**. Cerebrovascular accident is the leading cause of serious, long-term disability among middle-aged and older adults in the United States. Approximately14% of persons who survive a first cerebrovascular accident will have another one within 1 year, leading to long-term disability. 15%–30% of post-stroke patients are permanently disabled and 20% require institutional care**Heart Disease and Cerebrovascular accident Statistics (2005)**.

It is anticipated that by 2020, cerebrovascular accident will have moved from the 6th leading cause of lost disability adjusted life years (DALY's) to 4th**Elkins & Johnston(2003).**

This study aimed to determine the effect of rehabilitation program on functional abilities, psychological condition, and disability level of post-cerebrovascular accident patients.

Research hypothesis: Rehabilitation program may improve functional abilities, psychological condition, and decreases disability level of post-stroke patients with neurological diseases in Kingdom of Saudi Arabia.

Subjects and Methods:

Research Design: A quasi-experimental research design was used.

Setting: The study was conducted at Out Patient and Rehabilitation unit of King Khaled Hospital, Majmaa, Kingdom of Saudia Arabia.

Sample:

Sample size: According to statistical formula n =N\1 + (e) ^{2}, a sample of forty post-stroke patients was included in the study.

Sample type: simple random sample.

Sample Criteria: the sample was collected using the following criteria:

- Adult, medically diagnosed post-stroke patients.
- Free from chronic debilitating disease.
- Free from positive medical history of paresthesia or paralysis.

Tools of the study: in addition to **sociodemographic** data sheet, **Barthel index** had been used to monitor functional outcome, **Berg Balance Scale (BBS)** had been used to monitor **patient's** disability level, and **State Trait Anxiety Inventory (STAI)** had been used to monitor psychological outcome,

1- **Barthel index**: developed by Mahoney and Barthel, it was adopted to measure functional independence in personal care and mobility during performance of activities of daily living (ADL). A score of 0 (complete dependence), 5, 10, or 15 is assigned to each level, with a possible total score of 100 (totally independent). it is categorized into 5 levels (based on the score attained) very severely disabled patients scored 0-4, severely disabled patients scored 5-9, moderately disabled patients scored 10-14, mildly disabled patients scored 15-19, and independent patients scored 20. **Collin, Wade, Davies & Horne (1988).**

2- **Berg Balance Scale (**BBS): consists of 14 items, scored from 0 = no balance to 4 = full balance. It had been tested for reliability and validity with good results. **Berg, Wood-Dauphinee, Williams & Maki(1992)**

3- **State Trait Anxiety Inventory**: composed of 20 questions, used to monitor the anxiety state of the patient. It was originally developed by Spielberger, et al, (1983) and then it was translated into Arabic and tested for validity and reliability by Abdel Khalek. Questions number 3, 4, 6, 7, 9, 12, 13, 14, 17, and 18 are negative questions as it took a reverse score. **Spielberger, Gorsuch, Lushene, Vagg & Jacobs (1983).**

Ethical considerations:

- Ethical approval had been obtained from "Majmaah Institutional Ethical Committee" after explanation of the study's aim and the submission of the proposal.
- Official written permission to carry out the study had been obtained from the responsible authorities of the chosen setting.
- Written Consent for patient's participation had been obtained after explaining the aim, nature, and confidentiality of the study.

- The researchers had ensured the security of the participants' information by confirming that it is only to be used for research purposes.

- The participants had the right to decide whether to participate, and to withdraw at any time during the study.

- Only the researcher and his team had the access to the data. The statistics consultant had accessed only de-identified data. Data entry and analysis was done using SPSS 18.0 statistical software package.

Field work:

The study was conducted from January2015 to February 2016. After obtaining the administrative permission, researchers visited the study setting three days/week, from 10 am to 8pm, 3 times/week until the sample size was completed.

At the beginning of the interview, the researcher explained to the patients the aim of the study and then the consent was obtained. Confidentiality of the information was ensured to gain patient's confidence and trust. The questionnaire administered by the researcher in time ranging from 15-20 minutes.

The patients included in sample were randomly divided into 2 groups (20 patient each)Control group (I) maintained on standard hospital treatment protocol. The study Group (II) received standard hospital treatment protocol in addition to the rehabilitation program, which involved three therapeutic exercise sessions/ week, for eight weeks. Each session took around 30-45 minutes. During each session, patients perform a series of muscle strengthening exercises. Patients exposed to initial and advanced exercise according to the patient's tolerance and response.

Both groups were monitored at two point of time; **Initial assessment** had been done **at the initial patient contact**, using Barthel index, State Trait Anxiety Inventory (STAI), and The Berg Balance Scale (BBS). The **final one** will be carried out **by the end of final exercise session**.

Limitations of the study:

There was drop out of 17 cases, which were excluded.

Statistical analysis:

Obtained data were coded, analysed and tabulated. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative. Variables and means for quantitative variables. Chi-square test and T-test was to determine relation between data. Statistical significance difference was considered when P –value 0.05 and high significance when P - value. 001and no statistical significance difference was considered. When P –value > 0.05 and not highly significant when P – value>.001.

Results:

Table (1) shows sociodemographic characteristics of patients. Concerning age, about half of the studied patients (40%) were in the age group of 70<80, represented as 36.7% of control group, and 43.3% of exercise group. As regards sex, 68.3% of the studied patients were male. 73.3% in the control group and 63.3% of the exercise group.

Among the studied patients, 53% were illiterate, represented as 53.3% of the control group, 53.3% of exercise group.

As for their occupation, 36.6% of the studied patients were farmers, in form of 33.3% of the control group, 40% of the exercise group.

55% of the studied patients had previous medical history of hypertension and hyperlipidemia, distributed as 53.3% within the control group, and 56.7 % within the exercise group. Moreover, it was found that 63.3% of the studied patients are smokers, 63.3% each group.

Table (2) represents Barthel index score of both groups. It shows that the mean score of Barthel Index (BI) had significantly increased in the control group following routine hospital management protocol. As the mean score on admission was 29.83 ± 14.05, then it elevated to 39.83 ± 16.84. On the same hand, the mean score of Barthel Index (BI) had significantly elevated in the exercise group. The mean score had been significantly elevated from 21.33 ± 7.98 to 60.33 ± 19.52. It's obvious that the exercise group had achieved more significant improvement than the control group, as the mean score of improvement of the exercise group was 39.0±13.80, while it was 10.0±8.91 for the control group.

Moreover, the mean score of feeding, bathing, grooming, dressing, bowel, and stairs subscales had significantly more elevated in the exercise group than the control group. On the same hand, the exercise group had significantly shown more elevated mean score of bladder, toilet use, transfer, and mobility subscales than the control group.

Table (3) represents Berg Balance Scale (BBS) of both groups. it shows that the exercise group had achieved more significant improvement than the control group within the fourteen items that had been measured, as the mean score of improvement of Berg Balance Scale (BBS) of the exercise group was 59.26±25.94, compared to 25.66±18.18 for the control group .

Table (4) compares Barthel **index score, Berg balance score and STAI** score of patients. It's obvious that the exercise group had achieved more significant improvement than the control group, as the mean score of improvement of Barthel Index (BI) in the exercise group was 39.0±13.80, while it was 10.0±8.91 for the control group. On the same hand, there was significant improvement of the mean score of Berg Balance scale in the exercise group 12.03±4.84 than the control group 5.0 ± 3.53. it also goes hand in hand with the significant improvement of the mean State Trait Anxiety inventory (STAI) of the exercise group 21.40±8.15 if compared to that of the control group 7.47±3.43.

Table (5) presents the number of patients classified according to severity of disability level. It shows significant functional improvement and independency level of the exercise group as 86% scored 20-40 on Barthel index, which became 73.3% scored 61-80 following the exercise program. On the other hand, control group had a minimal improvement as scored by Barthel index. Moreover, number of patients who were very severely disabled, and severely disabled had been decreased.

Table (1): Comparison between the two studied groups according to demographic data

	Experimental (n=30)		Control (n=30)		Test of Sig.	P
	No.	%	No.	%		
Age						
90 – 100	3	10.0	5	16.7	χ^2= 0.895	^{MC}p= 0.905
80 < 90	9	30.0	8	26.7		
70 < 80	13	43.3	11	36.7		
60 < 70	5	16.7	6	20.0		
Sex						
Male	19	63.3	22	73.3	χ^2= 0.693	0.405
Female	11	36.7	8	26.7		
Occupation						
Clerical	9	30.0	10	33.3	χ^2= 0.708	0.702
Manual	0	0.0	0	0.0		
Famer	10	33.3	12	40.0		
House wife	11	36.7	8	26.7		
Level of education						
Illiterate	16	53.3	16	53.3	χ^2= 2.333	0.311
Secondary	0	0.0	0	0.0		
Read and write	10	33.3	6	20.0		
Baccalaureate	0	0.0	0	0.0		
Primary	4	13.3	8	26.7		
Others	0	0.0	0	0.0		
Associated medical diseases						
Hypertension	2	6.7	0	0.0	χ^2= 2.384	^{MC}p= 0.783
Diabetes mellitus	0	0.0	0	0.0		
Hyperlipedemia	1	3.3	1	3.3		
Heart diseases	0	0.0	0	0.0		
HTN +DM	5	16.7	6	20.0		
HTN +Hyper lipid	17	56.7	16	53.3		
HTN +HD	5	16.7	7	23.3		
Smoking						
Yes	19	63.3	19	63.3	χ^2= 0.0	1.000
No	11	36.7	11	36.7		

Table (2): Comparison between the two studied groups according to Barthel index score

		Improvement	Pre program (n=30)	Post program (n=30)	Test of Sig. t_1	p
Feeding	**Experimental**	5.17±0.91	0.67 ± 1.73	2.83 ± 1.90	31.00*	<0.001*
	Control	0.67±1.73	2.17 ± 2.52	2.83 ± 2.52	2.112*	0.043*
	t_2(p)	12.608* (<0.001*)	2.688*(0.009*)	5.211*(<0.001*)		
Bathing	**Experimental**	4.50±1.53	0.0 ± 0.0	4.50 ± 1.53	16.155*	<0.001*
	Control	1.0±2.03	2.0 ± 2.49	3.0 ± 2.49	2.693*	0.012*
	t_2(p)	7.539*(<0.001*)	4.397*(<0.001*)	2.812*(0.007*)		
Grooming	**Experimental**	4.17±1.90	0.33 ± 1.27	4.50 ± 1.53	12.042*	<0.001*
	Control	0.83±1.90	1.0 ± 2.03	1.83 ± 2.45	2.408*	0.023*
	t_2(p)	6.812*(<0.001*)	1.523(0.134)	5.060*(<0.001*)		
Dressing	**Experimental**	4.50±1.53	1.0 ± 2.03	5.0 ± 2.74	16.155*	<0.001*
	Control	1.33±2.25	2.0 ± 2.49	3.33 ± 2.40	3.247*	0.003*
	t_2(p)	6.382*(<0.001*)	1.703(0.094)	3.261*(0.002*)		
Bowels	**Experimental**	4.17±1.90	3.67 ± 2.25	7.83 ± 3.87	12.042*	<0.001*
	Control	1.17±2.15	1.67 ± 2.40	2.83 ± 2.52	2.971*	0.006*
	t_2(p)	5.732*(<0.001*)	3.333*(0.002*)	5.931*(<0.001*)		
Bladder	**Experimental**	3.83±2.15	0.67 ± 1.73	4.50 ± 3.04	9.761*	<0.001*
	Control	1.83±2.45	2.17 ± 2.52	4.0 ± 3.57	4.097*	<0.001*
	t_2(p)	3.360* (0.001*)	2.688*(0.010*)	0.584(0.561)		
Toilet use	**Experimental**	3.83±2.15	0.33 ± 1.27	4.17 ± 1.90	9.761*	<0.001*
	Control	1.67±2.40	2.50 ± 2.54	4.17 ± 3.24	3.808*	0.001*
	t_2(p)	3.685* (0.001*)	4.176*(<0.001*)	0.0(1.000)		
Transfers	**Experimental**	3.17±2.45	4.83 ± 2.45	8.0 ± 3.62	7.077*	<0.001*
	Control	1.33±2.25	6.0 ± 2.03	7.33 ± 3.41	3.247*	0.003*
	t_2(p)	3.019* (0.004*)	2.006* (0.049*)	0.735(0.466)		
Mobility	**Experimental**	3.50±2.33	5.0 ± 2.27	8.50 ± 3.26	8.226*	<0.001*
	Control	1.17±2.15	5.67 ± 3.14	6.83 ± 3.59	2.971*	0.006*
	t_2(p)	4.030*(<0.001*)	0.941(0.351)	1.883(0.065)		
Stairs	**Experimental**	3.0±2.48	4.0 ± 2.03	7.0 ± 4.07	6.595*	<0.001*
	Control	1.17±2.15	2.50 ± 2.54	3.67 ± 2.25	2.971*	0.006*
	t_2(p)	3.051*(0.003*)	2.523*(0.015*)	3.928*(<0.001*)		
Total score	**Experimental**	39.0±13.80	21.33 ± 7.98	60.33 ± 19.52	15.483*	<0.001*
	Control	10.0±8.91	29.83 ± 14.05	39.83 ± 16.84	6.150*	<0.001*
	t_2(p)	9.673*(<0.001*)	2.881*(0.006*)	4.356*(<0.001*)		

Table (3): Comparison between the two studied groups according to Berg balance scale

		Improvement	Pre program (n=30)	Post program (n=30)	Test of Sig. t_1	p
Sitting to standing	**Experimental**	0.83±0.38	1.67 ± 0.48	2.50 ± 0.68	12.042*	<0.001*
	Control	0.30±0.47	1.53 ± 0.51	1.83 ± 0.70	3.252*	0.001*
	t_2(p)	4.862*(<0.001*)	1.046(0.300)	3.738*(<0.001*)		
Standing unsupported	**Experimental**	0.80±0.41	1.0 ± 0.0	1.80 ± 0.41	10.770*	<0.001*
	Control	0.23±0.43	1.033±0.18	1.27 ± 0.45	2.971*	0.006*
	t_2(p)	5.242* (<0.001*)	1.00 (0.326)	4.817*(<0.001*)		
Sitting back unsupported	**Experimental**	0.83±0.38	1.33 ± 0.48	2.17 ± 0.70	12.042*	<0.001*
	Control	0.33±0.48	1.33 ± 0.48	1.67 ± 0.76	3.808*	0.001*
	t_2(p)	4.481* (<0.001*)	0.0(1.000)	2.656*(0.010*)		
Standing to sitting	**Experimental**	0.87±0.35	1.13 ± 0.57	2.0 ± 0.83	13.730*	<0.001*
	Control	0.33±0.48	1.23 ± 0.68	1.57 ± 0.94	3.808*	0.001*
	t_2(p)	4.942* (<0.001*)	0.617(0.539)	1.898(0.063)		
Transfers	**Experimental**	0.87±0.35	1.40 ± 0.50	2.27 ± 0.69	13.730*	<0.001*
	Control	0.40±0.50	1.40 ± 0.50	1.80 ± 0.76	4.397*	<0.001*
	t_2(p)	4.215* (<0.001*)	0.0(1.000)	2.486*(0.016*)		
Standing unclosed eyes	**Experimental**	0.87±0.35	1.77 ± 0.43	2.63 ± 0.72	13.730*	<0.001*
	Control	0.30±0.47	1.63 ± 0.49	1.93 ± 0.58	3.525*	0.001*
	t_2(p)	5.348* (<0.001*)	1.120(0.267)	4.143*(<0.001*)		
Standing feet together	**Experimental**	0.90±0.48	1.27 ± 0.45	2.17 ± 0.65	10.256*	<0.001*
	Control	0.30±0.47	1.30 ± 0.47	1.60 ± 0.77	4.397*	0.001*
	t_2(p)	4.908* (<0.001*)	0.282(0.779)	3.084*(0.003*)		
Reaching forward without stretched arm while standing	**Experimental**	0.87±0.35	1.73 ± 0.45	1.67 ± 0.48	13.730*	<0.001*
	Control	0.40±0.50	2.60 ± 0.50	2.07 ± 0.58	4.397*	<0.001*
	t_2(p)	4.215* (<0.001*)	0.555(0.581)	3.808*(<0.001*)		
pick up object from the floor standing	**Experimental**	0.87±0.35	1.50 ± 0.51	2.37 ± 0.72	13.730*	<0.001*
	Control	0.40±0.50	1.60 ± 0.50	2.0 ± 0.64	4.709*	<0.001*
	t_2(p)	4.215* (<0.001*)	0.769(0.445)	2.083*(0.042*)		
Turning to look behind	**Experimental**	0.90±0.40	1.43 ± 0.50	2.33 ± 0.71	12.245*	<0.001*
	Control	0.43±0.50	1.37 ± 0.49	1.80 ± 0.76	4.397*	<0.001*
	t_2(p)	3.963* (<0.001*)	0.519(0.605)	2.804*(0.007*)		
Turn 360 degrees	**Experimental**	0.87±0.35	1.07 ± 0.58	1.93 ± 0.87	13.730*	<0.001*
	Control	0.40±0.50	1.20 ± 0.61	1.60 ± 0.97	4.097*	<0.001*
	t_2(p)	4.215* (<0.001*)	0.865(0.391)	1.404(0.166)		
Place alternate foot on step	**Experimental**	0.83±0.38	1.13 ± 0.63	1.97 ± 0.89	12.042*	<0.001*
	Control	0.37±0.49	1.30 ± 0.65	1.67 ± 0.88	3.612*	0.001*
	t_2(p)	4.125* (<0.001*)	1.008(0.317)	1.310(0.195)		

Continue

		Improvement	Pre program (n=30)	Post program (n=30)	Test of Sig. t_1	p
Standing unsupported one foot infront	**Experimental**	0.87±0.35	1.43 ± 0.50	2.30 ± 0.70	13.730*	<0.001*
	Control	0.37±0.56	1.43 ± 0.50	1.80 ± 0.66	4.397*	<0.001*
	t_2(p)	4.182* (<0.001*)	0.0(1.000)	2.833*(0.006*)		
Standing on one leg	**Experimental**	0.87±0.35	1.70 ± 0.88	2.75 ± 4.20	13.730*	<0.001*
	Control	0.40±0.50	1.80 ± 0.92	19.80 ± 2.14	7.751*	<0.001*
	t_2(p)	4.215* (<0.001*)	0.430(0.669)	1.330(0.189)		
Total Score	**Experimental**	59.26±25.94	19.57 ± 4.20	31.60 ± 8.40	13.621*	<0.001*
	Control	25.66±18.18	19.80 ± 2.14	24.80 ± 4.13	11.918*	<0.001*
	t_2(p)	5.809* (<0.001*)	0.271(0.788)	3.978*(<0.001*)		

Table (5): Comparison between the two studied groups according to level of disability and functional improvement

Level of disability and functional improvement	Experimental		Control		□□	MCp
	No.	%	No.	%		
Pre program						
0 – 4 very severely disabled	1	3.3	0	0.0	23.869*	<0.001*
5 – 9 severely disabled	2	6.7	0	0.0		
10 – 14 moderate disabled	0	0.0	0	0.0		
15 – 19 mild disabled	1	3.3	10	33.3		
20 - 40 independent	26	86.7	12	40.0		
41 – 60 independent	0	0.0	8	26.7		
61 - 80 independent	0	0.0	0	0.0		
>80 independent	0	0.0	0	0.0		
Post program						
0 – 4 very severely disabled	0	0.0	0	0.0	42.089*	<0.001*
5 – 9 severely disabled	1	3.3	0	0.0		
10 – 14 moderate disabled	2	6.7	0	0.0		
15 – 19 mild disabled	0	0.0	0	0.0		
20 - 40 independent	0	0.0	15	50.0		
41 – 60 independent	5	16.7	13	43.3		
61 - 80 independent	22	73.3	2	6.7		
>80 independent	0	0.0	0	0.0		
Z	5.069*		4.146*			
P	<0.0001*		<0.001*			

Discussion:

Post-cerebrovascular accident rehabilitation program aimed to improve patient's functional abilities, psychological condition, and to achieve maximal functional independence. Our results showed a significant improvement of patient's functional independence as measured by BI. This goes hand in hand with **Kuptniratsaikul, Kovindha, Piravej & Dajpratham (2013)** who found a significantly increased functional outcome as measured by BI. On the same hand, **Langhammer& Lindmark (2012)** reported

significant improvement on ADL as measured by BI, balance as measured with BBS of both groups, but significantly higher mean scores of the exercise group. **French**, **Thomas, Leathley, Sutton & Mc Adam et al (2010)** reported that daily practice of exercise can improve patient's mobility and ADL. **Brazzelli, Saunders, Greig & Mead (2011)** reported improved physical functioning associated with post-stroke rehabilitation exercise.

Moreover, exercise group demonstrated a significant improvement in term of severity of disability level following the program as measured by BI. Similarly, **Kuptniratsaikul Kovindha, Piravej & Dajpratham (2013)** found that the number of patients who were modernly to severelydisabledhad decreased following engagement in rehabilitation program.

Mead& Bernhardt (2011) reported that post-stroke patient's mood had been positively influenced by exercise rehabilitation.This goes hand in hand with current study findings as there was a significant improvement of the exercise groups' psychological condition compared to control group as measured by STAI.In contrary, **Baer(2011)**found no significant difference between groups at any time point or within groups over time.

Conclusion& Recommendations:

Rehabilitation program had significantly improved functional abilities, psychological condition, and disability level of post-cerebrovascular accident patients.

Based on current study results, researchers recommend that:

- Establishing "post- stroke rehabilitation centers", and specialized post-stroke rehabilitation team is mandatory.
- Early initiation of post-stroke rehabilitation program is required.

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