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Original Research Paper

Effectiveness Of Mirror Therapy In Motor Recovery Of Post Stroke Hemiplegic Patients: A Randomized Controlled Trial

Medical Science

KEYWORDS : Mirror therapy, Brunnstrom stages, rehabilitation, stroke

*** Dr.Yumnam Ningthemba Singh**	MD , Department of Physical Medicine & Rehabilitation , Regional Institute of Medical Sciences * CORRESPONDING AUTHOR
Dr. Akoijam Joy Singh	MD, Professor & HOD, Department of Physical Medicine & Rehabilitation Regional Institute of Medical Sciences, Imphal
Dr. Naorem Bimol	MD, Assistant Professor, Department of Physical Medicine & Rehabilitation Regional Institute of Medical Sciences, Imphal
Dr. Yumnam Nandabir Singh	MD, Professor, Department of Physical Medicine & Rehabilitation Regional Institute of Medical Sciences, Imphal
Dr. Ningthoujam Brojendro Singh	MBBS, PGT, Department of Physical Medicine & Rehabilitation Regional Institute of Medical Sciences, Imphal

ABSTRACT

Currently among therapies available for the upper limbs post stroke rehabilitation, mirror therapy is one of them which have been seen to provide encouraging results. A randomized controlled trial was done to investigate the effectiveness of mirror therapy of the upper limb muscles in motor recovery on 72 post stroke hemiplegic patients in the age group of 35 to 65 years attending PMR department, RIMS, Imphal. Study group was given mirror therapy in addition to the conventional stroke rehabilitation programme. Patients were assessed in terms of motor recovery (Brunnstrom stages) and spasticity (MAS). These indices were measured at 0, 1 and 6 months. Statistically significant difference in motor recovery between the study and control groups was noted; difference between the means as seen at the baseline and after one month of treatment was 1.1±0.38 (study) versus 0.88±0.32 (control). However no significant difference was seen in spasticity between the groups

Introduction

Sequelae of stroke are often disabilities, and global involvement interferes significantly with Activities of Daily Living (Gerber, 2003). Arm functions are impaired in 73-88% of stroke survivors, and 55-75% of them present hemiplegia, resulting in disabilities and restrictions to function (Arjundas, 2006; Yan, Chan, & Li, 2005; Hesse et al., 2003). Currently among therapies available for the upper limbs post stroke rehabilitation, mirror therapy is one of them which have been seen to provide encouraging results in treatment of hemiparesis (Hesse et al., 2003; Seitz et al., 1998; Altschuler, 1999; Yavuzer et al., 2008; Fukumura et al., 2007; Sathian, Greenspan, & Wolf, 2000). The underlying principle is that it trick the brain by promoting a visual and kinesthetic illusion, when the subject performs movements with the normal limb that are reflected to the mirror and interpreted by the brain as performed by the affected limb (Altschuler, 1999; Yavuzer et al., 2008). By activating the mirror-neuron system and the corticospinal tract, mirror therapy accelerates recovery of hemiparesis and promotes cortical reorganization, resulting in functional and motor improvements (Arjundas, 2006; Yavuzer et al., 2008; Fukumura et al., 2007). This study was contemplated to investigate the effectiveness of mirror therapy of the upper limb muscles in motor recovery in post stroke hemiplegic patients.

Methods

A randomised controlled trial was conducted in the Department of Physical Medicine and Rehabilitation, Regional Institute of Medical Sciences, Manipur from October 2013 to September 2016. All post stroke patients with hemiparesis attending the OPD were examined and screened according to the inclusion and exclusion criteria. Inclusion criteria includes patients having first episode of unilateral stroke within 3-6 months, Brunnstrom motor recovery between stages II and IV in the affected upper extremity, able to understand and follow simple verbal instruction, spasticity of upper extremity not more than grade II, intact proprioception and age between 35-65 years. Patients who have cognitive impairment, visual problem, flaccid paralysis and uncooperative were excluded from the study. Patients were allocated into study and control group by using a block randomization technique. Since a sample of 72 patients needs to be enrolled; a list of 18 blocks was prepared. Study group was given mirror therapy for 30 minutes in addition to the conventional stroke rehabilitation programme. During the mirror therapy, patients were seated close to a table on which a mirror (30.5 × 30.5cm) was placed vertically. Non-paretic hand was placed in front of the mirror and made to do elbow, forearm, wrist & finger movements, while the patient looks into the mirror.

Ethical approval was obtained from the Research Ethics Board of RIMS, Imphal. Written informed consent was obtained from the patient before the start of the study.

Descriptive statistics such as mean (SD) and percentages were used. Data were analyzed using Chi square test and Independent t test. P value <0.05 was taken as statistically significant.

Results

Seventy two patients qualified for the study and were randomly allocated into either study or control group having 36 patients in each group. Mean age were 54.56±7.61 years (study) and 55.11±7.99 years (control). A summary of the demographic and clinical features of the patients is shown and no significant differences between the two groups were found (P > 0.05) (Table I).

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Table1. Table showing background characteristics of the study and control group (N=72)

Characteristics	Group		p-value
	Study (n,%)	Control (n,%)	
Age(years) Mean(SD)	54.56(7.61)	55.11(7.99)	
35-45	8(50.0)	8(50.0)	
46-55	8(42.1)	11(57.9)	0.69
56-65	20(54.1)	17(45.9)	
Sex			
Male	20(45.5)	24(54.5)	
Female	16(57.1)	12(42.9)	0.33
Onset			
Insidious	14(58.3)	10(41.7)	
Sudden	22(45.8)	26(54.2)	0.32
Side of weakness			
Left side	24(52.2)	22(47.8)	0.62
Right side	12(46.2)	14(53.8)	
Duration of stroke			
≤ 4 weeks	22(52.4)	20(47.6)	
≤ 24 weeks	8(50.0)	8(50.0)	0.83
>24 weeks	6(42.9)	8(57.1)	
Cranialnerves involvement			
Facial nerve	8(53.3)	7(46.7)	
Hypoglossal nerve	4(66.7)	2(33.3)	0.28
Both	18(46.2)	21(53.8)	
None	6(50.0)	6(50.0)	
Speech			
Aphonia	2(100)	0	
Slurring of speech	28(48.3)	30(51.7)	0.36
Not affected	6(50.0)	6(50.0)	
Proprioception			
Intact	26(48.1)	28(51.9)	0.58
Impaired	10(55.6)	8(44.40	
Risk factors			
Hypertension	10(27.8)	18(50.0)	
CAD	10(27.8)	4(11.1)	
Smoking+ Alcholic+ Hypertension	16(44.4)	14(38.9)	0.08
Stroke type			
Infarct	26(59.1)	18(40.9)	0.05
Hemorrhagic	10(35.7)	18(64.3)	

Overall 61.1% participants were males. Left hemiplegia (52.2%) was more prevalent in study and right hemiplegia (53.8%) in control group. Ischemic stroke more common cause of stroke in study group compared to control group (59.1% vs 40.9%).

Brunnstrom score and MAS of upper extremity were measured at 1 month and 6 months. Significant improvement in motor recovery in the study group from baseline to 1 month and from 1 month to 6 month follow up (P<0.001) in case of Brunnstrom was noted. However, no significant improvement in spasticity from baseline to 1 month and 6 months follow up (P>0.05) (Table 2).

Table 2. Table showing Motor Recovery of study participants at baseline, 1 month and 6 months follow up (N=72)

Parameters	Group	No. of cases	Mean(SD)	p-value*
Brunnstrom's score				
Baseline	Study	36	2.0(0.34)	0.419
	Control	36	1.94(0.23)	
1 month	Study	36	3.17(0.38)	<0.001
	Control	36	2.83(0.38)	
6 months	Study	36	4.22(0.42)	<0.001
	Control	36	3.17(0.38)	
Modified Ashworth score				
Elbow				
Baseline	Study	36	1.50(0.85)	0.279
	Control	36	1.28(0.88)	
1 month	Study	36	1.72(0.57)	0.489
	Control	36	1.83(0.78)	
6 months	Study	36	1.56(0.70)	0.234
	Control	36	1.78(0.87)	
Wrist				
Baseline	Study	36	1.64(0.68)	0.220
	Control	36	1.86(0.83)	
1 month	Study	36	1.47(0.61)	0.700
	Control	36	1.53(0.61)	
6 months	Study	36	1.17(0.38)	0.782
	Control	36	1.19(0.47)	

*pvalue<0.05 was taken as statistically significant

At the beginning of the study, Brunnstrom scores was 2.0±0.34 (study) and 1.94±0.23 (control), with no significant difference, p-value 0.419. After one month of mirror and exercise therapy, statistically significant improvement in motor function in study group (3.17±0.39) compared to the control group (2.83±0.38) (p<0.001) was seen. Improvement persisted in six months follow-up in the study group (4.22±0.42) compared to control (3.17±0.39) which was found to be significant, p<0.001(Figure 1).

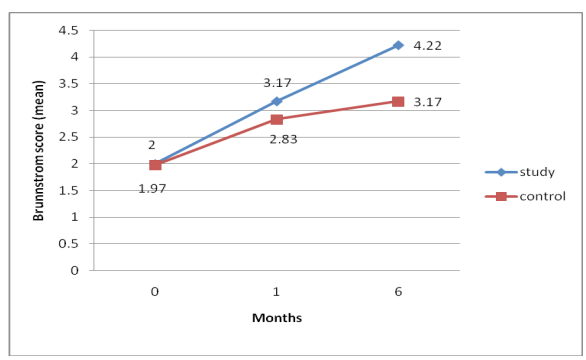

Fig 1. Time trend of Brunnstrom score of study and control group

Discussion

In this study males accounted for 61.1% and females 38.9% with a ratio of 1.5:1. Similar finding of 1.2:1 was noted in a study (Dhamija et al., 2008). Literature review shows higher incidence of stroke in male worldwide with ratios varying from 0.95-2.13 (Appelros, Stegmayr, & Terent, 2009) which is found to be consistent with this study.

In this trial, there was significant improvement of motor recovery in both groups as measured by Brunnstrom stage one month after treatment and significant difference was found between the groups in 95% confidence interval (CI) (p<0.05). When comparison was done between the groups, significant improvement was noticed in the study group from control group at baseline to 1 month and from 1 to 6 months follow up. The difference between the means as seen at the beginning of treatment and after 1 month of treatment was 1.1±0.38 (study) versus 0.88±0.32 (control) p-value <0.001. Our finding is comparable to a study where the mean change scores and 95% CI of the Brunnstrom stages for the hand were mean change, 1.5; 95% CI, 1.1 to 1.9 (study) versus mean change, 0.4; 95% CI, 0.1 to 0.8 (control); pvalue <0.001 (Yavuzar et al., 2008). However

our finding is in contrast to a study where they found no difference between the means as seen at the beginning of treatment and after one month of treatment was 0.5; 95% CI, 0.286 to 0.714 (study) versus 0.433; 95% CI, 0.221 to 0.646 (control) p-value 0.77 (Tufail et al., 2013). However, there was no significant improvement in spasticity at 1 month and 6 months in this study which was consistent to the study (Yavuzar et al., 2008). However, in a study Modified Ashworth score (MAS) showed statistically significant improvement in the study group compared to the control group (Tufail et al., 2013). This difference could be due to the larger sample size and presence of other co-morbid conditions in this study.

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