International Journal of Physiotherapy and Research,
Int J Physiother Res 2019, Vol 7(6):3301-07. ISSN 2321-1822
DOI: https://dx.doi.org/10.16965/ijpr.2019.187

Original Research Article

COMPARISON OF TASK ORIENTED APPROACH AND MIRROR THERAPY FOR POST STROKE HAND FUNCTION REHABILITATION

B. Ragamai *, K. Madhavi.

MNR Sanjeevani college of physiotherapy, Fasalwadi, MNR Nagar, Narsapur Road, Sangareddy, Telangana, India.

ABSTRACT

Objective: The purpose of this study was to compare the effectiveness of task-oriented therapy and mirror therapy on improving hand function in post-stroke patients.

Subjects and Methods: Total subjects 30 were randomly divided into two groups: the task-oriented group (15 patients) and the mirror therapy group (15 patients). The task-oriented group underwent task-oriented training for 45mins a day for 5 days a week for 4 weeks. The mirror therapy group underwent a mirror therapy program under the same schedule as task-oriented therapy. The manual dexterity and motor functioning of the hand were evaluated before the intervention and 4 weeks after the intervention by using FMA (Fugl-Meyer assessment) and BBT (Box & Block test).

Results: Hand function of all patients increased significantly after the 4-week intervention program on the evaluation of motor function and manual dexterity by FMA and BBT in both the groups of Task-Oriented approach and Mirror therapy, but Group A Task-oriented approach improved more significantly when compared to Group B Mirror therapy.

Conclusion: The treatment effect was more in patients who received a Task-Oriented approach compared to Mirror therapy. These findings suggest that the Task-Oriented approach was more effective in post stoke hand function rehabilitation.

KEY WORDS: Task-oriented approach, mirror therapy, stroke, hand function.

Address for correspondence: Ragamai Billa, MNR Sanjeevani college of physiotherapy. MNR Nagar, Narsapur Road, Sangareddy, Telangana, India. **E-Mail:** ragamai.reddy94@gmail.com

Access this Article online	Journal Information
Quick Response code	**International Journal of Physiotherapy and Research** ICV for 2016 86.93 ISSN (E) 2321-1822 | ISSN (P) 2321-8975 **https://www.ijmhr.org/ijpr.html** **DOI-Prefix:** https://dx.doi.org/10.16965/ijpr
DOI: 10.16965/ijpr.2019.187	**Article Information** Received: 29 Aug 2019 Accepted: 09 Oct 2019 Peer Review: 29 Aug 2019 Published (O): 11 Dec 2019 Revised: None Published (P): 11 Dec 2019

INTRODUCTION

Stroke is the sudden loss of neurological function caused by an interruption of the blood flow to the brain. Ischemic stroke is the most common type of stroke, affecting about 80% of individuals, which results in the loss of essential oxygen and nutrients. Rupture of the blood vessels leads to Haemorrhagic stroke which leads to leakage of blood in and around the brain.

Stroke is a common neurological disease that leads to morbidity, mortality, and disability in the adult population. WHO defined stroke as "Rapidly developing clinical signs of focal disturbance of cerebral function; lasting more than 24hours or leading to death, with no apparent cause other than the vascular origin [1]". During the past 2 decades, the prevalence of stroke in India was estimated to range from 84 to 262 per 100,000 population in rural areas to 334 to 424 per 100,000 population in urban areas [2]. Loss of upper limb function is one of the major impairments following stroke. 83% of the stroke survivors remain independent in

performing lower limb functional activities, whereas only 5-20% of the affected individuals remain independent in performing affected upper limb functional activities [3,4]. Major disability following upper limb impairment is loss of hand function, it leads to the disrupted connection between hand muscles and brain which leads to spasticity. Loss of neural connections leads to difficulty in performing hand movements where, fully straightening the fingers, grasping an item, grip strength and all other functions of the hand remains difficult in performing [5]. This makes individuals difficulty in performing everyday tasks and remains dependent on functional activities.

The task-oriented approach is defined as a 'training or therapy where patient has to practice context-specific motor tasks and receive some form of feedback [6]; A task-oriented approach or therapy concentrates mainly on the improvement of the functional activities, therapy majorly concentrates on regaining functional status by repetitive training of the functional tasks rather than the impairments, through repetitions and goal direct practice [7]. It has been found that "movement emerges from the interaction between the task, individual and the environment in which it is carried out [8].

Relatively another new intervention to improve upper limb function in recent times is Mirror therapy. Mirror neurons in brain fire both observing movements and execute movements; which are discovered by Rizzolattis et al. From the past few years, various investigations conducted to know the effect of mirror therapy suggested that, not only movement but also observing and visual imaging helps in improving motor recovery and in stimulating the motor pathway. The principle of mirror therapy is simple: by looking into the mirror placed in front, the patient observes the reflection of the unaffected limb positioned as the affected limb, which sends a virtual stimulus to the brain which activates the movement of the paralyzed or affected limb. While performing exercises with the unaffected limb, the reflection in the mirror is assumed as an affected limb, this visual reflection of the unaffected limb assumed as the affected limb helps therapeutically to enhance motor performance and perceptiveness of the paralyzed limb [9,10].

Need for the study: There are various studies conducted to know the effectiveness of Task-Oriented therapy and Mirror therapy as combined therapy or individual therapy in various regions and results were inconclusive, there is a need to replicate the study in different geographical locations. So the need for this study was to compare the effectiveness of mirror therapy alone and task-oriented alone in improving the hand function of stroke patients in the Telangana population.

SUBJECTS AND METHODS

Subjects 30 stroke patients in the study were selected from the Physiotherapy outpatient department. The inclusion criteria were: Both male and female patients of the age group from 45 to 70 years. Middle cerebral artery(MCA) stroke on MRI or CT scan, Patients with a stroke from 2 months up to 1year, Ability to pick up and lift the block on command, Patient having the Ability to participate in 45-min physiotherapy sessions. Exclusion criteria were: with shoulder subluxation, with uncontrolled hypertension, with upper limb contractures, with visual impairment.

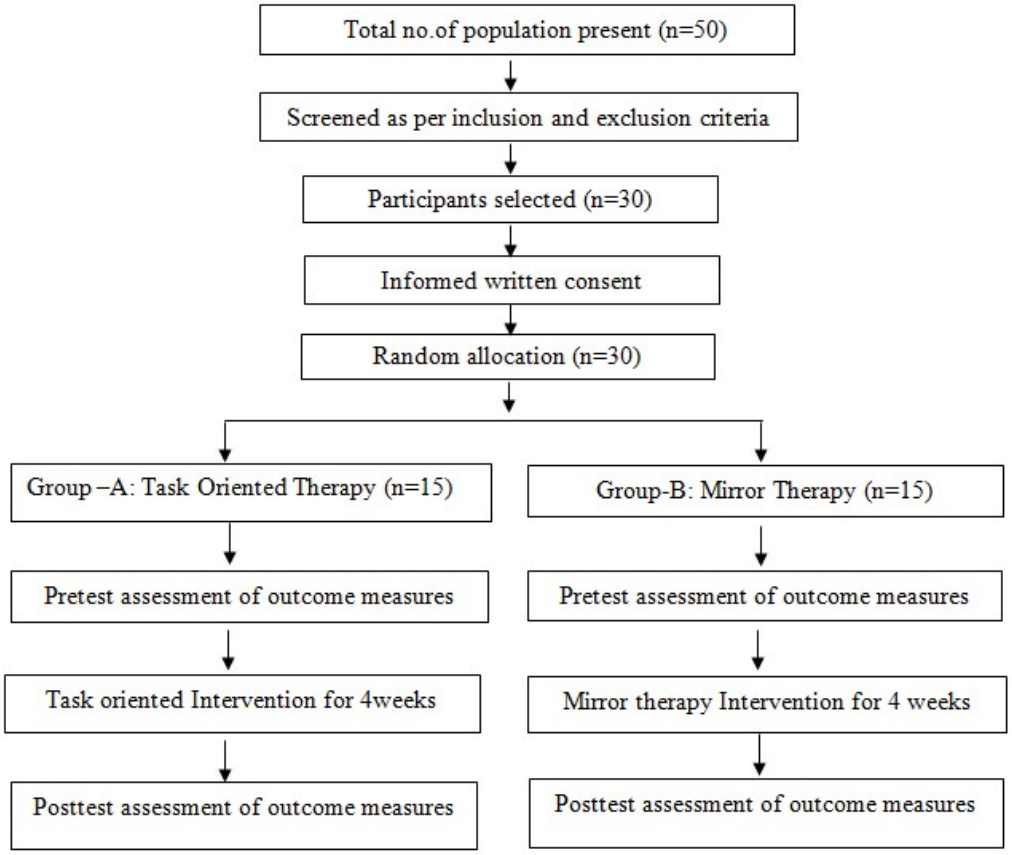
Methods 30 subjects who fulfilled the inclusion and exclusion criteria were randomly allocated into two groups 15 each in Task-oriented group and Mirror therapy group. A total of 30 patients selected were informed and explained about the study and the treatment protocol and agreement regarding their participation was signed by them.

Outcome measures: manual dexterity and motor functioning of the hand were evaluated before the intervention and 4 weeks after the intervention by using FMA (Fugl-Meyer assessment) and BBT (Box Block test)

Procedure

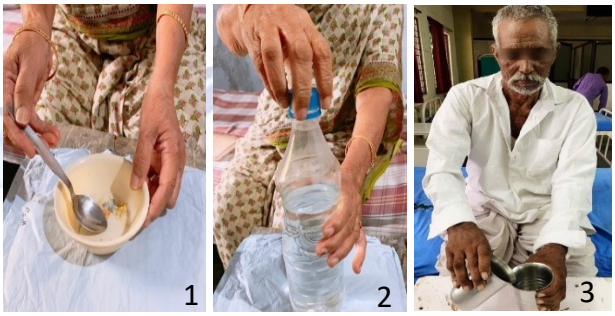
Intervention: 30 patients were randomly allocated into two groups, Group A: Task-oriented approach, Group B: Mirror therapy

Group A: Task-oriented therapy: Patients in this group received task-oriented exercises for 45 minutes per day for 5 days a week for 4 weeks. Therapy included following functional tasks; reaching, grasping or holding, lifting, placing



objects and counting fingers [7,11]. Above mentioned functional tasks were practiced through task-oriented exercises by performing simple activities of daily living such as eating (using a cup and spoon), dressing (wearing and taking off a shirt), using a belt, personal hygiene (using a towel , combing, tooth brushing) and other activities using household materials like bottle, book etc. Each of these activities was performed for 5 repetitions. Tasks were performed with the participants seating in front of the table placed at a suitable height where objects related to the intervention are arranged. The level of difficulty to the patient was increased slowly day by day by assigning the tasks above the patient's capacity[12] and by increasing the distance between the object by which task should be carried out and reducing the size of the object and by decreasing the time to carry out a task. A rest interval of 5mins was given whenever it is required by the patient in one exercise period. Along with task-oriented therapy, conventional therapy sessions were also conducted to the patient's in which active/ passive range of motion exercises, stretching for upper extremity and hand, strengthening exercises were Given [13].

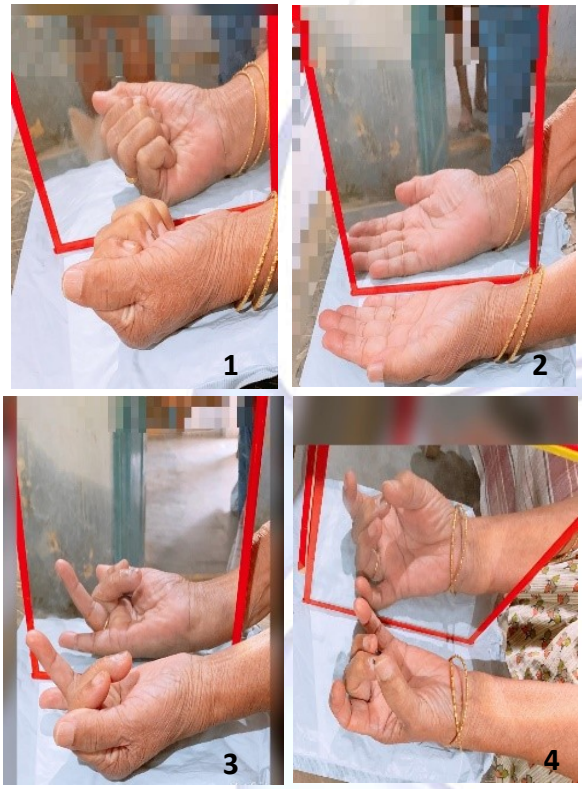
Fig. 1: Task oriented training by using household utensils like; 1.Using Cup and a spoon 2. Using Bottle and cap 3. Using Steel tumbler.



Group B: Mirror therapy: Mirror therapy group underwent the following protocol, training was given for 45min a day for 5 days a week for 4 weeks. Mirror box which was of 18×24inch [14] was placed on the learning table and exercises were carried out by the patient looking into the mirror where an unaffected limb is placed in front of the mirror, through looking into the mirror patient assumes the reflection of the unaffected limb as the paretic limb. Exercises performed were hand opening and closing, wrist extension and flexion, squeezing, opposition, the calculation[15]. A rest interval of 5mins was given whenever it is required by the patient in one exercise period. Along with mirror therapy, conventional therapy sessions were also conducted

to the patient's in which active/passive range of motion exercises, stretching for upper extremity and hand, strengthening exercises were given [13].

Fig. 2: Images showing patient performing mirror therapy movements: 1. Hand closing 2. Hand opening 3. Calculation 4. Opposition.



Data analysis: Statistical analysis in this study was done using SPSS ver16.0. Within the group comparison between pre and post-intervention was done by using paired t-tests. And for comparison of the difference between the groups, an independent t-test was performed.

RESULTS

Statistical analysis of the data showed that there was no significant difference in age and gender exists between groups A and B (p-value >0.05). Data indicate that there was no significant difference exists between groups A and B of Fugl-Meyer pre and Box and Block pre. There was a significant difference that exists between the pre and post of Fugl-Meyer and Box and Block test within groups A and B. There was a significant difference exists between groups A and B of Fugl-Meyer and Box and Block post ($p<0.001$).

Both groups A and B showed a significant difference from pre to post-intervention, but mean values when compared, it showed more improvement in group A(Task-oriented therapy) than group B(Mirror therapy).

GROUP -A

Paired Samples Statistics				
GROUP A	Mean	N	Std. Deviation	Std. Error Mean
Fugl-Meyer Post Test	11.4	15	1.35225	0.34915
Fugl-Meyer Pre Test	7.9333	15	1.90738	0.49248
.Box-Block Post Test	20.0667	15	3.12745	0.8075
Box-Block Pre Test	15.3333	15	2.76887	0.71492

Paired Samples Test							
	Paired Differences					t	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Fugl-Meyer Post Test – Fugl-Meyer Pre Test	3.467	1.06	0.274	2.8796	4.05373	12.67	14	.000*
Box-Block Post Test – Box-Block Pre Test	4.733	0.884	0.228	4.24395	5.22272	20.74	14	.000*

GROUP-B

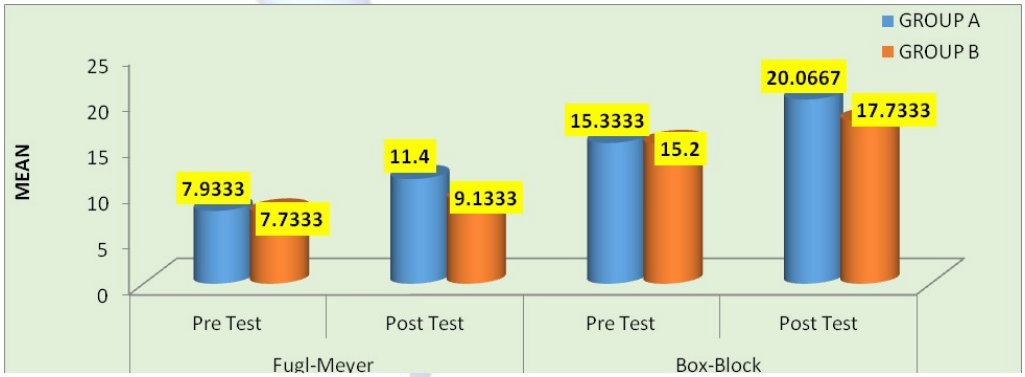
Paired Samples Statistics				
GROUP B	Mean	N	Std. Deviation	Std. Error Mean
Fugl-Meyer Post Test	9.1333	15	1.76743	0.45635
Fugl-Meyer Pre Test	7.7333	15	1.98086	0.51146
Box-Block Post Test	17.7333	15	2.78944	0.72023
Box-Block Pre Test	15.2	15	2.7826	0.71846

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Fugl-Meyer Post Test – Fugl-Meyer Pre Test	1.4	0.73679	0.19024	0.99198	1.80802	7.359	14	.000*
Box-Block Post Test – Box-Block Pre Test	2.53333	0.63994	0.16523	2.17895	2.88772	15.332	14	.000*

GROUP A VS B

Group Statistics					
		N	Mean	Std. Deviation	Std. Error Mean
Fugl-Meyer Pre Test	GROUP A	15	7.9333	1.90738	0.49248
	GROUP B	15	7.7333	1.98086	0.51146
Fugl-Meyer Post Test	GROUP A	15	11.4	1.35225	0.34915
	GROUP B	15	9.1333	1.76743	0.45635
Box-Block Pre Test	GROUP A	15	15.3333	2.76887	0.71492
	GROUP B	15	15.2	2.7826	0.71846
Box-Block Post Test	GROUP A	15	20.0667	3.12745	0.8075
	GROUP B	15	17.7333	2.78944	0.72023

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Fugl-Meyer Pre Test	0.282	28	0.78	0.2	0.71002	-1.25441	1.65441
Fugl-Meyer Post Test	3.945	28	0.000*	2.26667	0.57459	1.08966	3.44367
Box-Block Pre Test	0.132	28	0.896	0.13333	1.01356	-1.94285	2.20951
Box-Block Post Test	2.156	28	0.040*	2.33333	1.08203	0.11689	4.54978



DISCUSSION

The present study was conducted to know the effectiveness of two different rehabilitation approaches on 30 post-stroke subjects divided into two groups with 15 each. Group A was given Task-Oriented training and Group B was given Mirror therapy, and the study was carried out for 4 weeks. The study demonstrated that both mirror and task-oriented approaches were effective in helping to restore hand function in stroke patients with hemiplegia. comparatively, the task-oriented group showed more significant

improvement than mirror therapy.

In this study, the hand function of stroke patients improved by an average of 43% based on FMA and 30% based on BBT in patients who received task-oriented therapy and improvement of 15% based on FMA and 20% based on BBT in patients who received mirror therapy.

Though improvement was observed in both the groups after the 4-week intervention program, the task-oriented group showed significant improvement because of various reasons. Yoo[16] suggested that improvement in the range of motion is limited if therapy consists of only simple movements rather than movements with functional activities. Present results of this study support that conclusion. Here, I observed improvements in hand function with the application of mirror therapy but patients who received task-oriented therapy demonstrated sustained improvement in hand movement.

Differences in the performance between the two groups may also be caused due to boredom felt by the patients by doing mirror therapy. Baek [17] explained that the lack of effectiveness of mirror therapy was caused due to patients performing simple motions. He observed that therapy was more effective in the early days of the experiment where patients concentrated more on movements but later on, due to boredom felt by the patients in repeating the same simple movements effectiveness of the therapy reduced. Similarly, in this study patient who was assigned with simple movements in front of the mirror lost their interest and felt boredom in performing movements. Whereas patients in task-oriented group concentrated more on completing the tasks which were assigned to them.

As, task-oriented therapy consists of activities that involve both the hands in completing the task, the effectiveness of the treatment will be more [18]. Bilateral movement of the hands in performing the activities of daily living can improve aspects like speed and runtime in performing a task rather than movement performed with the affected side only [19].

Although the study demonstrated the effectiveness of task-oriented therapy over mirror therapy, it has some limitations. The sample size taken for the study was small to rule out the general conclusions of the therapies used for hand rehabilitation. As follow-up survey was not done, long term effects of the therapies were not known. Further research should be done on the larger population to rule out the effectiveness of the used rehabilitation protocols, and follow up surveys should be done to know the long term effects of the therapies.

CONCLUSION

The findings of the study confirmed that the treatment effect was more in the patients who received the Task-Oriented approach when compared to Mirror therapy.

Conflicts of interest: **None**

REFERENCES

[1]. Aho K, Harmsen P, Hatano S, Marquardsen J, Smirnov VE, Strass, et al. Cerebrovascular disease in the community: results of a WHO collaborative study. Bull World Health Organ. 1980; 58:113-130.

[2]. Archives of Physical Medicine and Rehabili tation by the American Congress of Rehabilitation Medicine. Published by Elsevier Inc 2016;97:1526-32

[3]. Jordan K, King M. Augmented reality assisted upper limb rehabilitation following stroke. INTECH Open Access Publisher; 2011 Dec 9.

[4]. Kwakkel G, Kollen BJ, van der Grond J, Prevo AJ. Probability of regaining dexterity in the flaccid upper limb: impact of severity of paresis and time since onset in acute stroke. Stroke. 2003 Sep 1;34(9):2181-6.

[5]. Raghavan P, Krakauver JW, Gordon AM. Impaired anticipatory control of fingertip forces in patients with a pure motor or sensorimotor lacunar syndrome. Brain 2006; 129: 1415-25.

[6]. Teasell RW, Foley NC, Salter KL, Jutai JW. A Blueprint For Transforming Stroke Rehabilitation Care In Canada: The Case For Change. Archives of Physical Medicine and Rehabilitation 2008;89:575–578.

[7]. Hubbard IJ, Parsons MW, Neilson C, Carey LM. Task specific training: evidence for and translation to clinical practice. Occupational Therapy International 2009;16(3 4): 175-189.

[8]. Shumway-Cook A, Woollacott MH. Motor Control: Translating Research Into Clinical Practice 2006.

[9]. Rothgangel AS, Braun SM, Beurskens AJ, Seitz RJ, Wade DT. The clinical aspects of mirror therapy in rehabilitation: a systematic review of the literature. Int J Rehabil Res. 2011;1:1-13.

[10]. Thieme H, Mehrholz J, Pohl M, Behrens J, Dohle C. Mirror therapy for improving motor function after stroke. Cochrane Database Syst Rev. 2012;14; 3: CD008449.

[11]. Birkenmeier RL, Prager EM, Lang CE. Translating animal doses of task-specific training to people with chronic stroke in 1-hour therapy sessions: a proof-of-concept study. Neurorehabilitation and neural repair 2010; 24(7):620-635.

[12]. Carr J, Shepherd R. Movement Science: Foundations for Physical Therapy in Rehabilitation. 2nd edition: Aspen Publishers 2000.

[13]. Priyanka A kale, Sharda Bhalearo et al. Effect of early physiotherapy intervention on hand function in acute stroke patients. International Journal of Multidisciplinary Research and Development 2018;5(1):110-114.

[14]. Dohle C, Pullen J, Nakaten A, Kust J, Rietz C, et al. Mirror therapy promotes recovery from severe hemiparesis: a randomized controlled trial. Neurorehabilitation and neural repair2009;23(3):209-217.

[15]. Kim JH, Lee B. The Effect of Mirror Therapy on Functional Recovery of Upper Extremity after Stroke: A Randomized Pilot Study. Journal of Experimental Stroke & Translational Medicine. 2017 Jan 24;10(1):1-7.

[16]. Yoo, S. J. An effect of mirror therapy on upper extremity function and activities of daily living in patients with post-stroke hemiplegia. Daegu, South Korea: Department of Occupational Therapy Graduate School of Rehabilitation Science, Daegu University 2010.

[17]. Baek N. Y. Effects of mirror therapy on hemiplegia in the function of the lower extremity. Daegu, South Korea: Department of Physical Therapy, Graduate School of Rehabilitation Science, Daegu University 2009.

[18]. Paik, Y. R., & Kim, S. K. A task-oriented approach consisting of modified constraint-induced movement therapy (m-CIMT) and bimanual activity effects on upper extremity function and activities of daily living (ADL) in stroke patients. Journal of Korean Academy of Occupational Therapy 2010;18:79-93.

[19]. Utley, A., & Sugden. Interlimb coupling in children with hemiplegic cerebral palsy during reaching and grasping at speed. Developmental Medicine and Child Neurology 1998;40:396-404.

How to cite this article:

B. Ragamai, K. Madhavi. COMPARISON OF TASK ORIENTED APPROACH AND MIRROR THERAPY FOR POST STROKE HAND FUNCTION REHABILITATION. Int J Physiother Res 2019;7(6):3301-3307. **DOI:** 10.16965/ijpr.2019.187