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Research Article

The Effects of Mirror Therapy on Eye Hand Coordination

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Abstract

Introduction/Background: Stroke is being noticed as the most prevalence cause of upper extremity (UE) impairments. Visual and motor pathway disruption results in disoriented eye-hand coordination. Mirror therapy (MT) established significant evidence for rehabilitation after stroke for UE. Remapping and visual illusion of active hand in place of affected UE can improve eye movements and hand coordination.

Aim: To investigate that during mirror therapy, eye movements and observation plays crucial role for arm movements for multiple hand activities. To demonstrate significant effect of MT on eye-hand coordination, manual function test, chedoke arm and hand inventory test on the basis of National institutes of health stroke scale severity level.

Methodology: Twenty-five sub-acute patients participated for 3 weeks of intervention, 5 days out of seven and 30 minutes of MT session. Patients were measured initially for NHISS to describe the level of severity in each patient. Burnnstorm stages of UE, line-bisecting test and mini-mental state examination with patient health questionnaire was examined to define the stage, hemi neglect, cognitive abilities and psychiatric issues. The improvement was measured by the mean and t-test of manual function test (MFT) and chedoke arm and hand inventory (CAHAI) pre and post reading. Percentage was also calculated to rule out the difference of improvement for MFT and CAHAI for mild, moderate and moderately-severe NHISS patients.

Result: MFT and CAHAI scores individually for all 25 patients and in relation with NHISS scores had shown significant improvement for mild and moderate patients. Mean, t-test was performed to evaluate the findings which were significant.

Conclusion: MT had shown benefits on eye hand coordination as well as on the stroke severity level as well. Manual function test and Chedoke arm and hand inventory had also shown great improvement in motor function of UE. MT with MFT and CAHAI had benefited motor function of the patients.

Keywords: Mirror Therapy; Eye Hand Coordination; CAHAI

Introduction

Stroke is also termed as cerebrovascular accidents (CVA) or brain attack which is fomented by disruption of bloodstream to the brain [1,2]. Cerebrovascular accidents are designated or specified as unexpected neurological loss developed by vascular lesion in the brain. Vascular injury can be one of two, ischemic or hemorrhagic. The most common type is ischemic stroke or cerebral ischemia, is an outcome when a bloodstream is congested or narrowed by a clot; limiting the oxygen and nutrition circulation of brain, influencing approximately 80% of people with CVA or stroke [4,7,12,20]. Intracerebral haemorrhage happens when outflow of blood cumulate inside the brain because of the ruptured vessel. Numbers of potential defects are diminished such as motor, cognitive, synergy, language, reflexes, perceptual, sensory and consciousness level

[1,2,8,12]. Neurological loss should be present for twenty-four hours minimum, to be documented as stroke [1]. Motor insufficiencies are denoted as hemiplegia i.e., paralysis and hemiparesis i.e., weakness of side opposite to the vascular lesion [13,15].

Location, extent, amount of brain attack and early care confirm the intensity or seriousness of neurological deficits in single patient. In 3 weeks of period, dysfunctions may settle voluntarily as swelling dismisses which is named as reversible ischemic stroke [19,20]. Persistent impairments more than 3 week advance the dysfunctioning and disability. Classification of stroke is distributed by etiology, vascular territory and management category. Stroke or CVA is a frequent reason of severe dysfunction, surviving through stroke is disturbed by heart problems, age, high blood pressure and diabetes. Unexpected numbness, confusion, headaches, nausea, weakness of arm or leg, balance and coordination are familiar symptoms of CVA or stoke [2,5,19,22].

Generally, most noticeable disabilities after CVA are abnormal muscular tone, paresis, reduced coordination and somatosensation [4,15]. As a repercussion of these disablements, CVA survivors may encounter diminished power to execute daily tasks like holding a key, computer work, opening and closing a door. The frequency of upper extremity disablement is round about 40-50 percent for chronic and 50-80 percent for acute phase of stroke [12,14,15]. The understanding of functional repercussion may play a crucial part for upper extremity relearning and rehabilitation. The prime functional repercussions of upper extremity disablement are: 1) learned non-use, 2) learned bad use and 3) forgetting analysis of activities. As a complication of upper extremity limitation, involvement of affected hand will be reduced by the patient, therefore relevant therapy is vital for underlying disability. Impairment or limitation are not constant for e.g., as motor function improves, nature and type of limitation may differ.

Weakness in hand due to CVA may not resolve after spasticity phase begins few months later which can limit treatment [12,15,17,22,25]. Learned non-use initiates with weakness, is considered to be critical impairment, further chronic pain, sensory impairments and immobility worsen the state of patient.

Compensatory joint and muscle movement is caused by muscle co-contraction, spasticity and abnormal will guide, to learned bad use. Weakness in upper extremities after CVA or stroke is cardinal impairment which promotes dysfunction [20,21,25]. Paresis is caused by the deficit of signal transmission to initiate motor impulse from motor cortex to spinal cord which carries out muscular movement through signals. Disrupt signal pathway results in late initiation, termination of motor contraction and delay in force development in upper extremity. These demonstrate as incapability to move or rapid movement with negative functional reaction or outcomes of shoulder, elbow and wrist. PEER-REVIEW HAS STOPPED HERE. THE AUTHOR(S) NEED ASSISTANCE WITH APPROPRIATE WORDS/ADJECTIVES/VERBS FOR TRANSLATION TO ENGLISH. THIS IS A GOOD TOPIC AND THE ARTICLE WILL BE RELEVANT, BUT THE ENGLISH IS INADEQUATE FOR A JOURNAL PUBLICATION.

Paresis influence all muscles or may be selectively or some muscle groups in upper extremities. Pattern of muscle group weakness can be different in multiple stroke cases but researches indicate that no weaker flexors to greater extensor or proximal to distal slope exist. Therapists or clinician cannot foresee any specific function even if certain strength is present in any muscle group, hence hand grip and wrist extension can be used as fair predictors for changes in force development. Sensory deficit linked with paresis of upper extremity and with stroke severity level, over tactile or cortical sensations such as deficits in graphesthesia and stereognosis which may be influenced by level of mobility, independence during ADLs and recovery process [1,2,5,8]. Even if there is only sensory deficit with complete motor strength, sensory deficit will prohibit the accurate muscular action which they are capable of performing the complete task. According to ICF classification, immobility is because of weakness in UE after stroke, which creates multiple of limitation and difficulty due to decrease compliance of soft tissues, spasticity, muscle fibrosis leading to abnormal UE posture and pain [12,15,17,18]. Immobility effect bone mineral density creates high possibility for osteoporosis on affected UE. Increased spasticity contributes to contracture rather than contraction. Early immobilization is essential to maintain the reserved range of motion, inhibit contractures to supress spasticity and more complications [8,12,15].

Weakness triggers instability and immobility which causes impairments. Sensory deficit, weakness and pain inhibit when patient tries to perform UE movement; they start using abnormal strategies to compensate unsynchronized movements. Immobility

reinforces contractures of muscle and stiffness and progress unsynchronized motor actions and spasticity [2,12,15,18].

All in together induce compensatory movements for e.g., use of flexion or bending forward of the trunk is used than elbow extension for UE reaching activities and compensating proximal interphalanges flexion by wrist extension, and metatarsophalangeal flexion for grasping function, this is a presentation or display of learned bas use. A patient does complete the task with compensatory actions but poor accuracy in relation to time will expand the failure probability of action [8,12,22,25].

In a short space of time, patient will get used to compensate movements in relation to his daily activities which will cause loss of muscle memory of function. Specified training strategies maybe required to encourage movements of UE in a regular manner rather than compensating hand function [8,10,12]. Movement outside the learned bas use should be labelled as crucial to improve quality of UE range and mobility. Paresis with immobility advances to non-use, unspecified motor synergies and spastic co-contraction leads to bad use. Delayed participation and treatment in combination to learned non-use and bad use causes patients to forget the actual muscle function in correlation with joint. Due to stroke or CVA, a patient leads with narrow UE function which limits their eating, dressing and reaching actions. Somatosensory system of non-stroke hemisphere has an indispensable role in requiring or recompense for affected functions [2,12,14,25]. Recovery of patients with stroke is itself a complex and long approach which demands broad spectrum methods of upgrading basic rehabilitation, combination and compensation techniques to execute an independent chore to subdue daily life barriers.

Restricted mobility can also be the repercussion of pain and affiliated disablements to the patient. Pharmaceutical advices are oftentimes the foremost preferred treatment for pain. Despite the fact that high cost and side effect restricts chronic dosing. Harmless and economical approach are advised and praised for pain treatment. Physiotherapy modalities, electrical stimulation can be administered for pain relive, other than these MT is advisable as it is easy, less cost is required and have benefited patients with strong evidences [7,15,27]. The individual observe their own reflection, has been used to treat neuropathies, regional pain syndrome and phantom pain. Fear of hand movement as it can cause increase in pain, anxiety or dissatisfaction in them self because of not being able to perform smallest activity demotivates the patients. MT is a visual activity that reciprocate healthy arm with no pain or limitation which motivates and reduce the anxiety of the patient; breaking the connectivity between the fear of initiating the movement due to pain [1,11,27].

Several studies had exercised high frequency repetitive trans cranial magnetic stimulation, functional electrical stimulation or anodal tDCS which demonstrated virtuous results in relearning of functional activities [1,15,17].

For UE rehabilitation variety of intervention had been published comprising electrical stimulation, patient-oriented task training, controlled exercises, robotics assisted training, virtual reality, bilateral arm training, constraint-induced movement, EMG feedback and motor relearning [1,15,17]. All of them presented great results but not all means are cost friendly to patients, availability is also a consideration for therapists as well as patients. Therefore, protocol should be shaped with all the points to be mind. Mirror therapy (MT) on the other hand is less in cost, can be used smoothly for home program and easily available. MT was originated by the notion that through visual response patient will be able to guide chronologically form simple to complicated hand movement, which stimulate the mirror neuron and induce neuroplasticity resulting relearning of lost muscle memory or weak hand movement [3,4].

MT had reported to improve speed, functional improvement and accuracy of movement. Repeated visual feedback of hand movements with bilateral arm training increases grasp and in-hand manipulation of affected hand, which contribute to a little muscular control making them capable to achieve task like self-care. Eleven studies had presented that if practitioners will establish intervention in early stage using MT with graded activities, task oriented rehabilitation and other techniques it would benefit patients in regards to performance and daily tasks [2-4,12,15,26]. Active or spirited participation of CVA patients into an intervention in the initial stage i.e., three months is pivotal for speedy improvement because after this time period plateau will reach or attain for neurological recovery.

Multiple joint and muscle coordination is valuable in tasks such as reaching, carrying, manipulation which is tricky to be executed by patients. Hand function is last to be recover as it include fine

joint and muscle movements, which cover large area in brain that is why it demands more time. As the treatment itself will take time, cost is important issue. MT has been less in cost, easy procedure and proven to be helpful in hand recovery. Visual feedback, observation, repetition shows particular role in MT as these components stimulate motor area of hand in brain. Simple, complex, oriented and multiple tasks can be executed to assess patients for personal care [1-3,7,13]. MT can be interpreted as fooling the brain, as patients unaffected UE is reflected which present constant visual images to brain. Brain perceives or judges that affected hand is executing the functions in response to visual images encourage mirror neurons and brain tardily starts recording the functions anew. Neuroplasticity with mirror neurons introduce relearning, reorganizing and building new connections in brain in a reaction to images perceived by MT [1,3,4,14,15].

The neuro physiologically is affirmed and there is holding evidence for it, that examination of performance and activities of the studied actions share analogous cortical motor sections. Activity mirroring i.e. reversal of visual response proceeds to further activation of hemisphere contralateral respect to perceived limb lateralisation. The mirror impression might raise corticomuscualar excitability. But, the accurate mechanisms of Chosen mirror therapy in audience will continue as stroke speculative. Since the visual illustration of paretic limb is recognized in the same way of personal moving limb of an individual [13-15,20].

Various suggestions had been proposed in many studies using MT that superior temporal gyrus and frontotemporal region initiate mirror neuron system when patients observes image in mirror. Observation of hand action in mirror facilitate cortico spinal pathway for motor function [2,4,19]. MT is a feasible therapy during any phase of stroke specifically in acute phase to train perceptual, motor and sensory perception. As other type of intervention require minimum level of spasticity e.g. CIMT and MT can use introduced during flaccid stage as well [1,5,19].

Estimation of results leads to treatments, for instance utilization of key tool like mirror therapy is significant for accurate assessment or evaluation. The examination and result are utilizing assessment tools to verify treatment at its best to promote recovery after a stroke. There are several alternatives for estimation following a stroke. The utmost prevailing scales are defined in this literature subject to FMA, MI, FIM, BI, BBT, MAS and JHFT [2,8,13,15,17,19,26]. The results measures or concentrate on estimating key areas subject to neuromuscular capability, frailty, or objectivity with ADL's. Several researched-on mirror therapy and proven that this technique has optimized motor performance in their patients occurred with a stroke, comparing the research study are challenging since the variation in result measures utilized in respective study [12,14,26].

Scales subject to Chedoke Arm and Hand Activity Inventory (CAHAI) are able to identify clinical significant changes that have two potential gains: 1. Enhanced efficiency of clinical trials (by minimizing sample dimension conditions) and 2. A theoretical valid estimation of therapeutic impact. On a certain time period there is continuous strain to rationalize health costs and validate treatment efficiency, the initiation of a new-found stroke functional result to a portion i.e., extra sensitive to significant clinical change and should be embraced. The CAHAI sets the CMSA and proposes researchers and clinicians a thorough platform for evaluating motor and operational recuperation in post stroke patients.

The CAHAI contains thirteen real life operational assignments that portraits 1) the significant fields viewed by survivors of stroke 2) Actions of both hands, 3) Non gender elements, 4) Maximum array of normative actions, pinches and comprehends and 5) The different phases of motor recovery. Supported with comprehensive instruction manual, the CAHAI is an operational measure with thirteen items that are estimated utilizing a seven-point quantitative scale which is similar to FIM instrument, 18 is total sum of 91 (minimum required score is 13) that might be clearly converted to percentage [23].

To accomplish UE activity during daily life or rehabilitation procedure, hand movement with respect to visual feedback is crucial [2,3]. Activities such as reaching, grasping different objects depends upon visual feedback or information about the movement or task to be done in correlation with hand control. Initiation of performing an activity begins with eye fixation or gaze at the object and passing the information to brain before any specific UE muscular activation. The hand movement concentration of a patient will be depending upon his visual concentration by adjusting his or her eyes from surrounding to object and then continuous eye movement from one to another part in task specific direction; this will be defined by the visual acuity. Synchronization of saccades, visual acuity and hand movement will accomplish sequence of UE reaching movement [28,29]. Intricate relationship of ocular system and motor system of UE comprises of reaching and manipulation depends on eye and hand control, can be called as eye-hand coordination (EHC).

CVA or stroke disrupts the connection and limit the coordination of eye and hand. Relearning, visual training and muscular activation with repeated movement during MT plays parts in reconnecting the disruption caused by brain attack or stroke. The end goal of finger and hand movements in regards with eye gaze and attention is to accomplish reaching, manipulation or grasping activities. The cortical region is responsible for generating action potential which transfers neural information from descending corticospinal tract (CCT) to hand musculature to initiate hand function. The premotor cortex (PMC) provides planning for hand anticipatory movements, guidance, sensory input to guide hand movement to complete the process of activity. The supplementary motor cortex (SMC) served the process of sequential hand movement through transferring neural signals of CCT which travels from internal capsule and pons, then decussates at medullas activating alpha motor neurons of spinal cord [28,29]. Other than PMC, cerebellum concentrates on the control and timing through frontal motor area and descending tracts pathway of manual ability and multiple joints movements.

Cerebellum anticipates the errors during the movement and then is able to modify the motor commands to reduce the disproportionate coordination of hand [29,30]. Therapists, instruct the patients to fix gaze or eye contact with the reflection of the mirror i.e., hand reflection, to deviate the attention completely to the mirror image. For the patients, eye contact and gaze are initial and crucial part to discriminate between the important or non-important visual stimuli for hand activity [28,30]. This can be seen in children, as they initiate an eye contact with the object then initiate the reaching and grasping activity of hand. It also demonstrated the future action of a person for e.g., patient will at the fruits and plates placements before moving plate from one plate to another. According the behavioural evidence, it is stated that by observing individuals gaze their actions ca be predicated before initiation of their arm or hand function. EHC depends upon repeated eye movements, visuospatial and remapping with the eye movements and transferring the recorded information to the motor system for accurate hand function based on given activity [29,30,31].

CVA, nervous system dysfunction, and cognitive decline are the result of EHC impairments, limiting hand activities. This can also be seen in old individuals, they lose their ability to perform independent hand functions leading to limiting ADLs and social activities [30,31]. EHC is subdivided into abilities and neural connection depending upon the nervous system to transfer information. Abilities like visual perception (VP), visual motor integration (VMI) and motor coordination (MC), all these are also useful in MT to ensure the natural and smooth EHC. VP includes visual attention, memory and cognition; VMI is known for transferring the information to organize, compare and analyse whereas MC applies to precise, smooth and controlled movement. EHC is crucial part of daily life, it combines variety of domains; visual perception, recording information, organizing the behaviour before muscular activity, transferring the signals through designated tracts and at the last activating hand muscles to complete the EHC pathway.

Need of the study

Stroke is most common and affects the large population resulting limited functional ability of hand to complete any movement. Stroke rehabilitation is a long term process with many therapies and new approaches. Need of this study was done to evaluate the hand progress as stroke affects the hand activity the most and covers larger area in the brain rather than lower limbs, trunk and face which delays the rehabilitation. By using range of motion, functional and task-oriented exercises with Mirror therapy in duration of 3 weeks, and comparing pre-post readings of MFT and CAHAI this study was done to construct significant effects of mirror therapy on eye hand coordination.

Aim of the study

To find the significant effect of mirror therapy on eye hand coordination in sub-acute patients.

Objective of the study

- To find the effect of mirror therapy on eye hand coordination in sub-acute stroke patients.
- To find the effect of mirror therapy of manual function test on sub-acute stroke patients.
- To find the effect of mirror therapy chedoke arm and hand inventory on sub-acute patients.
- To find the effect of mirror therapy on manual function test and chedoke arm and hand inventory as per severity of National institutes of health stroke scale.
- **Null Hypothesis:** There is a significant effect of mirror therapy on eye hand coordination in sub-acute stroke patients.
- **Alternative Hypothesis:** There is not significant effect of mirror therapy on eye hand coordination in sub-acute stroke patients.

Discussion

Previous studies had illustrated that Mirror therapy is encouraging, affirmative as well as convenient. MT is uncomplicated for

patients to comprehend and pursue simple rule. The notion of looking mirror image and observing their hand movements is a positive feedback and motivate them to continue practicing. MT reflects visual feedback for affected hand but activates motor function of non-affected hand, which stimulates both hemispheres of the brain. MT is adjustable for any patient to regain muscular strength, coordination, balance while performing fine tasks [9,11,17]. The universal method of MT is that the patients sit on supported or comfortable chair in front of the table heighted at his elbow level. Mirror box is to be placed on the table, weak hand will be inside the box and active hand will be outside of mirror box so that it will reflect image to the patient. This adjustment is created as visual illusion with intact muscle function, sensation and proprioception which will be perceived as active hand for the patient [16].

MT is considered to be an imaging demonstration when the image reflection of opposite active hand is thought to evoke affected hemisphere or cortical activation. The affected side of the brain will capture the image when within the range movements are performed with non-affected hand. Activation of mirror neurons or corpus callosum is may be affected by looking at the arm which was stored as impaired. MT is believed to elicit the motor area in the brain that is premotor cortex for muscular rehabilitation. Brain has a vast connection throughout the whole body for e.g. cross-connection from brain to body; different tracts might get connected with the reflective image from the mirror to the brain to then to the motor function which can be the possible reason for regaining motor ability in non-active hand. Neuroplasticity is also needs to be taken into consideration. Initial phase after stroke are very vital for relearning impaired activities. During MT when therapists instruct the patients to repeat certain designed activity in relation to the intensity of the speed, this was done to stimulate the brain activity for initiate new connection or neurons through the brain. Repetition, speed, time given to each activity or single movement, simplicity and complexity all these are dependent variables for building new connection or neurons in the brain.

In this study we have combined range of motion activities for shoulder, elbow, hand and wrist which was performed in from of the mirror. As repetition is important for restoring the muscle action in the brain and muscle memory as well, 30 repetition of each movement is performed with constant speed by which patient can observe each every movement slowly and brain can perceive the image without any negative feedback.

Other activities that we had included are functional and task based in which patient is asked to put plates over other plates, holding different fruits and placing them on a plate, stacking different size of the objects. These exercises were demonstrated before patients were asked to perform. Manual function test[24] and Chedoke arm and hand inventory test[23] are assessed before and after the completion of intervention. These both scales are for upper extremity assessment scales for limitation based on the simple activities that an individual perform in daily basis. Validity, reliability and sensitivity of these scales for assessing UE functions and available movements are significant.

Rehabilitation is also age dependent; MFT scores were low in old age patients and were significantly improved in adults. CAHAI is 91 score scale with 0-7 rating in regards with the assistance reuired when each activities is being performed. CAHAI includes shoulder, elbow, hand, and wrist and finger movements in all range of motions which make it precise with the limitation and scoring. Stroke requires long procedure of rehabilitation with change in the activities to improve the preserve ability and to relearn new functions. Rehabilitation is time and cost consuming for patients, many patients does find it difficult to choose costly modality or therapy in their protocol, which limits the possibility of recovery. MT on other hand is easily available and does not affect or limit an individual with price issues.

MT is dependent on the visual feedback and hand coordination which is noted be limited or affected in CVA or stroke cases due to paresis of UE. Eye hand coordination has been the most crucial part for the performance to be successful as well as completely oriented with respect to activity. Re-learning through can improve visual acuity, gaze and attention on stroke patients which helps brain to store new functions, enhance visual skills and muscle memory as well. Interventions that have been done before demonstrated that repeating the muscle action increases the visual gaze, concentrated and feedback to work with motor system can be defined as EHC. Grasping, manipulation, lifting, reaching, goal oriented etc. such activities should be trained during MT to focus and improve EHC simultaneously. Starting from basic activities include eye gazing with repeated eye movements will increase the concentration level of eye during arm movement. Include activities which covers the ranges for visual acuity is known to be beneficial for survival and daily mobility activities.

Percentage difference of MFT and CAHAI with respect to NHISS division of patients on the level of severity of stroke has also been calculated to find out the numerical difference after the treatment. Pre percentage of MFT was calculated from total score of 288 for 9-mild patients of which is 52.77% pre and post MFT was 73.61%, the difference from MFT reading indicates that there was total of 20.83% of improvement after the treatment. CAHAI percentage of pre-readings from 819 was 56.77% and 74.48% for post readings, which shows that 17.7% was the difference of improvement after the study. 14 patients were in moderate stroke, MFT percentage was calculated out of 448. Pre percentage was 29.24% and 43.3% was post, this signifies that there was 14.06%. CAHAI pre percentage was 32.88% and post was 47.01%, the difference was 14.12% for moderate stroke patients.

The last category was moderately severe stroke which has only 2 participants that is why the percentage difference after per and post was only 7.81% for MFT and 10.43% for CAHAI pre and post scores. The t-test was also calculated for both scales as well as for the NHISS graded stroke. MFT and CAHAI t-test was significant for all 25 patients. NHISS patient's t-test of pre and post MFT and CAHAI for mild (9) and moderate (14) was significant but because only 2 patients were in severely moderate NHISS level, their scores were not significant.

Clinical significance of the study

Mirror therapy can be provided for home rehabilitation as well and can also be used to rehabilitate eye-hand coordination. As we live in developing country, in India the main concern for maximum patients is the cost for the treatment. Mirror therapy provides low cost and still beneficial results for their impairments. Patients can also utilize mirror therapy in their home settings also, where they can perform repeated hand activities in their own comfortable environment. Exercises like reaching, grasping, lifting and moving one object from one place to another increases eye-hand coordination, simultaneously hand function have also been improve. Different hand assessment scales like manual function test or chedoke arm and hand inventory test can be used to assess different ranges and activities achieved after the intervention.

Further scope of study

- The above calculations and results signify that mild and moderate were more statically improvement rather than moderately severe patients.
- There were only 2 patients that is why significant result was not achieved.
- Further investigations can be done with the severely moderate patients for the large sample size for significant results.
- Manual function test and chedoke arm and hand inventory test can be used for moderately severe or severe patients according to NHISS scores on a large population.
- Other scales in combination of mirror therapy can be studies in further studies.

Limitation of this Study

- Because of covid-19 pandemic it was not able to complete decided sample size which was 30.
- Small sample size.
- Limited number of moderately severe stroke patients according to the NHISS.
- Did not assess the correlation of trunk and hand movements.

Conclusion

This study was conducted to develop effects on hand coordination by using mirror therapy with range of motion exercises, functional and task-oriented exercises. For evaluation manual function test and chedoke arm and hand activity inventory was used to compares each scales pre and post reading. Percentage calculations pre and post for MFT and CAHAI for mild, moderate and severely moderate stroke patients. The result suggested that the study was significant which was calculated by t-test. The mirror therapy in this study has shown beneficial results for all 25 patents as well in subdivision by NHISS on eye hand coordination.

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