

The Effectiveness of Neuro Physiotherapy Techniques in Improving the Upper Limb Function of Stroke Patients

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Abstract: ***Aim:** to investigate the effectiveness of neuro physiotherapy techniques in improving upper limb function of stroke patients. **Methods:** a comprehensive search on pubmed, Medline, Cochrane, Google scholar, CINAHL clinical keys database using keywords stroke, interventions used in stroke, upper limb function and physiotherapy evidence based database was utilised for quality assessment. **Results:** 12 studies were included 5 RCT, 2 comparative study, 4 experimental studies. The result of this review provides evidence that neurophysiological techniques in neuro physiotherapy will improve upper limb function of stroke patients. **Conclusion:** the result of this review provides sufficient positive evidence about neuro physiotherapy techniques will improve upper limb function of patients suffering from stroke*

Keywords: Neuro physiotherapy techniques, stroke, evidence based practice, upper limb functions, neuro physiological techniques, evidence based physiotherapy.

1. Introduction

Stroke is defined as sudden neurological deficit caused by the loss of blood supply to part of brain because of the blood clot in the blood vessel or the rupture of blood vessel in brain leading to loss of blood supply to particular part causing the cellular or tissue damage [1]

According to World Health Organization stroke is a global public health problem which causes more disabilities statistics made by Bruce stated that 65% of stroke patients faces difficulty in using affected upper limb [hemiparetic limb] it is noted that 85% of stroke patients experiences the hemiparesis in that 55 to 75% of patients have limitations in upper limb functioning such as delay in time to maximal grip aperture prolonged movement time, difficulty in reaching to grasp, lack of accuracy and a disability especially in upper limb. Physical rehabilitation is emerging a lot treating the stroke related disabilities especially in upper limb. [2]

There are lot of studies which utilizes different types of treatment techniques with different duration therapy to determine the effectiveness of upper limb functions. The main therapeutic approaches for the rehabilitation of upper limb functions in stroke patients are (Proprioceptive Neuromuscular Facilitation PNF) [3], Brunnstorm, Bobath therapy [4], the Motor Relearning Programme (MRP) [5],

Constrained Induced Movement Therapy (CIMT) [6]and Mirror therapy (MT) [7]among the therapy motor relearning programme and mirror therapy is commonly used by therapist in improving upper function there are many interventions to prove the effectiveness of upper limb functioning improvement by physical therapy but still there is a lack of evidence to prove the statement [8]

Rehabilitation is a kind of therapy used in stroke patients it will decreases the risk of extra cerebral complications which is associated with immobilization of the patient leading to decrease the mortality of early post stroke and increasing independency of individual [9].

The current study was planned to review the effectiveness of neuro physical therapy techniques in improving upper limb function of stroke patients. The aim of post - stroke rehabilitation is to restore the patient's best possible functioning, so there is a great interest in looking for more effective ways to do this even though the rate and extent of rehabilitation result differed according to the region affected in the centres of the brain. And the degree of disability. It is known that most of the stroke patients will recover within first 3 months in motor functioning [10, 11]. the remaining motor functioning can be achieved through training and learning within 6 months of stroke. [11]

2. Literature Review

Sr no.	Author	Title	Year	Study design	Conclusion
1.	Muhammad Aliyu Abba et al [6]	Comparative effect of constraint - induced movement therapy and proprioceptive neuromuscular facilitation on upper limb function of chronic stroke survivors	2020	Comparative study	This study concluded that CIMT and PNF interventions are both beneficial in improving upper limb function, with CIMT being more advantageous. CIMT may be the preferred approach for the management of chronic upper limb post - stroke impairments.
2.	Shafqatullah Jan et al [8]	A randomized control trial comparing the effects of motor relearning programme And mirror therapy for improving upper limb motor functions in stroke patients	2019	A randomized controlled trial	Author performed and compared the techniques of motor relearning and mirror therapy for improving upper limb function in stroke patients by including 66 patients and divided equally in two groups. the experimental group received MRP for a period of 6 week 3 days per week 2 hours per session. the control group received mirror

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					therapy as following the same experimental period. data was analysed and it is noted that pre treatment statistical analysis is significantly improved in both groups.
3.	Jung - Ho Lee. Et al [3]	Upper Extremity Rehabilitation of Stroke Patients	2019	Experimental study	This study concluded that in the comparison of treatment effects of the therapeutic intervention, the experimental group showed a statistically significant larger change compared to the control group.
4.	MARINESCU GABRIELA - ADRIANA et al [12]	The role of mirror therapy in the improvement of upper limb Function in post - stroke patients – case study	2014	The bibliographic research	This study concluded that Mirror therapy is a useful tool for the functional rehabilitation of upper limb in post – stroke. Patients. The positive results we had so far are enabling us to continue the research and in the end extend it on large Groups of subjects.
5.	Korelacje między wynikami rehabilitacji metodą et al [13]	Associations between Results of Post – Stroke. NDT - Bobath Rehabilitation in Gait Parameters, ADL and Hand Functions	2013	Experimental study	According to this study there have been observed statistically significant and favourable changes in the health status of patients, described by gait parameters, changes in hand functions and ADL.
6.	Z zakresu reedukacji chodu et al [14]	Associations between Results of Post – Stroke. NDT - Bobath Rehabilitation in Gait Parameters, ADL and Hand Functions	2013	Experimental study	According to this study There have been observed statistically significant and favourable changes in the health status of patients, described by gait parameters, changes in hand functions and ADL. Based on the presented correlations. There is an assumption that it is hard to achieve simultaneous recovery in all areas: gait parameters, hand functions and adls in two weeks of rehabilitation
7.	Myung - Mo Lee et al [15]	The Mirror Therapy Program Enhances Upper - Limb Motor Recovery and Motor Function in Acute Stroke Patients	2012	Experimental study	According to this study mirror therapy program is an effective intervention for upper - limb motor recovery and motor function improvement in acute stroke patients. Additional research on mirror therapy program components, intensity, application time, and duration could result in it being used as a standardized form of hand rehabilitation in clinics and homes.
8.	El - Bahrawy M. N., Elwishy A. A. B. [5]	Efficacy of motor relearning approach on hand function in chronic stroke patients. A controlled randomized study	2012	A randomized controlled trial	This study concluded that The MR intervention can be used to increase the power of hand grip strength and correction of the ulnar deviation of the wrist (due to flexor synergy of the upper limb) that interferes with the normal functional position of the hand.
9.	Dr. A. P. GANESAN, et al [16]	Comparison of upper limb functional outcomes in stroke patients receiving motor relearning programme (mrp) vs. Proprioceptive neuromuscular facilitation (pnf).	2011	Comparative study	According to this study Both the treatment techniques were found to improve the upper limb functions in one or the other aspect and therefore it is more beneficial if the techniques will be used in adjunct to each other for rehabilitation so that the overall all improvement could be achieved.
10.	Henk Stam, Gunes Yavuzer [7]	Mirror Therapy Improves Hand Function in Subacute Stroke: A Randomized Controlled Trial	2008	A randomized controlled trial	According to this study in their group of subacute stroke patients, hand functioning improved more after mirror therapy in addition to a conventional rehabilitation program compared with a control Treatment immediately after 4 weeks of treatment and at the 6 - month follow - up, whereas mirror therapy did not affect Spasticity.
11.	Corwin Boake, phd, Elizabeth A. Noser et al [17]	Constraint - Induced Movement Therapy during Early Stroke Rehabilitation	2007	A randomized controlled trial	According to this study Future trials of CIMT during early stroke rehabilitation need greater statistical power, more inclusive eligibility criteria, and improved experimental control over treatment intensity. The relationship between changes in motor function and in evoked motor responses suggests that motor recovery during the 1st 3.
12.	Steven L. Wolf, phd, PT et al [18]	Effect of Constraint - Induced Movement therapy on Upper Extremity Function 3 to 9 Months after Stroke	2006	The EXCITE Randomized Clinical Trial	This study concluded that Among patients who had a stroke within the previous 3 to 9 months, CIMT produced statistically significant and clinically relevant improvements in arm motor function that persisted for at least 1 year.

Study Design

Search Method and Eligibility Criteria

An extensive literature search was done, the search engines used were PubMed, google scholar, Medline, and Pedro. Based on the available study there is an improvement of upper limb functioning by neuro physiotherapy techniques.

Keywords used are stroke, upper limb rehabilitation, neuro physiotherapy techniques, NDT and PNF. The articles focusing on improving upper lib function through neuro physiotherapy techniques are only included in the study and the articles which were not published in the English language were excluded.

Sample Size

A sample size of 33 articles was searched with the keywords of stroke, hemiplegia, upper limb rehabilitation, NDT, PNF, hand functioning. Out of these articles, papers obeying the inclusion and exclusion criteria are filtered and finally, 12 articles were obtained for the review.

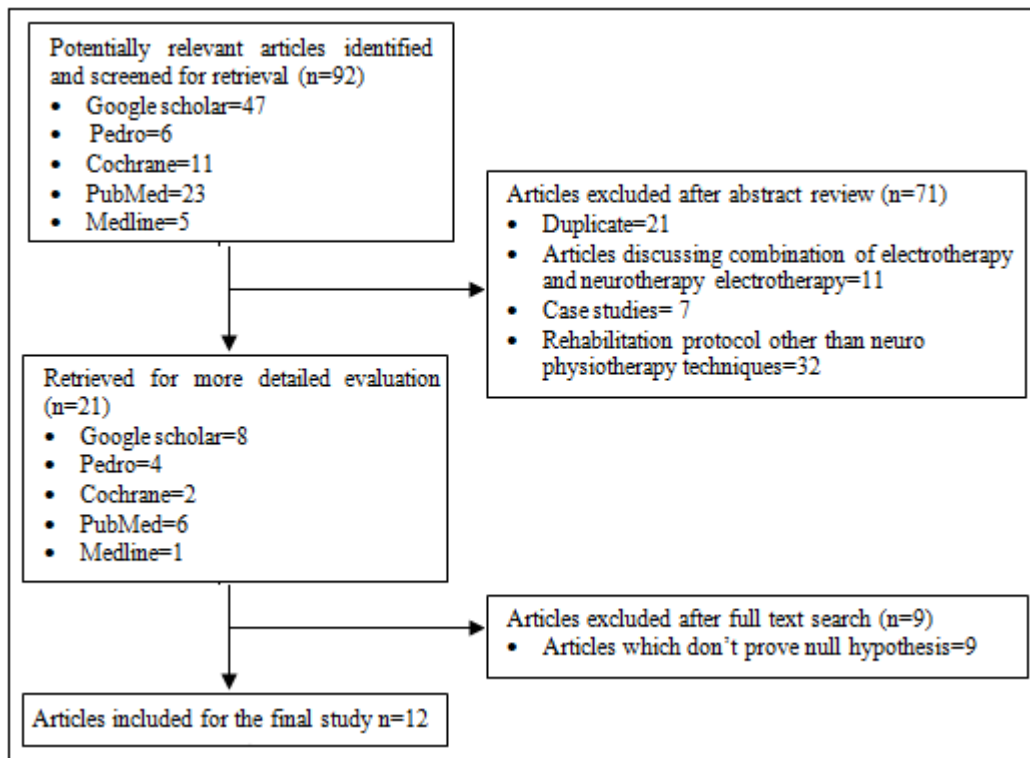
Inclusion Criteria

- Articles explaining stroke rehabilitation were included.
- Articles published in recent years.
- Full - text articles.

- Articles published in English.

Exclusion Criteria

- Articles of past 2003
- Articles explaining other than hemiplegia were excluded.
- Articles discussed other than neuro physiotherapy techniques were excluded.

3. Methodology**4. Discussion**

One of the major cause for disability is stroke. There will be considerable change in independent living and social participation in half of the stroke survivors who have disability associated with hemiparesis or hemiplegia¹.

There are articles which proves by giving neuro physiography techniques there will be positive outcomes in independent living and social participation of stroke survivors. this article will be discussing about effects of neuro physiotherapy techniques specifically in improving functioning of the upper limb in stroke patients inspite of acute or chronic stage [19].

According to Shafqatullah Jan et al in his article comparing the effects of motor relearning programme And mirror therapy for improving upper limb motor functions in stroke patients, author concluded that both MRP and MT techniques were shown good impact [p <0.05] in improving upper limb function of stroke patients. [8]

MRP deals with the upper limb tasks related functions like reaching, balancing, manipulation and dexterity. Upper limb require placement at the appropriate place for manipulation

in performing activity and to transport the objects from one place to another. The muscle forces produced and the timing and sequencing of joint movement involved in a specific action are a function of the task being performed, the object, the individual's position relative to the object and the constraints of the environment. MRP Training is designed to help the patient to regain the ability, to harness the degrees of freedom available so the limb functions as a coordinated unit in functional actions with many different goals. [16]

S. Mense et al., stated that The PNF therapy for the rehabilitation of stroke patients improves functions by stimulating the proprioceptive receptors in muscles and tendons and has been used as a representative therapeutic intervention for rehabilitation to improve the motor skills of patients with defection motions. [20]

According to Steven L. Wolf, et al performed a study to know the effectiveness of the CIMT in early rehabilitation of stroke patients concluded that there is a significant change in motor activity on upper extremity [steven article]. Neuro - physiological studies of cortical activity after repetitive task practice using the paretic upper extremity have also been performed. Data from a trans cranial magnetic stimulation study indicate that following CIMT there is a substantial

increase in the amount of cerebral cortex representation of paretic hand muscles [18]. The Bobath concept uses the integration of postural control and task performance. In addition, the integration of sensory information in motor control and perception could be promoted at the cortical level through specialised handling, supporting surface, and gravity [21]. The combination of stability and mobility organised postural control of the multi joint kinetic chain of the trunk and limbs [22]. These reflect the body's schema for maintaining equilibrium and posture during activities [23]

5. Conclusion

The above mentioned articles proved that neuro physiotherapy techniques gives a significant results in improving the posture, improving the motor control, muscle tone and dexterity of upper limb in stroke patients. it is prescribed to therapist to choose any neuro physiotherapy techniques for treating the acute or chronic patients with hemiplegia.

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