

Efficacy of MCIMT with Auditory Cueing in Order to Augment Functional Motor Recovery of Chronic Hemiparetic Arm

Himanshu Sharma¹ Pallav Bhatnagar² Kapila jain³ Bhupesh Goyal⁴ Nikita Joshi⁵

Corresponding Author: Himanshu Sharma; pthimanshu@gmail.com 9024672384

C 171 Indra Colony Near Mother Teresa School Vigyan Nagar Kota

Authors:

1 Ex PG Resident Of Physiotherapy, Geetanjali College Of Physiotherapy, Udaipur

2 Professor & Principal Geetanjali College Of Physiotherapy Udaipur Rajasthan

3 Assistant Professor & HOD Physiotherapy Jagannath University Jaipur

4 Professor & HOD Department Of Physiotherapy Vivekananda Global University, Jaipur

5 Physiotherapist, Swarnagiri Neuro physiotherapy And Multispecialty Clinic Kota

Article Info

Page Number: 12764-12770

Publication Issue:

Vol. 71 No. 4 (2022)

Abstract

Background

Acc. To WHO Stroke is the leading cause of functional impairments, with 1/5 of sufferers requiring institutional care after 3 months and 15% - 30% becomes permanently disabled. It is a life-changing event that affects person along with family and caregivers. The concept of learned nonuse has been used to explain the motor deficits that often occur following stroke. Learned nonuse develops as a result of an upper motor neuron lesion that suppress the central nervous system and motor activity.⁽¹⁾

- Constraint induced movement therapy is a Neuro rehabilitation approach that has been previously found effective in improving functionality of Chronic hemiparetic stroke patient. CIMT is based on the principle of behavioural training. Components of CIMT are-

- 1) Repetitive task specific training (shaping & task practice)
- 2) Adherence improving behavioral techniques (i.e. transfer package)
- 3) Constraining use of more affected extremity (UE)

It improves cortical reorganization & neural plasticity of the affected hemisphere. It mainly covers –TBI, SCI, CVA, CP.⁽²⁾

This study was being performed with the objective To evaluate the efficacy of 8 week M-CIMT programme with auditory cueing to enhance timed & strength (coordinated) performance in hemiparetic upper limb.

Methodology

This study include purposively selecting 60 stroke survivor within age group of 20 yrs or above who fulfill the inclusion & exclusion criteria. Data was collected for each participant after obtaining the written consent from each subject. Subjects were tested using Wolf Motor Function Test (WMFT), & Motor Activity Log (MAL) which test the functional activity of the affected arm in real world pre test, 3rd week, 6th week, post test. The subjects participated in 8 week Modified CIMT Programme 5 day/week. Each session consist of –

Warm up- 5-10 min

MCIMT Protocol – 45 min

Cool down- 5 min

Results

After participation in MCIMT Programme, subjects demonstrated a significant improvement in WMFT & MAL score (mean \pm SD) pre test score 46.6000 sec, 1.1765 & post test score 16.8500 sec, 3.14 with significant (t value- 14.292, -

51.356) & (p value- 0.0) A strong correlation was found between both data sets. Analysis from the result found that MCIMT was effective to produce significant difference in affected extremity function in chronic stroke patients.

Conclusion

This study has indicated that Modified CIMT protocol using a more distributed practice schedule but still emphasizing repeated use is effective in reducing upper-limb impairment and improving upper-limb use and function. The major finding was improvement in Post test score thereby it can be concluded that MCIMT is a promising approach in improving upper extremity rehabilitation after chronic stroke.

Article History

Article Received: 25 July 2022

Revised: 30 August 2022

Accepted: 15 September 2022

Keywords: stroke; rehabilitation; upper extremity; forced use; constraint-induced movement therapy; transcranial magnetic stimulation; neuroimaging ; Motor activity

Introduction

Stroke, or a cerebral vascular accident, is the sudden death of brain cells due to inadequate blood flow. Acc. To WHO stroke is the rapid development of clinical signs and symptoms of a focal neurological disturbance persisting for >24 hours or may lead to death with no causes other than vascular origin'. (WHO 2005)

ischaemic 50%–85% haemorrhagic 1%-7% (Feigin et al 2009)

Stroke is also a leading cause of functional impairments, with 20% of survivors requiring institutional care after 3 months and 15% - 30% being permanently disabled(AHA 2009).

Prevalence rates increases-

21/100,000 for the **20-40 age**

625/100,000 in the **60+ year age** group(Dhamija et al 2000).

- Neuroplasticity has been defined as “the ability of brain to change & repair itself”.
- Constraint induced movement therapy or forced use in patients following stroke has demonstrated significant and large improvements of UE function (Susan O Sullivan).
- Components of CIMT are-
 - Repetitive task oriented training (shaping & task practice)
 - Adherence improving behavioral techniques (i.e. transfer package)
 - ✓ Daily application of MAL
 - ✓ Home diary
 - ✓ Behavioral contract
 - ✓ Caregiver contract
 - ✓ Home exercise protocol
 - ✓ Daily dairy
 - ✓ Home skill assignment
 - Emphasizing use of affected extremity (hemi paretic Arm)
 - ✓ Mitt for restricting
 - ✓ Any method to facilitate repetitive use of more affected Arm.

Hence this study was performed to assess the effects of M-CIMT along with PNF for improving upper limb function among patients who had their first stroke within the previous 5- 12 months . (D.M.Morris et al; 2006)

Objective of the Study: -

To examine the efficacy of 8 week M-CIMT programme with auditory cueing to enhance timed & strength (coordinated) performance in hemiparetic upper limb.

Methodology: -

SOURCE OF DATA: Data were collected from Geetanjali hospital Neuroscience department which are eligible as per inclusion criteria.

Ethical Clearance: - Ethical clearance was being taken from Human Ethics Committee of Geetanjali University, Udaipur.

Method & collection of data:

Data was collected as per requirement-

Study design- Experimental Study

Sample size- 60 subjects

Sampling required- Extremity Constraint Induced Therapy evaluation (EXCITE)

Statistical Methods- t-test & pearson product moment correlation (r value)

Inclusion Criteria: - In order to participate in this study subjects will have to fulfill following criteria.

Age group: 20 years or above

Gender: Both genders will be included

Patients must have 10 degree active wrist extension

10 degree thumb abduction/extension

10 degree extension in at least 2 additional digits

Modified Ashworth Scale(MAS) less than 2

VAS Scale Score 4 or less

Exclusion Criteria: - Potential participants were excluded if-

Scored less than 24 on the Standard Mini Mental status Examination (SMMSE) if required

Excessive pain in any joint of the paretic extremity

Uncooperative patient

Visual deficit (squint, homonymous hemianopsia, nystagmus, diplopia etc.)

Serious balance problem

Malunited fracture of paretic upper extremity

Recurrent stroke more than 2 or TIA

Posterior circulation stroke

Thalamic bleed

Apraxia, agnosia or gertsman syndrome

Intervention / Assessment To Be Done:-

To assess-

Motor Activity log

Wolf motor Function Test

Methodology:-

Selection of subjects-

The study will be performed on 60 Stroke patients mainly MCA, (ischaemic) falling under inclusion criteria of both sex (Male & Female).

average age 19-60 year.

Purposive sampling.

This study involves non invasive procedure as listed below with no financial burden on subjects. The following procedure will be conducted-

Primary outcomes included a laboratory based measure of upper extremity motor function (The Wolf motor function test) and participant are interviewed of real world arm use (MAL)

Materials Used:

- Basket (used to administer test)
- Box (26 cm Height) (used to administer test)
- Can (used to administer test)
- Data collection Sheet (WMFT / Mal Score sheet & Data data collection sheet at 4 times pre to post treatment)
- Finger gripper (used to strengthen hand grip)
- Goniometer for wrist & finger
- Hand held dynamometer (to measure the grip strength)
- Hand rehabilitation unit (incl. Peg boards, switch boards, door knobs etc)
- lock & key (used to administer test & practice ADL's)
- Paper clip (used to administer test)
- Pencil (To note the readings)
- Static cockup splint (For constraint of less affected extremity during treatment)
- Table (2)
- Timer/ stopwatch
- Towel
- Metronome
- Weighing machine
- Weights (1, 20 lb)



Patient position- Chair position side, chair position front, chair position front-close

Intervention:-

- Intervention was being administered 5 day/week for 8 week.
- Total intervention (3 Hr/ day) include- A) Supervised intervention- 1 hr
B) Home protocol- 2hr/day

As per MCIMT protocol total time of restraint – 5 hr/day

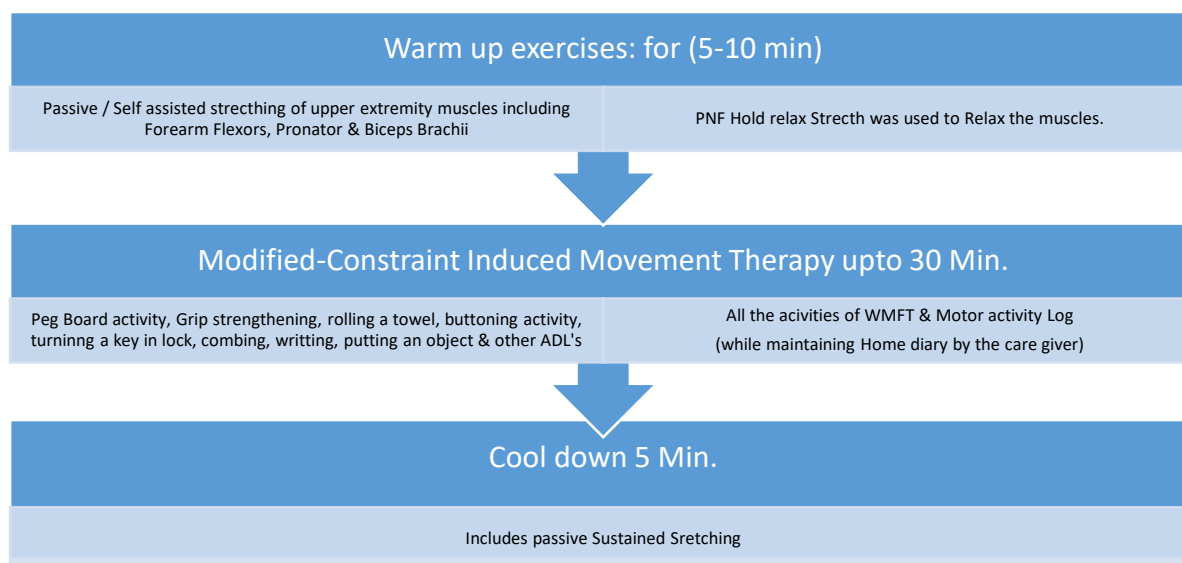


Figure 1Folding towel in specific pattern



Figure 2PNF Hold Relax stretch

Result:-

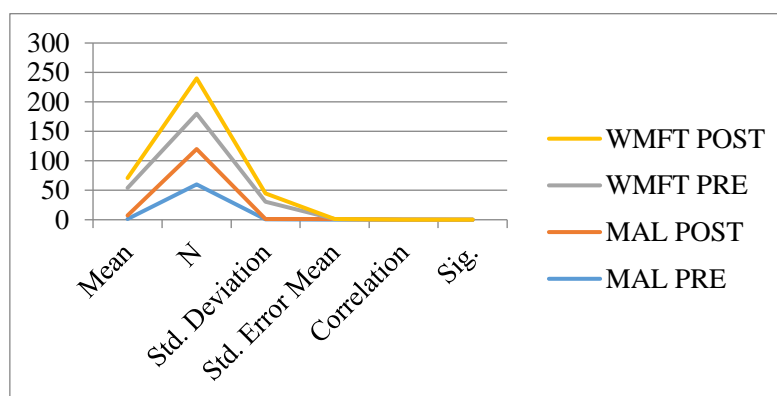
Descriptive statistics were calculated for functional activities of affected upper extremity. Significant difference was found between Pre & Post WMFT & MAL score. Analysis from the result found that MCIMT was effective to produce significant difference in affected extremity function in chronic stroke patients. The following inferences were made from the obtained results-

Table 1Significannce & SD Pre & Post intervention for both outcomes

		Mean	N	Std. Deviation	Std. Error Mean	Correlation	Sig.
MAL	PRE	1.1765	60	.45968	.149	.257	.05934
	POST	6.2900	60	.69135	.950	.000	
WMFT	PRE	46.6000	60	29.25991			.08925
	POST	16.8500	60	14.51688			

Table 2 DESCRIPTIVE STATISTICS OF PAIRED DIFFERENCES,T-TEST, DF, & P VALUE OF BOTH MEASURES SHOWS SIGNIFICANCE

		Paired Differences					t	df	P
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
MAL	PRE & POST	-5.1134	.77126	.09957	-5.3127	-4.9142	-51.356	59	.000
WMFT	PRE & POST	29.750	16.12412	2.08162	25.5847	33.9153	14.292	59	.000

**Graph Icreasing mean & SD of both measures after treatment shows recovery**

After participation in MCIMT Programme, subjects demonstrated a significant improvement in WMFT & MAL score (mean \pm SD) pre test score 46.6000 sec, 1.1765 & post test score 16.8500 sec, 3.14 with significant (t value- 14.292, -51.356) & (p value- 0.0) A strong correlation was found between both data sets.

Conclusion: -

- ✖ This study has indicated that Modified Constraint Induced Movement Therapy produce significant improvement in upper extremity function after CVA. The major findings of the study are-
- ✖ Increase in mean score of MAL
- ✖ Increase in Mean Time score of WMFT
- ✖ Good correlation In MAL & WMFT
- ✖ P value shows significant change
- ✖ Based on these findings, it can be concluded that M-CIMT is effective in improving motor function after chronic CVA significantly.

References

- [1] Dhablia, D., & Timande, S. (n.d.). Ensuring Data Integrity and Security in Cloud Storage.
- [2] Dhabalia, D. (2019). A Brief Study of Windopower Renewable Energy Sources its Importance, Reviews, Benefits and Drwabacks. *Journal of Innovative Research and Practice*, 1(1), 01–05.
- [3] Mr. Dharmesh Dhabliya, M. A. P. (2019). Threats, Solution and Benefits of Secure Shell. *International Journal of Control and Automation*, 12(6s), 30–35.
- [4] Verma, M. K., & Dhabliya, M. D. (2015). Design of Hand Motion Assist Robot for Rehabilitation Physiotherapy. *International Journal of New Practices in Management and Engineering*, 4(04), 07–11.
- [5] Dhabliya, M. D. (2019). Uses and Purposes of Various Portland Cement Chemical in Construction Industry. *Forest Chemicals Review*, 06–10.
- [6] Dhabliya, M. D. (2018). A Scientific Approach and Data Analysis of Chemicals used in Packed Juices. *Forest Chemicals Review*, 01–05.
- [7] Dhabliya, D. (2021a). AODV Routing Protocol Implementation: Implications for Cybersecurity. In *Intelligent and Reliable Engineering Systems* (pp. 144–148). CRC Press.