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Effectiveness of Constraint Induced Movement versus Motor Relearning To Improve Motor Function of Hemiplegic Upper Limb after Stroke: A Comparative Study

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Abstract: ***Background:*** *A stroke is a medical condition in which poor blood flow to the brain results in cell death. In 2013 approximately 6.9 million people had an ischemic stroke and 3.4 million people had a hemorrhagic stroke.[1] In 2015, stroke was second most frequent cause of death after coronary artery disease, accounting for 6.3 million deaths [11% of the total].* ***Material and Methods:*** *A sample of 6 patients was received in my clinic through purposive sampling technique. Six patients were placed to each [Group A] and [Group B]. Group A was treated with constraint induced movement therapy and Group B was treated with motor relearning programme for three weeks. Pre and post measurements were determined by upper arm of motor assessment scale [MAS] and self care item of functional independence measure [FIM] scale.* ***Results:*** *These analysis of intra group shows significant results [p-value<0.04] in motor assessment scale in both groups. Advanced hand activities of motor assessment scale in motor relearning shows insignificant result [p-value=0.048]. Self-care of functional independence measure scale also shows significant result [p-value<0.04] in both groups except dressing upper body [p-value=0.048] in constraint induced movement therapy group and grooming and dressing upper body [p-value=0.048 & 0.052] in motor relearning programme group showed insignificant p-values.* ***Conclusion:*** *Group A shows more improvement in motor function and self-care activities of hemiplegic upper limb than Group B in patients with sub-acute stroke assessed by MAS and FIM scales. CIMT to be more statistically significant and clinically effective in comparison to motor relearning programme in the patients between the age of 35-60 years.*

Keywords: *Upper Limb, Constraint induced movement therapy, Motor relearning programme, Stroke.*

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I. Introduction

A stroke is a medical condition in which poor blood flow to the brain results in cell death. There are two main types of stroke: ischemic stroke and hemorrhagic stroke. Ischemic stroke due to lack of blood flow and hemorrhagic stroke due to bleeding. Both result in parts of the brain not functioning properly.

In 2013, approximately 6.9 million people had an ischemic stroke and 3.4 million people had a hemorrhagic stroke. In 2015, there were about 42.4 million people who had previously had a stroke and were still alive.[3] Between 1990 and 2010 the number of strokes which occurred each year decreased by approximately 10% in the developed world and increased by 10% in the developing world.[4] In 2015, stroke was the second most frequent cause of death after coronary artery disease, accounting for 6.3 million deaths [11% of the total].[2] About 3.0 million deaths resulted from ischemic stroke while 3.3 million deaths resulted from hemorrhagic stroke.[2] About half of people who have had a stroke live less than one year.[5] Overall, two-thirds of strokes occurred in those in those over 65 years old.[4]

Neuro-developmental technique, splinting, and electrical stimulation are the various therapeutic procedures but rehabilitation of upper limb is a challenge and the best method to improve upper limb function is still not clear.[6] The therapies to improve motor function of hemiplegic upper extremity are motor relearning programme and constraint induced movement therapy.

Motor relearning programme focus on task specific learning through effective use of feedback practice and studies have shown that it is effective in enhancing motor function recovery of post stroke paretic limb.[7,8] However, constraint induced movement therapy is a recent intervention and has gained much attention in the treatment of post stroke paretic arm.[9] This therapy helps to overcome learned non use by constraining movement of unaffected arm with a sling and encourage repetitive task practice of affected arm including shaping, a behavioural technique.[10] A number of studies reported that constraint induced movement therapy improves functional activities and maximizes motor function of paretic upper limb.[9, 10, 11]

II. Material And Methods

In this study, 6 males and females patients having stroke and hemiplegic upper extremity. The wrist extension is ≥ 20 degrees and all fingers extension is ≥ 10 degrees. Patients between the 35-60 years of age having ischemic or hemorrhagic strokes confirmed by CT or MRI scan. Both group had three patients. After proper assessment, patients in Group A were asked to perform tasks only with hemiplegic upper limb and unaffected hand in a sling. Group B were asked to perform tasks with both affected and unaffected upper limb.

Both process consisted of six sessions per week, two hours in each session, for three weeks. Motor function of hemiplegic upper limb was determined by using upper arm section of motor assessment scale in pre and post treatment evaluation. This section includes, upper arm function item, hand movements item and advanced hand activities item. An activity of daily livings was measured by using functional independence measure scale which includes eating, grooming, bathing, dressing, upper body and dressing lower body.

Table I: Exercises demonstrated to Group A and Group B

Group A: Repetitive exercises like stacking cones and blocks, grasping and releasing of an object, reaching forward and sideways, lifting and dropping of an object from one end of table to the other end.

Group B: Oriented exercises like reaching and pointing activities, weight bearing of hemiplegic upper limb and in sitting position holding jar with unaffected hand and opening lid with affected hand and vice versa.

III. Results

In this study, total six patients are present. There were total 3 males and 3 females are present. The mean age of the participants was 49.67 years [SD= 7.01] in Group A and 4ss9.47 years [SD= 8.19] in Group B. Patients who suffered from ischemic stroke were 4 and patients having hemorrhagic stroke were 2 respectively. At the end of third week, mean scores significantly increased in all items of both[MAS & FIM] in both groups. The mean value in group A was greater than in group B.

Intra-group analysis showed significant result [p-value< 0.04] in all item of MAS in both groups. Group B showed insignificant result [p-value= 0.048]. Self-care items of FIM scale also showed significant result [p-value< 0.04] in both groups. However dressing upper body item [p-value= 0.048] in group A and grooming and dressing upper body [p-value= 0.048 and 0.052] in group B showed insignificant result.

Table II: Pre and post treatment mean and SD of MAS and FIM scale in Group A.

Outcome Measures	Pre-treatment [Mean±SD]	Post-treatment [Mean±SD]	P-value
MAS: Upper arm function	1.22±0.37	4.00±0.52	0.001
MAS: Hand movements	0.70±0.30	3.04±0.63	0.001
MAS: Advanced hand activities	0.17±0.35	0.46±0.06	0.002
MAS: Total [Max Score: 18]	1.32±.70	0.051±1.10	0.001
FIM: Eating	0.33±0.37	4.51±0.47	<0.001
FIM: Grooming	0.08±0.30	3.04±0.38	<0.001
FIM: Bathing	0.13±0.33	2.80±.51	<0.001
FIM: Dressing upper body	0.27±0.38	0.60±0.67	0.048
FIM: Lower body	0.17±0.35	2.46±0.40	<0.001
FIM: Total [Max Score: 35]	5.32±0.45	07.75±0.41	<0.001

Table III: Pre and post treatment mean and SD of MAS and FIM scale in Group B.

Outcome Measures	Pre-treatment [Mean±SD]	Post-treatment [Mean±SD]	P-value
MAS: Upper arm function	0.22±0.37	3.08±0.57	<0.001
MAS: Hand movements	0.65±0.33	1.22±0.21	0.002
MAS: Advanced hand activities	0.27±0.40	0.51±0.40	0.048
MAS: Total [Max Score: 18]	1.46±0.05	6.03±0.45	<0.001
FIM: Eating	0.23±0.37	3.51±0.40	<0.001
FIM: Grooming	0.13±0.33	0.37±0.64	0.048
FIM: Bathing	0.13±0.33	2.37±0.40	0.001
FIM: Dressing upper body	0.27±0.40	0.51±.056	0.052
FIM: Lower body	0.23±0.37	2.00±0.44	0.001
FIM: Total [Max Score: 35]	5.41±1.61	13.08±0.36	0.001

Post treatment p-value showed statistically significant results [p-value< 0.04] in all items of MAS and FIM scale accept dressing upper body item.

IV. Discussion

The study revealed the overall effectiveness of constraint induced movement therapy over motor relearning programme to improve motor function of hemiplegic upper limb in sub-acute stroke patients. In this study, patients were between two weeks to three months post stroke. Group A starts within two weeks of stroke onset is more effective in upper limb rehabilitation.[12] The further study results that functional recovery after stroke possibly can occurs after three months to six months.[13,14]

This study is agree with Myint et al. [2008][11] which suggested significant improvements were found in motor function of hemiplegic arm after two weeks of process and twelve weeks follow up in Group A. In this study, no follow up was after three weeks. Taub et al. [2006][15] also shows improvements in Group A. In this study mean age of participants was 54.6 years in group A, while group B was 50.7 years. However, in present study, mean age of patients was 49.67 in group A and 49.46 years in group B. Study shows the improvements in both groups but significantly in group A. The difference in results may be due to that present study included younger age group patients. However in other studies the mean age 66.4 years[16.]

Wu et al. [2007][18] also used same procedure as used in our study and shows good results. Motor relearning programme given to group B require long time to show maximal improvements.

Constraint induced movement therapy has developed to give good results is use dependent neural plasticity.[19] It is associated with large modification that constraint induced movement therapy creates in humans after stroke.[20] Constraint induced movement therapy is based on learned non use and forcing the use of hemiplegic arm in post stroke hemiparesis by immobilizing the normal arm in a sling and encourage repetitive exercises or tasks of hemiplegic arm including shaping, a behavioural technique used in CIMT.[21]

V. Conclusion

This study concluded that group A shows more significant improvements in motor function and self-care performance of hemiplegic upper limb comparison to the group B.

References

[1]. Global Burden of Disease Study 2013. "Global, regional and national incidence, prevalence and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013". Lancet.386 [9995]: 743-800. PMC 4561509. PMID 26063472

[2]. GBD 2015 Mortality and causes of death collaborators [October 2016]. "Global, regional and national life expectancy, all cause mortality and cause specific mortality for 249 causes of death, 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015". Lancet.388 [10053]:1459-1544.

[3]. PMC 5388903 PMID 277733281.

[4]. GBD 2015 Disease and injury incidence and prevalence. "Global, regional and national incidence, prevalence and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global burden of disease study 2015". Lancet.388 [10053]: 1545-1602. PMC 5055577 PMID 27733282.

[5]. Feigin VL, Forouzanfar MH, Krishnamurthi R, Mensah GA, Connor M, Bennett DA, Moran AE, Sacco RL, Anderson L, Truelsen T, O'Donnell M, Venketasubramanian N, Barker-Collo S, Lawes CM, Wang W, Shinohara Y, Witt E, Ezzati M, Naghavi M, Murray C [January 2014]. "Global and regional burden of stroke during 1990-2010: findings from the Global burden of disease study 2010". Lacet.383 [9913]: 245-54. PMC 4181600 PMID 24449944.

[6]. Donnan GA, Fisher M, Macleod M, Davis SM [May 2008]. "Stroke". Lancet.371 [9624]:1612-23. PMID 18468545.

[7]. Veerbeek JM, van Wegen E, van Peppen R, van der Wees PJ, Hendriks E, Rietberg M, et al. What is the evidence for physical therapy post stroke? A systematic review and meta analysis. [PMC free article] [PubMed] [Goggle Scholar]

[8]. Patten C, Dozono J, Schmidt SG, Jue ME, Lum PS. Combined functional task practice and dynamic high intensity resistance training promotes recovery of upper extremity motor function in post stroke hemiparesis. J Neurol Physical Therapist.2006; 30(3):99-115. [PubMed] {Goggle scholar]

[9]. Chan DY, Chan CC, Au DK. Motor relearning programme fir stroke patients. Clinical Rehabilitation. 2006; 20(30): 191-200.

[10]. Singh P, Pradhan B. Study to assess the effectiveness of modified constraint-induced movement therapy in stroke subjects: A randomized controlled trial. An Indian academy Neurol. 2013; 16(2): 180-184. [PubMed] [Goggle scholar]

[11]. Wolf SL, Winstein CJ, Miller JP, Taub E, Uswatte G, Morris D, et al. Effect of constraint induced movement therapy on upper extremity function 3 to 9 months after stroke. JAMA. 2006; 296(17):2095-2104. [PubMed] [Goggle Scholar]

[12]. Myint JMWW, Yuen GFC, Yu TKK, Kng CPL, Wong AMY, Chow KKC, et al. A study of constraint induced movement therapy in subacute stroke patients in Hong Kong. Clinical rehabilitation. 2008; 22(2):112-124.

[13]. Boake C, Noser EA, Ro T, Baraniuk S, Gaber M, Johnson R, et al. Constraint induced movement therapy during early stroke rehabilitation. Neurorehabilitation Neural Repair. 2007; 21(1): 14-24. [PubMed] [Goggle Scholar]

[14]. Langhammer B, Stranghelle JK. Bobath or motor relearning programme? A comparison of two different approaches of physiotherapy in stroke rehabilitation: A randomized controlled study. Clinical rehabilitation. 2000; 14(4):361-369. [PubMed]

[15]. Wade DT, Wood VA, Hewer RL. Recovery after stroke: the first 3 months. J Neurol Neurosurgery Psychiatry. 1985; 48(1):7-13. [PubMed] [Google Scholar]

[16]. Taub E, Uswatte G, King DK, Morris D, Crago JE, Chatterjee A. A placebo controlled trial of constraint induced movement therapy for upper extremity after stroke. Stroke. 2006; 37(4): 1045-1049.

[17]. Porter K, Lord s. Constraint induced movement therapy for people following stroke in an outpatient setting. NZ J Physiotherapy. 2004; 32(3): 111-120.

[18]. Taub E, miller NE, Novack TA, Cook EW, 3rd, Fleming WC, Nepomuceno CS, et al. Technique to improve chronic motor deficit after stroke. Arch Physical med rehabilitation. 1993; 74(4): 347-354. [PubMed] [Goggle scholar]

[19]. Wu CY, Chen CL, tang SF, Lin KC, and Huang YY. Kinematics and clinical analysis of upper extremity movements after constraint induced movements after constraint induced movement therapy in patients with stroke: A randomized controlled trial. Arch Physical Med Rehabilitation. 2007; 88(8): 964-970.

[20]. Taub E, Uswatte G, Pidikiti R. constraint induced movement therapy: A new family of techniques with broad application to physical rehabilitation- A clinical review. J Rehabilitation Res Dev. 1999; 36(3): 237-251.
[21]. Taub E, Uswatte G, Elbert T. new treatments in Neuro-rehabilitation founded on basic research. 2002; 3(3): 228-236.

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