EFFICACY OF NEURAL MOBILIZATION ALONG WITH MID CARPAL BONE MOBILIZATION OF INDIVIDUALS WITH CARPAL TUNNEL SYNDROME

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Abstract*: The mechanical interface should be regarded as the most anatomically adjacent tissue to the 'nervous system that can move independently to the system. The primary aim of the neural mobilization is a restoring the dynamic balance between the relative movement of neural tissues and surrounding mechanical interfaces, thereby allowing reduced intrinsic pressures on the neural tissue and thus promoting optimum physiologic function Mid carpal bone mobilisation is especially used for to increase wrist mobility, open the joint spaces allowing for greater movement in wrist joint Findings from previous studies support the use of traction/distraction manual therapy technique to decrease intra-articular pressure .Aim of the study is To find the effectiveness of reduction in pain for individuals with carpal tunnel syndrome.To find out the effectiveness of increase in the functional status.Based on the inclusion and exclusion criteria the samples was collected from Physiotherapy OPD at Saveetha medical college and hospital. Patients were divided into two groups A and B in Group-A 15 patients were received median nerve mobilization and mid carpal bone mobilization for 30 mins per day for 3weeks. In Group B 15 patients were received conventional therapies which include range of motion exercises and passive stretching for 30 minutes perday and 5 days a week over a period of 4 weeks. Outcome measure Numerical pain rating scale was used to assess the pain and was documented for both the groups before and after the interventions with duration period of 3weeks. Result: On comparing the mean values of pre-test and posttest within the groups (GROUP-A and GROUP-B) of sensory nerve conduction velocity and numerical pain rating scale scores show significant improvement after the median nerve mobilization along with midcarpal bone mobilization in individuals with carpal tunnel syndrome compared to GROUP-B(conventional therapy)Conclusion: The study concluded that the median nerve mobilization along with mid carpal bone mobilization (GROUP-A) is an effective intervention for individuals with carpal tunnel syndrome than the conventional therapy(GROUP-B)

***Keywords*: Carpal tunnel syndrome, neural mobilization ,midcarpal bone mobilization**

I. INTRODUCTION

Carpal tunnel syndrome is a common problem with an estimated annual incidence rate of 0.5-5.1 per 1000[1]. Certain occupations involving wrist activities materially increase the risk of Carpal tunnel syndrome. Carpal tunnel syndrome was first reported 1947 by Brian among six cases of CTS in repetitive work. It is the most common compressive neuropathy of the upper limb and an increasingly recognized cause of work disability[1]. Carpal tunnel syndrome (CTS) is a constellation of symptoms associated with compression of the median nerve at the wrist in carpal tunnel.[1] Carpal tunnel syndrome is the most common compression neuropathy,[2] The main symptoms of Carpal tunnel syndrome are numbness, pain and tingling of the first three fingers and radial side of the ring finger, nocturnal awakening is due to pain, numbness and impaired fine motor control because of weakness of the hand. In moderate to severe cases there will be hand clumsiness, weakness of thumb and atrophy of thenar muscles may be seen which will eventually decrease the functional ability of the hand and interfere with daily activities.[2,7] Carpal tunnel syndrome belongs to a manage of disorders called cumulative trauma disorders (CTDs) which are caused by the repetitive, sustained, or forceful motions occurring over time, compromising the integrity or functioning of the soft tissues producing inflammation of the tendons or compression of the peripheral nerves.

Physiotherapy methods for treating Carpal tunnel syndrome such as electrotherapy may provide some symptomatic relief. However, such methods do not address the pathological neurodynamics of the median nerve and its surrounding structures. Anecdotal clinical evidence supports physiotherapeutic intervention with these patients as improvement has been seen in response to a variety of manual therapy treatment approaches. There is also some evidence of chiropractic or osteopathic manual intervention providing some relief of symptoms for patients experiencing Carpal tunnel syndrome.[8-13]

Higher prevalence rates have been observed in certain groups with repetitive hand movements especially flexion at the wrist joint and extension at the shoulder and elbow joints[2]. Diagnosis of CTS is based on characteristic complaint confirmed preferably by abnormal electrophysiological tests.

II. NEED OF THE STUDY:

The effects of early standing on a tilt table for the sub-acute stroke patient as early standing can prevent general and neurological

complications reduces spasticity prevent muscle contracture and let the patient to bear weight which helps to improve its joint proprioception the study also benefits such as prevention of hip and knee flexors contractures, circulatory training, autonomic nervous system stimulation, and sensory activation Moreover, recovery of the ability to stand up and sustain load on the affected limb is crucial to gait training and recovery of upper limb functionality. Supported standing on tilt table is an adjunctive therapeutic practice commonly adopted in subjects with several central nervous diseases who are unable to stand actively, which helps to improve antigravity muscles strength and head and trunk postural control, maintain standing ability, and prepare for gait training

III. METHODOLOGY

Thirty subjects were recruited from In-patient Department of Saveetha Medical College and Hospital, Saveetha University, Thandalam Chennai. The subjects were randomized into two groups By lottery method into Group A and Group B. the lot box contained 15A and 15B those who have picked A were placed in group A and those who picked B were placed in group B. for all the subjects signed an informed consent form before participation. The subjects were included in the study if they fulfill the following criteria

2.1 Inclusion criteria with Both males and females ,Individuals with positive sign Phalens test ,Age group between 25 to 70 yrs of age .

2.2 Exclusion criteria with Presence of metabolic disorders like Diabetes mellitus, Thyroid disease, Rheumatoid Arthritis, Pregnancy, Cervical radiculopathy, peripheral neuropathy, Recent Fracture or dislocation in the affected upperlimb

Recent surgery at at wrist and hand Open wounds, cuts or bruises at wrist and hand, History of steroid injection to carpal tunnel, Impaired cognitivefunction, Any orthopedic condition that may interfere with treatment process.

2.3 Procedure: all 30 subjects after baseline assessment, were randomly allotted into to two groups by lottery method namely Group- A and Group-B, 15 patients in each group. From Saveetha hospital In patient department. Among the selected population, based on inclusion and exclusion criteria patients with stroke were included in the study. Detailed procedure was explained in their informed consent form prior to the treatment. For all the 30 patients Pre and post test measurements was done by using sensory nerve conduction study and numerical pain rating scale. Before and after the intervention with Treatment duration: 1 session per day; 5 days per week for 3 weeks.

2.4Treatment protocol

2.4.1 Group A received median nerve mobilization along with midcarpal bone mobilization for 30 minutes one session in a day for 5 days for 3weeks.

2.4.2 Group B received conventional therapies which include range of motion exercises and passive stretching for 30 minutes perday and 5 days a week over a period of 4 weeks.

2.5 Outcome measures: Numerical pain rating scale(NPRS).

IV. STATISTICAL ANALYSIS:

The Data was calculated and tabulated. Paired t-test was used to analyze the result within the group and unpaired t-test was used as to analyze the result between the groups.

V. RESULTS:

The statistical analysis revealed high statistically significant difference ($p<0.0001$) between the Pre and Post test of Group-A and Group-B for numerical pain rating scale.

The pretest mean values of numerical pain rating scale of GROUP-A 6.13(SD=0.91) and posttest mean values of numerical pain rating scale of Group-A 1.33 (SD=0.61). This shows that numerical pain rating scale(NPRS) in posttest values were comparatively less than pretest value- $p<0.0001$ and t- value is 16.96(Table no.1)

The pretest mean values of numerical pain rating scale of GROUP-B 6.26(SD=0.91) and posttest mean values of numerical pain rating scale of Group-B 7.23 (SD=0.61). This shows that numerical pain rating scale(NPRS) in posttest values were comparatively more than pretest value- $p<0.194$ and t- value is 1.32(Table no.2)

On comparing mean values of Group-Aand Group-B means of Numerical pain rating scale scores shows the significant decrease in posttest means in Group-A shows(1.33) is more effective than Control group Group-B(7.23) at $p\leq 0.001$.

The pre test value for Group-A was 0.87(SD=0.64) whereas, the post test value was 1.93(0.59) and the pre test value for Group-B was 0.93 (SD=0.70) whereas, the post value was 2.67(SD=0.49).

The unpaired t-test analysis for post test between Group-A and Group-B showed and extremely statistically significant difference at p=0.0008

Table: 1 Comparison of pre-test and post-test values of Numerical pain rating scale in GROUP-A

Numerical pain rating scale(NPRS)	Mean	Standard Deviation	t-value	P- value
Pre test	**6.13**	**0.91**	**16.96**	**<0.0001**
Post test	**1.33**	**0.61**		

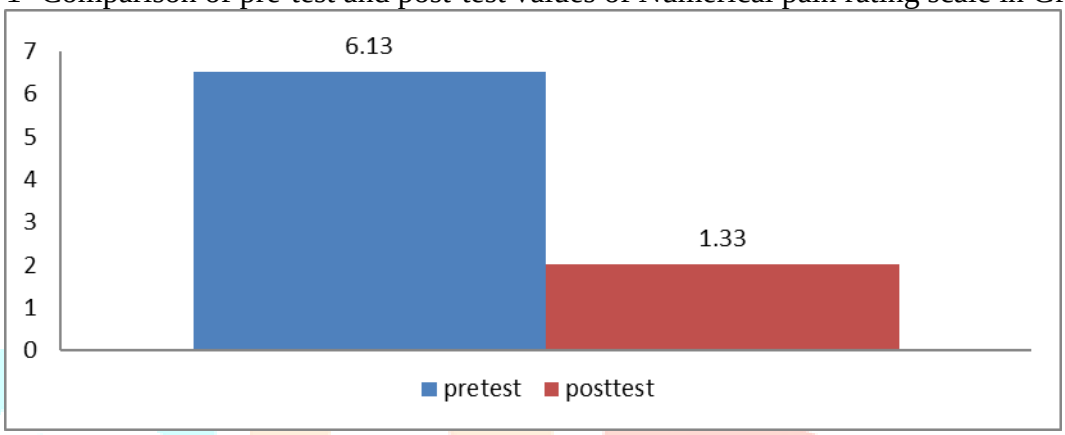
Table 2- Comparison of pre-test and post-test values of Numerical pain rating scale in Group-B

Numerical pain rating scale(NPRS)	Mean	Standard Deviation	t-value	P- value
Pre test	6.26	2.19	1.32	0.194
Post test	7.23	1.79		

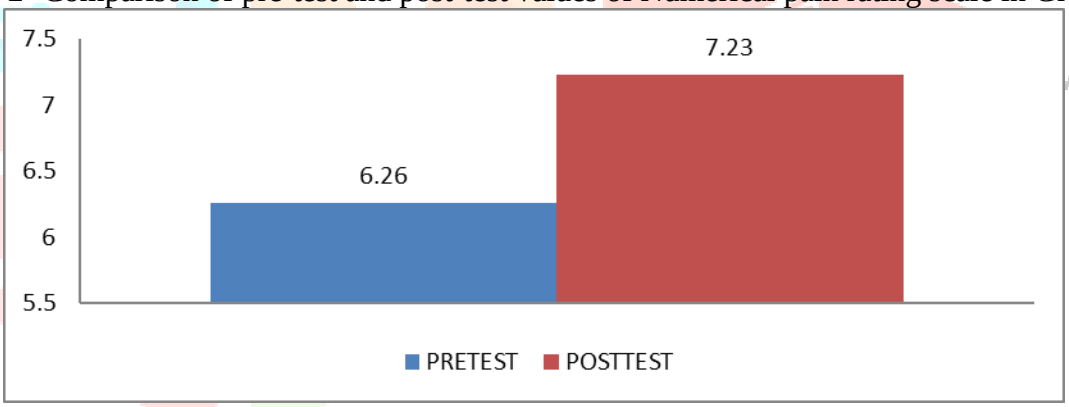
Table 3 Comparison of sensory Numerical pain rating scale between Group-A & Group-B

NUMERICAL PAIN RATING SCALE(NPRS)	POSTTEST		t-value	P- value
	MEAN	SD		
GROUP-A	1.33	0.61	12.08	0.0001
GROUP-B	7.23	1.79		

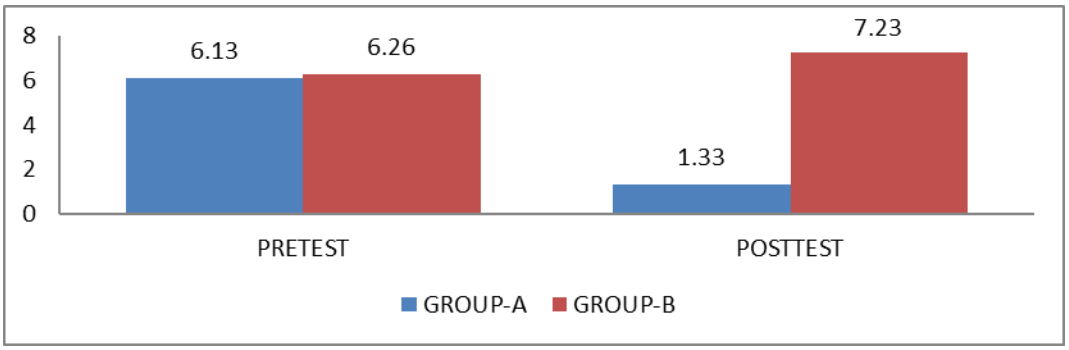
Graph 1- Comparison of pre-test and post-test values of Numerical pain rating scale in Group-A



Graph 2- Comparison of pre-test and post-test values of Numerical pain rating scale in Group-B



Graph 6- Comparison of pre-test and post-test values of Numerical pain rating scale in individuals with carpal tunnel syndrome



VI. DISCUSSION:

In this study based on the criteria 30 individuals with carpal tunnel syndrome was taken with the age group of 25 to 70 years of age and 15 individuals had undergone for neural mobilisation and midcarpal bone mobilisation in order Carpal tunnel syndrome is considered an inflammatory disorder caused by repetitive stress, physical injury or a medical condition15. Carpal tunnel syndrome is the most common clinical entity seen by the health surgeons with some reporting that the condition affects up to 10% of the general population.[11] It is often very difficult to determine the precise cause. The most important problem associated with this occupational exposure is the complexity of exposure assessment at the workplace[3-7]. No tests are yet available to target the causative factor. Except in patients with certain underlying diseases, the biological mechanisms leading to Carpal tunnel syndrome are unknown. Some studies suggest that more than half of Carpal tunnel syndrome cases are associated with workplace factors, though there is no strong evidence of cause and effect relationship. Carpal tunnel syndrome is felt to be induced or aggravated by any process that compresses the median nerve as it passes through the narrow carpal canal. Repetitive flexion and extension of the wrist and grasping motions of the hand are thought to repeatedly compress the median nerve between the tendons and carpal bones, leading to nerve injury. Such recurring movements at the wrist joint also make a person prone to develop tendonitis and tenosynovitis. The goal of treatment for carpal tunnel is to allow to return to normal function and activities to prevent nerve damage and loss of muscle strengthen fingers and hand. In the upper limb, McLellan and Swash (1976) placed needles in the median nerve and observed sliding of up to 2 cm in relation to interfacing tissue in the upper arm of volunteers during wrist and neck movements. Millesi (1986) pointed out that the median nerve has to be capable of adapting to a nerve bed made 20 per cent longer from wrist and elbow flexion to wrist and elbow extension. Pechan and Julis (1975) were able tomarkedly affect intraneural ulnar nerve pressure at the elbow by altering shoulder and wrist positions with the elbow position constant. Using buckle transducers, Reid (1987) documented tension changes in the cords of the brachial plexus during the Upper Limb Tension Test (ULTT), a test presumed to test the mechanical integrity of the nervous system in .the arm and neck (Elvey 1979) . It is veryUkely that tension points may occur in nerves at the elbow and shoulder during arm and neck movement combinations. Rubenach (1987) noted very little movement of the median nerve at the elbow during ULTT manoeuvres in a cadaver, and Sunderland (1978) has suggested that where nerves branch or enter a muscle at an abrupt angle, movement was likely to be less16. The median nerve can move can usually move upto approximately 9.6mm to allow the wrist to flexion, and to a lesser extent during extension. A long term nerve compression of the median nerve can inhibit gliding, which may lead to injury and scarring. when scarring occurs the nerve will adhere to soft tissue around it and become locked into a fixed position, so that less movement is apparent The nervous system must adapt to a wide variety of ranges, speeds and, combinations of movement, It also has the anatomical structure to mechanically limit some movement combinations.The nervous system adapts to and mechanically controls movement in two ways that invariably overlap: - by the development of tension or pressure within the system. - by movement relative to its mechanical interface[14]. The mechanical interface should be regarded as the most anatomically adjacent tissue to the 'nervous system that can move independently to the system. The primary aim of the neural mobilization is a restoring the dynamic balance between the relative movement of neural tissues and surrounding mechanical interfaces, thereby allowing reduced intrinsic pressures on the neural tissue and thus promoting optimum physiologic function6.

Mid carpal bone mobilisation is especially used for to increase wrist mobility, open the joint spaces allowing for greater movement in wrist joint Findings from previous studies support the use of traction/distraction manual therapy technique to decrease intra-articular pressure .

VII. CONCLUSION

From this study it is concluded the median nerve mobilization along with mid carpal bone mobilization(GROUP-A) was highly significant and which can be an effective intervention for individuals with carpal tunnel syndrome than conventional therapy(GROUP-B).

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