THE EFFECT OF STRETCHING AND PROPIROCEPTIVE NEUROMUSCULAR FACILITATION IN SPASTIC DIPLEGIC CEREBRAL PALSY-A COMPARATIVE STUDY

DISSERTATION

Submitted for the partial fulfillment of the requirement for the degree of

MASTER OF PHYSIOTHERAPY (MPT)

(Elective MPT-NEUROLOGY)

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BY

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Submitted to

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This is to certify that the dissertation entitled**"THE EFFECT OF STRETCHING AND PROPIROCEPTIVE NEUROMUSCULAR FACILITATION IN SPASTIC DIPLEGIC CEREBRAL PALSY-A COMPARATIVE STUDY"** was done by **B.M.SURYA (REG NO: 271620223).** The undersigned examiners has duly verified and examined the submitted dissertation done by the above candidate.

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CERTIFICATE BY THE PRINCIPAL

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I hereby declare that the dissertation entitled **"THE EFFECT OF STRETCHING AND PROPIROCEPTIVE NEUROMUSCULAR FACILITATION IN SPASTIC DYPLEGIC CEREBRAL PALSY-A COMPARATIVE STUDY"** was done by **B.M.SURYA (REG NO: 271620223).** This work has been done as a partial fulfilment for the degree of**Master of Physiotherapy**done at**Madha college of physiotherapy, Chennai**and submitted in the year October 2018 to**The Tamilnadu Dr. M.G.R. Medical University.**

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Date:

Place:

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INTRODUCTION:

Cerebral palsy (CP) is a common developmental disability first described by WILLAM LITTLE in 1940. Cerebral palsy is a common problem, worldwide incidence being 2-2.5/1000 live birth. As much as 75-80% of the cases are due to prenatal injury with less than 10% being due to significant birth trauma or asphyxia. The most important risk factor seems to be prematurity and low birth weight.

PREVALANCE AND TYPES OF CP:Diplegia 30 - 40%, Hemiplegia 20 - 30%, Quadriplegia 10 – 15%.

COMMON CAUSES:Neonatal asphyxia, Infants born prematurely with low birth weight, maternal infections such as high grade fever or rubella during pregnancy. In an analysis of 1000 cases of CP from India, it was found spastic quadriplegia constituted 61% cases followed by diplegia 22%.

Cerebral palsy – It is an umbrella term covering a group of non-progressive, but often changing, motor impairmentsyndromes secondary to lesion or anomalies of the brain arising in the early stages of its development.Tightness in one or more muscle group affects 70-80% of individual with CP. Hamstring tightness is most common of all. Significant effects were only observed when the popliteal angle exceeds 85 degree ($p<0.001$) and included increased effort of walking, decreased speed, stride and step length, decreased hip flexion and increased knee flexion instance, increased posterior pelvic tilt, decreased pelvic obliquity and rotation and premature ankle dorsi- and plantar- flexion in stance.

STRETCHING:

Static stretching is the most common term used to describe a method by which effects soft tissue are lengthened just past the point of tissue resistance and then held in lengthen position for extended period of time with a sustained stretch force. There is evidence shows that manual stretching having positive effect in improving muscle flexibility in cerebral palsy children between age group of 5 - 12 years.

The stretching may be given for 15-30 seconds sometimes it may be extended upto 60 seconds. In manual stretching the therapist applies an external force to move the involved body segment slightly beyond the point of tissue resistance and available ROM. The therapist manually controls the site of stabilization as well as the direction, speed, intensity and duration of the stretch. It usually employs a control end range static and progressive stretch held for about 30 to 60 seconds.

PROPRIOCEPTIVE NEUROMUSCULAR FACILIATTION:

PNF techniques were used to aid the rehabilitation of clients with spasticity and paresis by either facilitation or muscle elongation, supposedly through enhanced inhibitory mechanism affecting the target muscle and or improving muscle strength through excitatory mechanism affecting the target muscle. Herman kabat showed that PNF technique is effective and beneficial in improving muscle flexibility, Resistance and stretch are applied manually to the muscles working to perform patterns of mass movement and dynamic commands give verbal stimulation to the patient's voluntary effort. Maximal resistance isconsidered to be the most important means of stimulation the proprioceptors and the techniques concerned with its application to the patterns of mass movements are basic.

TECHNIQUES OF EMPHASIS:

To use the means of facilitation to correct muscle imbalance and re-store the patients ability to perform effective co-ordination movement.

A. Repeated contractions: Repetition of activity against resistance is essential for the development of muscle strength and endurance.
B. Slow reversal: It is applicable to voluntary movement and to interaction of antagonist group in the performance of movement.
C. Rhythmic stabilization: It is maintained against resistance by a co-contraction of antagonistic muscles.
D. Hold relax: It is designed to obtain a lengthening of muscles whose action is antagonistic to the movement limited in range.
E. Rhythmic initiation: It is a relaxation technique.

NEED OF THE STUDY:

The main purpose of the study is to functionally educate the spastic diplegic cerebral palsy patients by using stretching and proprioceptive neuromuscular facilitation and to compare which approach is more significant.

OBJECTIVE OF THE STUDY:

1. To find out the effectiveness of the PNF technique for the tightness of lower limb muscles in spastic diplegic CP.
2. To find out the effectiveness of stretching for the tightness of lower limb muscles in spastic diplegic CP.
3. To compare the effectiveness of PNF versus stretching, for the tightness of lower limb muscles in spastic diplegic CP.

HYPOTHESIS:

NULL HYPOTHESIS:

There is no significant difference between the effectiveness of PNF and stretching for lower limb muscle tightness in spastic diplegic CP.

ALTERNATIVE HYPOTHESIS:

There is significant difference between the PNF and stretching for lower limb muscle tightness in spastic diplegic CP.

REVIEW OF LITERATURE

REVIEW OF LITERATURE:

1) A study was done by pin T, Dyke P, Chan M. (2006 OCT) The aim of this review was to evaluate the evidence on the effectiveness of passive stretching in children with spastic cerebral palsy. There was limited evidence that manual stretching can increase range of movements, reduce spasticity, improve walking efficacy in children with spasticity. It appeared that sustained stretching of longer duration was preferable to improve range of movements and to reduce spasticity of muscles around the targeted joints.

2) Stuberg et al conducted a study on subjects of manual stretching on hamstring flexibility in children with spastic cerebral palsy and they concluded that improvement in range of motion (angle when maximum subject tolerance was reached) on the treated side was primarily due to increase stretch tolerance (torque at Amax)since angle at the highest common torque level achieved across test didn't change significantly.

3) Shamik Bhattacharjee, Masih Muhammad Khan, PritamDeka, AbhijitDutta (2016) a study conducted the efficacy of modified proprioceptive neuromuscular facilitation stretching with cryotherapy overall passive stretching with cryotherapy on hamstring flexibility. Group 1 received passive manual stretching and group 2 received modified PNF stretching and both groups received cold application after the interventions for 10 minutes commonly for 5 days. ROM was taken on day 1, 5, and 7. After day 7, group 2 with modified PNF stretching along with cold application showed a significant increase in ROM tested with active knee extension test. The study concluded that modified PNF stretching is considered to be the effective intervention in increasing and maintaining ROM in ankle knee extension test over passive manual stretching with cold application after the interventions.

4) Melanie j sharman et al (2006) conducted a study on proprioceptive neuromuscular facilitation stretching mechanism and clinical implication and they have concluded that PNF is most effective means to increase ROM by the way of stretching , particularly in respect to short term gain in ROM .

5) J B feland ,H N marin (2004) conducted a study on effect of submaximal contraction intensity in contract relax in PNF stretching. Subject qualified by demonstrating tight hamstrings, defined as the inability to reach 70degree of hip flexion during a straight leg raise. 16 subjects were randomly assigned to 1 of 3 treatment groups: 1. 20 % of MVIC; 2. 60 % of MVIC; 3.100% of MVIC. 12 subject were randomly assigned to a control group (no stretching). Subjects in group 1 – 3 performed 3 separate 6 second CRPNF stretches at the respective intensity with a 10 second rest between contractions once a day for 5 days. Paired t test showed a significant change in flexibility for al treatment group and concluded that contract relax PNF stretching using submaximal contraction is just a beneficial in improving hamstring flexibility and maximum contraction , and may reduced the risk of injury associated with PNF stretching.

6) MH Morcelli, JMCA Oliveira, MT Navega (2013) a study conducted to compare static, ballistic and contract- relax stretching on instant gain muscle flexibility on the hamstring muscle. Each technique was performed in a single session with an interval of seven days between sessions. In comparison with the baseline there were significant increase in muscle flexibility in the popliteal angle test after the application of techniques. Among the three techniques the ballistic, contract-relax stretching techniques improved gain of muscle flexibility on the hamstring muscle.

7) T Tupimai, P Peungsuwan, et al (JAN 2016) this study evaluated the immediate and short-term effects of a combination of prolonged passive muscle stretching(PMS) and whole body vibration(WBV) on the spasticity, strength and balance of children and adolescents with cerebral palsy. This study showed that 6 weeks of combined prolonged passive muscle stretching and whole body vibration had beneficial effects on spasticity, muscle strength and balance of children and adolescents with cerebral palsy.

8) NoureddinNakhostin Ansari, SoofiaNaghdi(2012) A study conducted to investigate the inter-rater reliability of the modified Modified Ashworth Scale in the upper limb of patients with hemiparesis and to determine the effect of pain and contracture presence on the reliability of the MMAS.

9) Katrin Baxter, Todd E. Davenport (2012) A study conducted on passive stretching and its effect on spasticity and range of motion in children with cerebral palsy. A total of 13 articles on stretching in children with cerebral palsy were found from the years 1990 – 2011. 2 individual studies were found in which manual stretching was the intervention. 9 individual studies were found in which positional stretching was the intervention, 4 of which serial casting was the intervention. 2 systemic reviews exist in the last two decades that explore the effect of stretching in children with CP, however neither encompass all of the studies reviewed in this paper nor do they discuss serial casting as a form of positional stretching. Taken together, the individual studies using positional stretching and the small randomized controlled trial using electrical stimulation in addition to manual stretching led to better outcomes for reducing spasticity and increasing passive range of motion compared to manual stretching alone.

10) Nastaran Ghotbi et al (2009) conducted a study on Inter - rater reliability of the Modified Modified Ashworth scale in assessing lower limb muscle spasticity. In this study, 22 adults with neurological conditions of both sex were participated. Hip adductor, knee extensor and ankle plantarflexor were assessed in a random order. Inter-rater agreement for two raters was very good for the hip adductor and the knee extensor and good for the ankle plantar flexor. The study concluded that the Modified modified Ashworth Scale produced reliable measurements between raters in the assessment of lower limb muscle spasticity.

11) Joong-san wang, Sang-Bin lee and Sang-Hyun moon (2016) a study on the immediate effect of PNF on muscle tone and muscle stiffness in chronic stroke patients. The subjects consisted of 15 patients with chronic stroke (stroke group) and 15 healthy persons (healthy). We measured the effects of PNF intervention on the lower extremities using a muscle tone measurement device. This detected changes in muscle tone and stiffness in the lower extremities muscles. Measurements taken before the intervention showed that on average, the lower extremity muscles of the stroke group showed abnormally increased muscle tone and stiffness compared to the lower extremity muscles of the healthy group. Based on the finding of the study we recommend PNF treatment of both affected and non-affected sides to decrease the abnormally increased muscle tone and stiffness in the lower extremity muscles of chronic stroke patients.

12) Ujwal lakshman yeole et al (2017) conducted a study on effectiveness on proprioceptive neuromuscular facilitation on spasticity in hemiplegia: randomised control trial. 30 subjects were randomly allowed for treatment period of 4 weeks. The spasticity and functional independency was evaluated using Ashworth scale and barthel index respectively result obtained were compared. The Ashworth scale in PNF group showed significant improvement as compared to conventional group. The barthel index in PNF group showed significant improvement as compared to conventional group. The range of motion also had shown significant improvement in PNF group. Both the techniques showed significant reduction in spasticity measured on Ashworth scale with PNF being more effective. PNF technique significantly effective over conventional physiotherapy for reducing spasticity and improving functional activities in hemiplegia.

13) Mohamed Ali Elshafey et al (2014) conducted a study on the effect of functional stretching exercise in spastic diplegic cerebral palsy children. Children were randomly assigned into two matched groups. The control group received physical therapy program with traditional stretching exercises. The study group received physical therapy program with functional stretching exercises. There was significant improvement in all the measuring variables for both groups in favor of study group. Functional stretching exercises were effectively used in rehabilitation of spastic diplegic children; it reduced H\M ratio, increased popliteal angle, and improved gait.

14) YN Wu, M Hwang et al (2011) a study on combined passive stretching and active movement rehabilitation of lower limb impairments in children with cerebral palsy using a portable robot. Ankle impairments are closely associated with cerebral palsy. Passive stretching is often used to increase the range of motion of the impaired ankle. Improving motor control is also a focus of physical therapy. Passive stretching combined with engaging in active movement training was of benefit in this pilot study for children with cerebral palsy.

15) Heng Zhao et al (2011) a study conducted on changes of calf muscle tendon biomechanical properties induced by passive stretching and active movement training in children with cerebral palsy. In the present study, architectural and mechanical properties of gastrocnemius medialis and soleus muscle fascicles and Achilles tendon in children with cp were evaluated before and after 6-wk program of passive stretching and active movement training. Increased calf muscle fascicle length and decreased fascicular stiffness, decreased tendon resting length, and increased tendon stiffness were induced by the 6-wk training.

DESIGN AND METHODOLOGY

DESIGN AND METHODOLGY:

STUDY DESIGN:

A Comparative Experimental Study.

STUDY SETUP:

Madha medical college hospital and research institute.

SAMPLE SIZE:

30 subjects (Group A -15 and Group B -15 Patients).

INCLUSION CRITERIA:

- Spastic Diplegic cerebral palsy.
- Both the sex was considered.
- Age group of patients ranged between 5years to 10years.
- Muscle tightness
- Subject who is able to follow the instruction.
- Willing to participate in study.

EXLUSION CRITERIA:

- Patients with medical co-morbid.
- Patients with mental retardation.
- Patients with contractures.
- Gross deformity of lower limb.

THE PARAMETER USED FOR STUDY:

Modified Ashworth Scale.

SAMPLES FOR THE STUDY:

- This study consists of 30 spasticity patients.
- Durations: subjects on the day diagnosed to have spasticity.
- Age ranged between 5years to 10years.
- Side of lesion – both the right and left.

This study was conducted only after evaluating patients completely.

Period of data collection:

The data collection procedure was carried out for a period of one Month. The investigator herself collected both pre and post data.

TOOLS USED FOR STUDY

- Treatment table.
- Towel.
- Bed sheets.
- Balance board.
- Parallel bar.
- Data collection sheet.

PROCEDURE

PROCEDURE

PHYSIOTHERAPY INTEVENTION FOR GROUP (A)

STRETCHING:

This method of treatment is mainly focusing on the specific muscles that are useful for increasing the ROM and muscle power, which are the primary goals of treatment for the functional independence of the spasticity patient. The following stretching techniques were given for the control group.

RESPONSE TO STRETCH:

When a muscle is stretch and elongates the stretch force is transmitted to the muscle fibres via the connective tissue in and around the fibres. During passive stretch both longitudinal and lateral force transduction occurs. The elements of stretching include the alignment and stabilization of the body is important. At the same time the intensity, speed, duration, frequency and mode of stretch are also important. While selecting the safe and effectiveness of the patient needs, goals and capabilities are considered.

MANUAL STRETCHING:

Manual stretching was performed with an external force beyond the point of tissue resistance and available range of motion and held for about 30 to 60 seconds.

While applying manual stretching the extremity was moved slowly through the free range, to the point of tissue restriction, the proximal segment was stabilized firmly and the distil segment was moved. The stretch force was applied in a low intensity, slow sustained manner and the direction of the stretching movement is directly opposite to the line of pull and within the muscle range. The stretch position was maintained for the 30 to 60 seconds and gradually the stretch force was released.

A. TEND0-ACHILLES STRETCHING:
   Action: Flexion of knee planter flexion of ankle.
   Position of patient: Supine lying
   Position of the Therapist: Standing beside the patient
   Procedure: The therapist holds the lower thigh region with his left hand and flexing the knee. The therapist right hand holds the heel in neutral position. Slowly extending the knee with the left hand and dorsi flexes the heel with the right hand.

B. QUADICEPS STRETCHING:
Action: Hip flexion and Knee extension
Position of the patients: prone lying
Position of the Therapist: standing beside the patient
Procedure: patient knee is flexed and the therapist holds the anterior position of the knee with left hand and the right hand holds ankle of the patient while forearm and elbow stabilizing the patient pelvis. Lifting the thigh up with the left hand of the therapist extend patients hip.

C. HAMSTRING STRETCHING:
Action: Flexion of the knee and extension of the knee
Position of patient: Supine lying
Position of the Therapist: Standing beside the patient and the patient leg kept over the shoulder.
Procedure: With the knee extension therapist flexes the hip of the joint.

D. GLUTEUS MAXIMUS:
Action: Hip Extension
Position of the patient: Supine lying
Position of the therapist: Therapist is standing besides the patient and facing the limb
Procedure: Therapist right hand grasping the ankle while the left hand holds the knee posteriorly.
The leg lifted with hip and knee flexed towards the cranial side of the patient.

E. ILLIACUS AND PSOAS MAJOR:
Action: Hip flexion
Position of the patient: Side lying
Position of the therapist: Standing behind the patient
Procedure: Therapist left hand stabilizes the pelvis and right hand grasps the lower thigh and knee, with forearm supporting the leg region of the patient.

F. HIP ADDUCTORS:
Action: Hip Adduction
Position of the patient: Crook lying
Position of the therapist: standing beside the patient facing the limb
Procedure: Both the heels are kept together and then drawn apart.

FIG: 1 PHOTOGRAPHIC REPRESENTATION OF GIVING STRETCHING TECHNIQUES.

PHYSIOTHERAPY INTERVENTION FOR GROUP (B)

PROPRICEPTIVE NEUROMUSCULAR FACILITATION:

Proprioceptive neuromuscular facilitation aims to summate the effects of facilitation to increase the response of the neuromuscular mechanism man movement patterns are used on the basic of characteristic of all motor activity.

The use of neuromuscular inhibition for elongation of shortened muscles was first discussed by knott and van in their approach.

EXTENSION – ABDUCTION – INTERNAL ROTATION

Patient position: supine position

Grip: distal hand holds the foot with the palm of the left hand along the planter surface. The thumb is at the base of the toast to facilitate toe flexion. The fingers hold the medial border of the foot while the heel of my hand gives counter pressure along the lateral border. The right hand holds the posterio lateral side of the thigh.

Elongated position: Traction the entire leg while moving the foot into dorsiflexion and inversion. Continue the traction and maintain the internal rotation as the leg lifted into flexion.

Stretch: The proximal hand gives a stretch by raid traction action of the thigh. The forearm of the distal hand to traction up through the shin. While the stretch, the patient foot farther into dorsiflexion.

Movement: The toe flex and the foot and ankle plantar flex and event. The eversion promotes the hip internal rotation. These motions occur at the same time. The thigh moves down into extension and abduction, maintaining the internal rotation. Continuation of this motion causes extension with left side bending of the trunk.

Resistance: The distal hand combines resistance to eversion with approximation through the bottom of the foot. The approximation resists both the plantar flexion and the hip extension. The resistance to the hip abduction and internal rotation comes from the resisted eversion. The proximal hand lifts the thigh back towards the starting position. The lift resists the hip extension and abduction. The placement of the hand coming from lateral to posterior, gives resistance to the internal rotation.

As the hip approaches full extension continue to give approximation through the foot with the distal hand and approximate through the thigh with the proximal hand.

End position: The foot is in planter flexion with inversion and the toes are flexed. The knees remains in full extension. The hip is in as much hyperextension while maintaining the abduction and internal rotation.

Timing for emphasis: Repeated contractors are used to exercise the hyperextension hip motion.

EXTENSION – ABDUCTION – INTERNAL ROTATION WITH KNEE EXTENSION

Grip: Stand on the right side of the table facing up towards the patients left hip. Right hand was on the patient's foot, the left hand on the thigh.

Elongated position: The foot is in dorsiflexion with inversion. The hip and knee are in full flexion with the heel close to the right buttock. The knee heel are aligned with each other and lined up approximately with the right shoulder.

Stretch: Apply the stretch to the hip, knee, foot simultaneously. The proximal hand combine traction of the hip through the line of the femur with a rotatory motion to stretch the internal rotation. The distal hand stretches the foot further into dorsiflexion and inversion as you stretch the knee extension by bringing the patients heel closer to the buttock.

Movement: The foot and ankle planter flex and evert. The hip motion begins next.

Resistance: The distal hand resists the foot and ankle motion with a rotatory push. By using the foot as handle, resist the knee extension by pushing the patients heel back toward the buttock the angle of this resistance at the foot resists the knee a hip rotation as well.

End position: The end position was in straight leg pattern

Timing for Emphasis: Prevent knee extension at the beginning of the range and exercise the hip motion. Lock in hip extension in mid-range and exercise knee extension. Lock in the knee before it is fully extended and exercise the hip extension.

EXTENSION – ABDUCTION – INERNAL ROTATION WITH KNEE FLEXION:

Grip: The grip on the foot contacts the active surface, dorsal and holds the sides of the foot to resist the rotatory components. Using the lumbrical grip will prevent squeezing or punching the prevent foot.

Stretch: The reflex comes from the rapid elongation and rotation of the hip, ankle and foot by both hands simultaneously little extra traction movement to the knee with distal hand to elongate the knee flexor muscles further.

Movement: The foot and ankle plantar flex and event. The hip motion begins next. It is important that the hip and knee reach their end ranges at the same time.

Resistance: The distal hand resists the plantar flexion and eversion and uses that force to resist the knee flexion as well. The force is back toward the starting position of the knee extension and foot inversion. The proximal hand resists the hip motion as it did for the SLP. As the hip approaches full extension, approximate through the thigh with the proximal foot.

End position: The hip is extended with abduction and internal rotation. The knee was flexed over the side of the table and the foot was in plantar flexion with eversion.

Timing for Emphasis: Lock in the hip extension at the important in the range and exercise the knee flexion.

DATA ANALYSIS

RESULT

STATISTICAL ANALYSIS

The statistical analysis of this date was done by using student 't' test both unpaired and paired.

Formula's used

A. Unpaired't' test

$$T = \frac{X_1 - X_2}{S\sqrt{\frac{n_1 \times n_2}{n_1 + n_2}}}$$

t = Unpaired't' test value

n = Number of samples

X_1 = Mean of group A

X_2 = Mean of group B

S = Standard deviation

$$S = \sqrt{\frac{(n_1-1)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}}$$

$$S_1 = \sqrt{\frac{\Sigma x_1^2 - n\,(X_1)^2}{n-1}}$$

$$S_2 = \sqrt{\frac{\Sigma x_1^2 - n\,(X_1)^2}{n-1}}$$

S_1 = Standard deviation of control group (A)

S_2 = Standard deviation of experimental group B

Σx_1 = The sum total of group A.

Σx_2 = The sum total of group B.

PAIRED t TEST :

$$t = \frac{|\bar{d}|}{S/\sqrt{n}}, \quad t = \frac{|\bar{d}|}{SE}$$

Where $SE = S/\sqrt{n}$

$\bar{d}$ = The deviation between the two mean ($\bar{d} = x_1 - x_2$)

SE = Standard error

S = Standard deviation

N = Number of observation

STATISTICAL ANALYSIS

The statistical analysis of this date was done by using student 't' test both unpaired and paired.

Formula's used

A. Unpaired 't' test

$$T = \frac{X_1 - X_2}{S}$$

T = Unpaired 't' test value

N = Number of samples

X_1 = Mean of group A

X_2 = Mean of group B

S = Standard deviation

S =

S_1 =

S_2 =

S_1 = Standard deviation of control group A

S_2 = Standard deviation of experimental group B

$\sum x_1$ = The sum total of group A.

$\sum x_2$ = The sum total of group B.

PAIRED t TEST:

t =

where SE = S / $\sqrt{n}$

d = The deviation between the two mean ($d = x_1 - x_2$)

SE = Standard error

S = Standard deviation

N = Number of observation

STATISTICAL ANALYSIS:

Modified Ashworth Scale

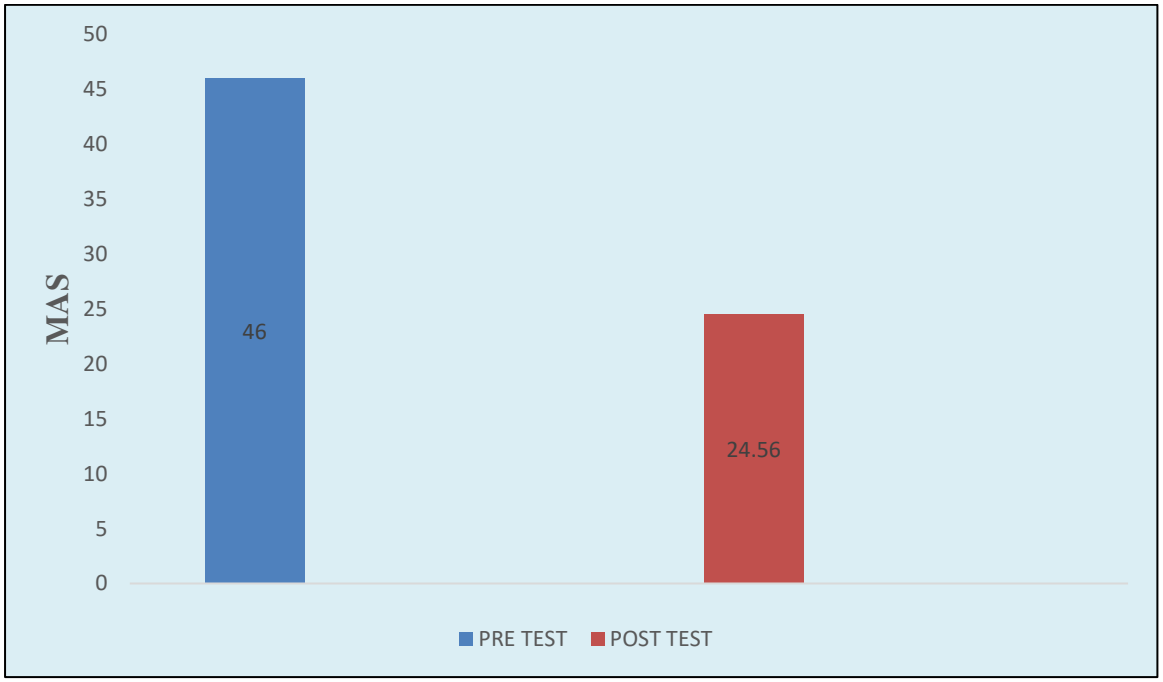
Table: Pre and Post paired ‘t’ test of Group A

	PRE TEST	POST TEST
MEAN	**DAY 1**	**DAY 4**
	46	24.56
‘t’ value	0.4901	

'p' value and level of significance	P < 0.05 and significant

The statistical analysis of MAS obtained at the end of 30 days period for GROUP A showing the comparison of MAS value. This result are presented in Fig and Table 1.

DEMOGRAPHIC REPRESENTATION OF GROUP-A MEAN



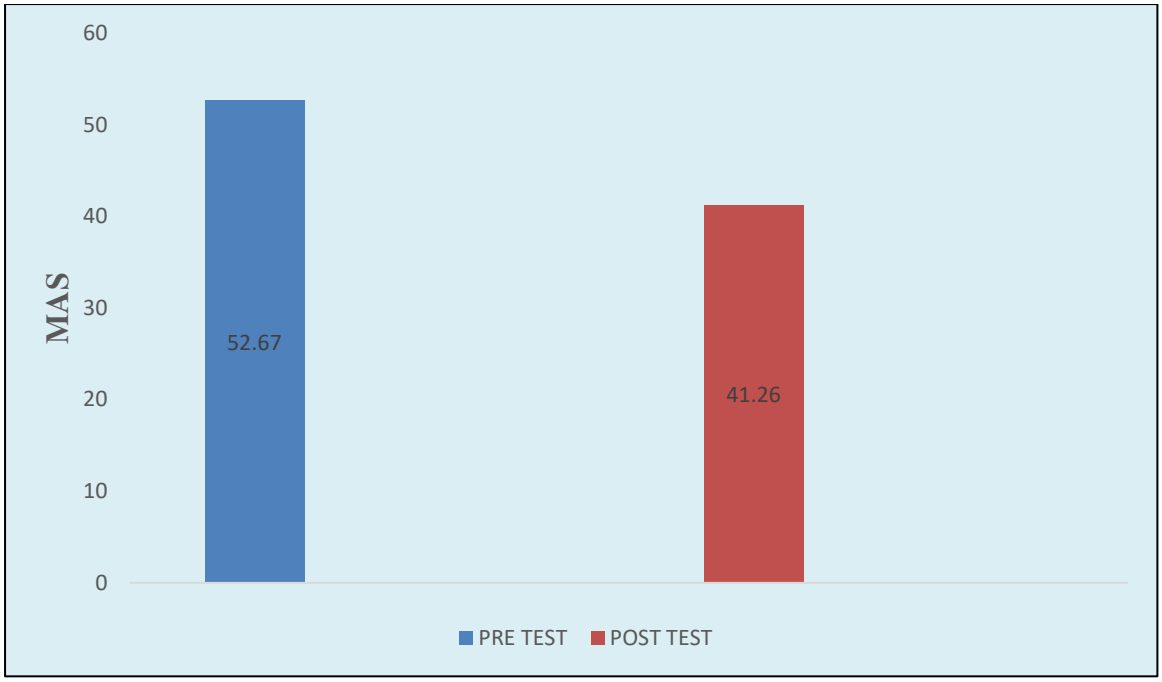
Modified Ashworth Scale

Table: Pre and Post Paired 't' test of Group-B

MEAN	**PRE TEST**	**POST TEST**
	DAY 1	**DAY 30**
	52.67	41.26
't' value	1.3801	
'P' value and level of significant	P<0.05 and significant	

The statistical analysis of MAS obtained at the end of 30 days period for GROUP B showing the marked decrease incomparison of MAS value. This results are presented in Fig and Table 2.

DEMOGRAPHIC REPRESENTATION OF GROUP-B MEAN


60
50
40
30
20
10
0
MAS
52.67
41.26
PRE TEST
POST TEST

INTERPRETATION

PAIRED ‘t’ TEST

GROUP A

Day 1 to Day 30

For 14 degrees of freedom at 5% level of significance the table ‘t’ value is 18.12. This is lesser than the calculated ‘t’ value of 16.38 and hence the alternate hypothesis is accepted.

GROUP B

Pretest value Day 1 to Day 30

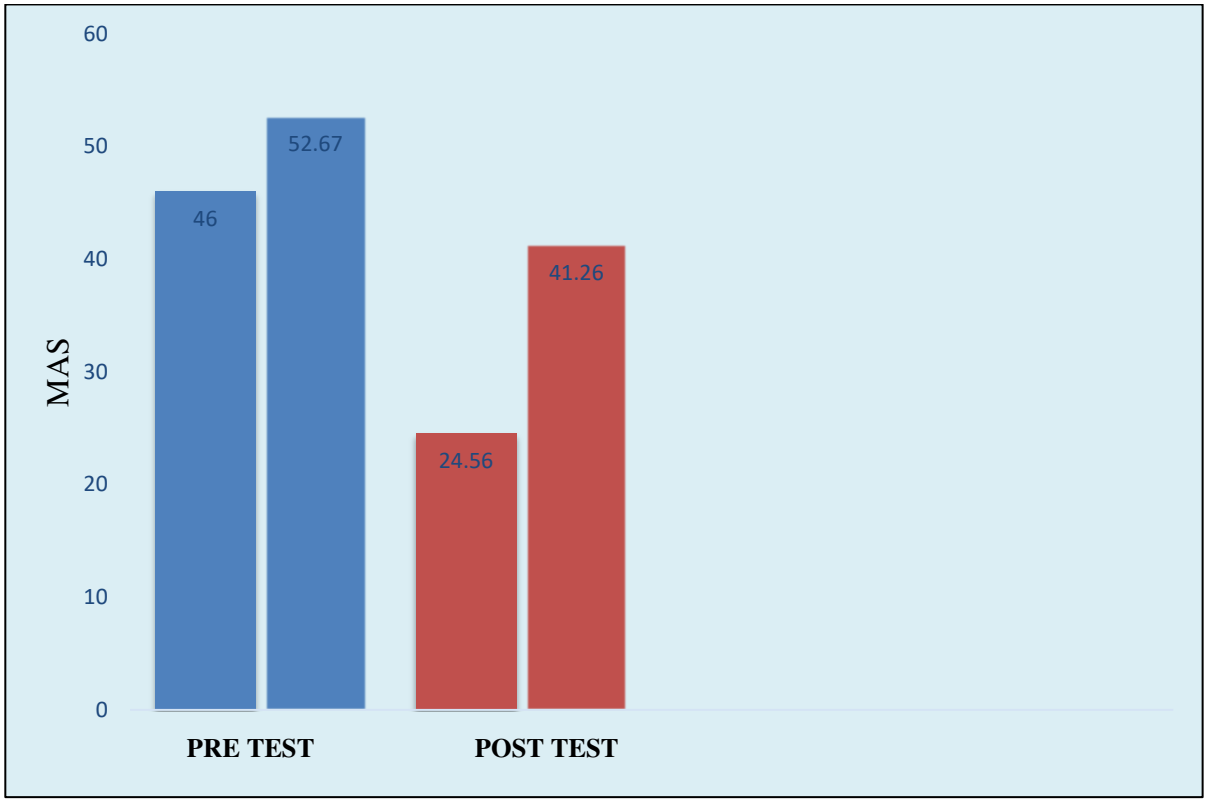
For 14 degrees of freedom at 5% level of significance, the table ‘t’ value is 16.38. This is lesser than the calculated ‘t’ value 18.12 and hence the alternative hypothesis is accepted.

Unpaired ‘t’ Test

Table – Pre and Post Group A Vs Group B

	PRE TEST		POST TEST	
MEAN	PRE TEST GROUP A	PRE TEST GROUP B	POST TEST GROUP A	POST TEST GROUP B
	75.46	75.86	35.867	33
't' value	18.12		16.38	
'P' value and level of significance	P<0.05 and not significant		P<0.05 and not significant	

Fig: Pre and Post test comparison of MAS in both groups



RESULTS AND DISCUSSION

DISCUSSION

This study compares the effects and uses of stretching and PNF techniques for the functional re-education of patients following spasticity. In case of unpaired 't' test the result obtained at 5% level of significance is the accepting the alternative hypothesis because the 't' value remain less than that of table value. In a former study by Dyek and associates, concluded that patients who were treated with stretching as well as patients treated with PNF technique. Another study conducted by Harris and colleagues compared PNF and Stretching technique found that there is significant difference in outcome.

In the same way the current study also shows that there is statistical significance in outcome. But when pre test and post test data of individual techniques were analysed using coefficient of variation, Paired 't' test. The result obtained at 5% level f significant shows that stretching concept as significant difference in the outcome then that of PNF. The difference between the two techniques is significant. It really emphasis that patients who belong to group receiving stretching showed slower improvement than the PNF for a given period of time.

The time or early regaining of functional independence is very much useful during the management of spasticity patients.

EVIDENCE BASED TREATMENT APPROACH:

Any approach which is evidence based might be more attractive in the society. There by the stretching also belongs to the best among the evidence based treatment.

CONCLUSION

CONCLUSION

Thus this study conclusively emphasis that proprioceptive neuromuscular facilitation is more valid for the recovery of functional activities in the patients following spasticity than the stretching.

LIMITATIONS AND SUGGESTIONS

LIMITATIONS

The time duration of study was very less to achieve maximum functional independence in the patients.

The sample size was small for the result to generalized.

Since age group selected varies from 2 to 5 years, the chance to produces based functional outcome is more.

SUGGESTIONS AND RECOMMENDATIONS

In order to generalize the result obtained in this study. A study with large sample and longer duration is suggested and also recommended.

A study by an expert in stretching concept will be needed to make the study more valid.

SUMMARY

The stretching and proprioceptive neuromuscular facilitation approaches are highly controversial in the aspects of principle and techniques and also their effects and uses. A comparative study to judge the effectiveness of both the techniques upon the functional re-education of the spasticity patients was conducted with 30 patients. Who were belonged to Spastic Diplegic CP type of age between 2 years to 5 years and evaluated their functional outcome with Modified Ashworth scale. This 30 patients irrespective of age and sex were selected for the study by using convenient sampling method, grouped into two name as group A and group B. Group A underwent stretching and group B PNF approach. The individual functional outcome was measured, analyzed and interpreted using coefficient of variation, paired and unpaired 't' test.

The result of paired 't' test at 55 level of significance showed that the alternative hypothesis is accepted a speed of functional recovery is more in the patients belonging to stretching and PNF. Where is the result ofunpaired 't' test at the same 55 level of significance showed that the alternative hypothesis accepted statistical difference in the effects produced by both the group upon their functional activities.

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APPENDICES

ANNEXURE

MASTER CHART

FUNCTIONAL ASSESSMENT SCORE GROUP-A

SL. NO.	MODIFIED ASHWORTH GRADING SCALE (CONTROL GROUP)	
	PRE TEST	POST TEST (Within one month)
1	2	1
2	3	1
3	2	2
4	2	1
5	3	1
6	2	2
7	2	1
8	3	2
9	2	1
10	3	1
11	2	2
12	2	2
13	2	1
14	2	1
15	1	1

MASTER CHART

FUNCTIONAL ASSESSMENT SCORE GROUP-B

SL.NO.	MODIFIED ASHWORTH GRADING SCALE	
	PRE TEST	POST TEST (with the period of one month)
1	3	2
2	3	3
3	2	2
4	2	2
5	3	1
6	2	2
7	3	3
8	2	2
9	3	2
10	3	2
11	3	2
12	3	1
13	3	2
14	2	1
15	2	1

MODIFIED ASHWORTH SCALE

Modified Ashworth Scale is the most widely used semi-Quantitive clinical scale to access spasticity. Modified Ashworth scale was first developed in 1964 by David C Good.

It has become the gold standard for semi quantitative clinical assessment of spasticity.

Modified Ashworth Scale Grading Spasticity

GRADE 0 – No increase in muscle tone

GRADE 1 – slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the ROM when the affected part is moved or extension.

GRADE 1+ – slight increase in muscle, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM.

GRADE 2 – more marked increase in muscle tone through most of the ROM but affected parts easily moved.

GRADE 3 – considerable increase in muscle tone passive movement difficult

GRADE 4 – affected parts rigid in flexion or extension.

Sl.no	Name of the patient	Pre-test value	Post-test value	Difference

Patient Consent Form

I

Mr/Mrs……Here by consent to participate in the study conducted by SURYA.B.M Final year master of physiotherapy student of Madha College of Physiotherapy, Kundrathur, Chennai.

Signature of Patient