

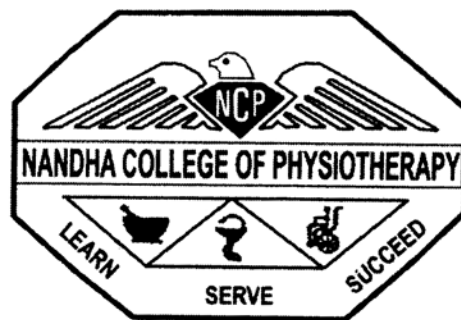
**A STUDY TO DETERMINE THE EFFECT OF DYNAMIC SOFT
TISSUE MOBILIZATION OF HAMSTRING FLEXIBILITY IN
HEALTHY SUBJECT**

A Dissertation Submitted to
**THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY
CHENNAI**

*in partial fulfillment of the requirements
for the award of the*

**MASTER OF PHYSIOTHERAPY
(ADVANCED PHYSIOTHERAPY IN ORTHOPAEDICS)
DEGREE**

**Submitted by
Reg. No.27102002**



**NANDHA COLLEGE OF PHYSIOTHERAPY
ERODE – 638 052.
APRIL 2012**

**THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY
NANDHA COLLEGE OF PHYSIOTHERAPY
ERODE-638052**

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Under the Guidance of

Prof.V.MANIVANNAN,M.P.T(Ortho)

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Dissertation evaluated on -----

Internal Examiner

External Examiner

CERTIFICATE BY THE HEAD OF THE INSTITUTION

This is certify that the dissertation entitled “**A STUDY TO DETERMINE THE EFFECT OF DYNAMIC SOFT TISSUE MOBILIZATION OF HAMSTRING FLEXIBILITY IN HEALTHY SUBJECT**” is a bonafide compiled work, carried out by Register No. 27102002, Nandha College of Physiotherapy Erode – 638 052, in partial fulfillment for the award of Degree in Master of Physiotherapy as per the doctrines of requirements for the degree of the TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY CHENNAI – 32. This work was guided and supervised by **Prof.V.MANIVANNAN M.P.T (ORTHO)**

PRINCIPAL
NANDHA COLLEGE OF PHYSIOTHERAPY
ERODE - 52

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled “**A STUDY TO DETERMINE THE EFFECT OF DYNAMIC SOFT TISSUE MOBILIZATION OF HAMSTRING FLEXIBILITY IN HEALTHY SUBJECT**” submitted by (Reg No. 27102002) is a record of original and independent work done by the candidate during the period of study under my supervision and guidance. The dissertation represents entirely an independent work on the part of the candidate but for the general guidance by me.

Guide

Prof.V.MANIVANNAN, M.P.T(Ortho)
The Principal,
Nandha College of Physiotherapy
Erode-638052

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I. INTRODUCTION

Physical therapists all over the world have been conducting newer trials and have used many different methods to increase joint range of motion and maintain it.

Techniques commonly used by to increase flexibility include static and ballistic stretching as well as PNF. Recent literatures have indicated that stretching does not provide significant benefits.

The effectiveness of massage on resting muscle flexibility has not been extensively researched. However several studies investigated use of massage as treatment of delayed onset of muscles soreness

A dynamic deep muscle tissue model was developed to treat patient with muscle tightness and associated soft tissue problems. The dynamic deep muscle tissue technique consists of series of progression from traditional to dynamic techniques which concentrated on one specific area of muscle tightness. Clinical experiences suggest that dynamic deep muscle tissue model is an efficient pain free intervention that appears to have an immediate effect on improving hamstring flexibility.

1. OPERATIONAL DEFINITION

1. DYNAMIC SOFT TISSUE MOBILIZATION

Dynamic Soft Tissue Mobilization is a relatively recent development in manual therapy in which it combines with therapist delivered manual treatment a number of different features such as joint, soft tissue positioning and movements involving either concentric or eccentric movement.

2. HAMSTRING MUSCLE

Of is a knee flexor and a hip extensor which appears as a bulk of muscle in the back of the thigh.

It consist of

1. Biceps femoris
2. Semitendinous
3. semimembranous

3. FLEXIBILITY AND FLEXIBILITY TRAINING PROGRAMME

Flexibility is defined as the ability of a muscle to elongate. Flexibility training is generally acceptable as important aspect of individual conditioning.

2. NEED FOR THE STUDY

Flexibility is important not only for successful physical performance but also in prevention of injuries. In many situation a muscle is forced to stretch beyond its normal active limits. If the muscle does not have enough elasticity to compensate for this additional stretch the musculo-tendonous units may be injured. The physical therapist have used many different therapeutic methods to maintain and increase joint range of motion by altering the extensibility of musculo-tendonous units that produce movement in a joint and to prevent deformities and dysfunction resulting from injuries.

In order to find the effect of dynamic soft tissue mobilization in increasing hamstring flexibility and its effects compared with classic soft tissue mobilization this study was conducted.

3. STATEMENT OF PROBLEM

“Effect of dynamic soft tissue mobilization on hamstring flexibility in healthy subjects”.

4. OBJECTIVES OF THE STUDY

To increase hamstring flexibility by means of

1. Dynamic soft tissue mobilization technique
2. Classic soft tissue mobilization technique

5. HYPOTHESIS

1. Null hypothesis

There is no significant different between the effect of dynamic soft tissue mobilization technique verus classic soft tissue mobilization technique to improve hamstring flexibility in healthy subject.

2. Alternate hypothesis

There is significant different between the effect of dynamic soft tissue mobilization technique verus classic soft tissue mobilization technique to improve hamstring flexibility in healthy subject.

6. ASSUMPTION

The study had been conducted assuming both dynamic soft tissue mobilization and classical soft tissue mobilization technique will have an efficacy over the hamstring flexibility in healthy subject.

II. REVIEW OF LITERATURE

1. **Diana Hopper et al** [2003] conducted a study on evaluation of effect of two massage technique on exercising hamstring muscle length. She concluded that dynamic soft tissue mobilization had an immediate significant effect on hamstring muscle length in competitive female field hockey players.

2. **D. Hopper. S Deacon** concluded that dynamic soft tissue mobilization increase hamstring flexibility. Journal of sport medicine [2005] Volume : 39, issue : 9 page 594-598

3. **Alison Ruston, Simon Spencer** concluded effect of dynamic soft tissue mobilization on flexibility and passive resistant in the hamstring muscle. Published online 03 Nov [2010].

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5. **Elizabeth Quinn**, concluded that sit and reach is a simple measure of lower back and hamstring flexibility Nov 20, [2008] all about.com.health (medical review board @.about.com)

6. **J.Brummit** concluded that dynamic soft tissue mobilization increase hamstring flexibility sports phys the V.3 (1) Feb : [2008]

7. **C.J. Jones. RE Rikli, J Max** [1998] sit and reach test as a measure of hamstring flexibility in older adults. www.ncbi.nlm.nih.gov pub med. 98 64752

8. **PL. Rodrigvaz** [2008] conducted a study on hamstring muscle performance and concluded hamstring flexibility was evaluated through the sit and reach test.

9. **Brandy W D and Irion** [1977] examined that 30 and 60 seconds of static stretching on hamstring flexibility is more effective.

10. **Bennel et al** [1998] stated that in untrained or weak hamstring muscle May pre dispose the athlete to injury as this muscle is less able to withstand potentially injuring focus. The muscle has decreased capacity to generate active tension and therefore lessen stress or loads.

11. **Clin J** Sports medicine [1997] stated that hamstring injury is most common in football players.

12. **Charles Ecodrin** [1997] stated that adequate flexibility may help to prevent muscle strain and such orthopedic problems such as backache and they also stated that good flexibility may bring about improved athletes performance.

13. Dr. Ben Kim concluded in his study that chronic low back pain can improve and end fully heal their back by release hamstring tightness on by doing stretching their hamstring muscle.

14. **Godess JJ et al** [2003] concluded that soft tissue mobilization and PNF was effective for providing immediate improvements in gleno-humeral internal rotation and reach in patients in shoulder disorders.

15. **PoPe R P et al** [2000] concluded that a typical muscle stretching protocol performed during pre exercise warm up does not produce clinically meaningful reduction of exercise related injury in army recruits.

16. **Youdas JW et al** [2005] stated that hamstrings flexibility was not influenced by age. They found that hamstrings length significantly in females demonstrating greater flexibility than males in counter parts.

17. **Worell Jwet et al** [1994] conclude that hamstring muscle flexibility was an effective method for increasing hamstring performance as selective Isokinetic condition.

18. **Rob D Hebert et al** [2002] concluded that stretching before or after exercise does not confer protection from muscle soreness and stretching before exercise does not seem to confer a practically useful reduction in risk of injury.

19. **D Scott Davis et al** [2005] stated that these stretching techniques on improving hamstring flexibility during a 4 week training program. Here effectiveness of three stretches using consistent parameters.

20. **Erik Witvrouw P T PhD et al** [2003] concluded that soccer players with an increased tightness of hamstrings or quadriceps muscles have a stretching higher risk for a subsequent musculo skeletal lesion. Hence increased tightness of hamstrings muscle leads to a risk for a muscle strain stretching.

III. MATERIALS AND METHODOLOGY

1. STUDY DESIGN

Quasi experimental design study

CONTROL GROUP

This group consist of 15 subject to asses the effectiveness of classic soft tissue mobilization technique in increasing hamstring flexibility in healthy subject.

EXPERIMENTAL GROUP

This group consist of 15 subject to asses the effectiveness of dynamic soft tissue mobilization technique in increasing hamstring flexibility in healthy subject.

2. STUDY SETTING

1. Nandha College of Physiotherapy
2. Nandha Arts and Science College
3. Nandha hostel

3. SELECTION OF SAMPLES

All the students studying in Nandha College was included in this study. Only 30 student were considered for this study. All the subject were divided into 2 group of 15 each using convenience sampling

4. STUDY DURATION

2 Months

5 CRITERIA FOR SELECTION OF SAMPLES

1. INCLUSIVE CRITERIA

- Hamstring muscle tightness
- Sit and reach test positive
- Medically stable
- Male and females

2. EXCLUSIVE CRITERIA

- Recent hamstring injury.
- Musculoskeletal and neurological dysfunction.
- Recent lower limb injuries and fractures.
- Professional sports players.
- Non cooperative subject

6. MATERIALS

1. Inch tape and yardstick
2. Sit and reach box
3. Stop Watch
4. Powder
5. Towel

7. PARAMETERS

Sit and reach test

Table interest

8. VARIABLES

Independent variables

In this study the independent variable consists of dynamic soft tissue mobilization and classical soft tissue mobilization.

Dependent variable

Hamstrings muscle flexibility measured by sit and reach test is considered as dependent variable.

9. PROCEDURES

1. CLASSIC SOFT TISSUE MOBILIZATION

All subjects were positioned with hip and knee in neutral relaxed position. Each subject received a massage based on traditional Swedish technique on hamstring muscle group. The specific technique included effleurage kneading. Picking up and shaking.

The total massage counted of 5 strokes of each of these techniques and was completed in 5 minutes.

2. DYNAMIC SOFT TISSUE MOBILISATION

Before dynamic intervention subjects received some classic massage technique with same tissue frame of 5 minutes.

The dynamic intervention was divided into hierarchical progression which involved assessment and identification of specific area of hamstrings tightness, the application of reassessment after each technique.

To asses hamstrings muscle group subjects remained in prone position and deep longitudinal strokes were applied to the earlier muscle group. Once specific area of tightness was located remaining treatment was limited to target area.

To execute dynamic intervention subjects was moved into supine with hip and knee flexed in 90 degrees. In this position all dynamic techniques worked hamstrings muscle length from 3 quarters to end range of motion. Deep longitudinal strokes were applied to proximal directions in the area of hamstring tightness when the leg was passively moved to hamstring lengthened positions. Five strokes were applied and 20 seconds of shaking was performed at the completion of these techniques. The specific area of hamstring tightness was not reduced the treatment was stopped.

The same sequence was implemented for the most dynamic technique. During this technique the subject was required to actively extend their leg in order to achieve reciprocal inhibition of hamstrings. In the final technique the subject was required to work the hamstring muscle group eccentrically by creating tension in the therapist hands as muscle was elongated to end range of motion. During this movement therapist performed 5 distal to proximal longitudinal strokes over the hamstring area of muscle tightness.

Overall time to complete the combination of both classic and dynamic intervention is approximately **8 minutes**.

10. STATISTICAL ANALYSIS

To compare the effect of hamstring flexibility student 't' test for paired value.

$$t = \frac{\bar{d}}{S} \sqrt{N}$$

\bar{d} = Mean

S = Standard deviation (S.D)

N = Number of observation

To compare the effects between two groups. Student 't' test for unpaired values .

$$t = \frac{|x_1 - x_2|}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

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

\bar{x}_1 = Means of dynamic soft tissue mobilization group

\bar{x}_2 = Means of classic soft tissue mobilization group

s_1 = Standard deviation of dynamic soft tissue mobilization
Group

s_2 = Standard deviation of classic soft tissue mobilization group

n_1 = Number of observation dynamic soft tissue mobilization
group

n_2 = Number of observation classic soft tissue mobilization group

IV. DATA PRESENTATION

1. TABULATION

SIT AND REACH TEST

TABLE – I

DYNAMIC SOFT TISSUE MOBILIZATION GROUP

S.No	Pre – Test	Post – Test
1	.5	12
2	1.3	10
3	1	15
4	2	20
5	1.5	18
6	2.3	20
7	3.7	25
8	4.3	21
9	3.6	22
10	1.5	19
11	1.2	16
12	0.9	9
13	3.7	27
14	2.1	20
15	4.7	25

TABLE – II
CLASSIC SOFT TISSUE MOBILIZATION GROUP

S.No	Pre – Test	Post – Test
1	1.8	7.8
2	1	10
3	2	15
4	1.6	18
5	1.2	16
6	3.9	20.4
7	2.6	12
8	2.1	16
9	3.5	24
10	3.5	19.5
11	0.8	10
12	2.4	13
13	1.3	10.5
14	2.8	21
15	2.5	15.2

Table I

Mean = 16.3

S.D = 4.30

Paired t test value = 14.4

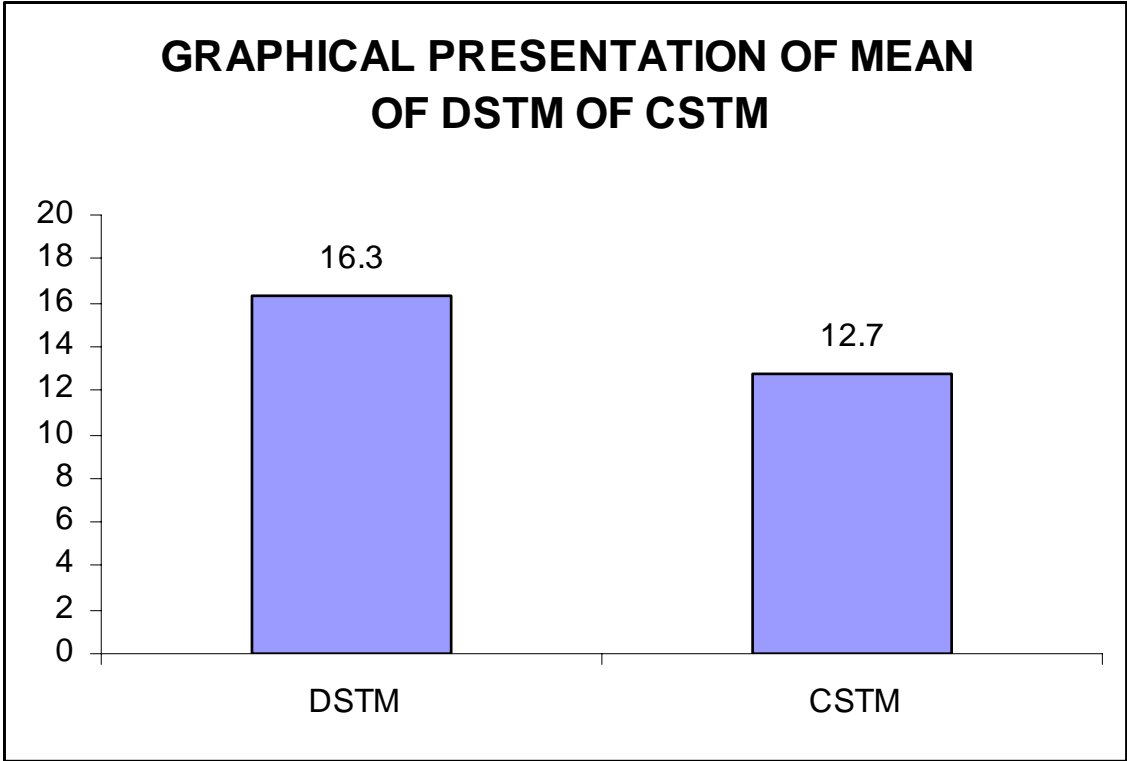
Table II

Mean = 12.7

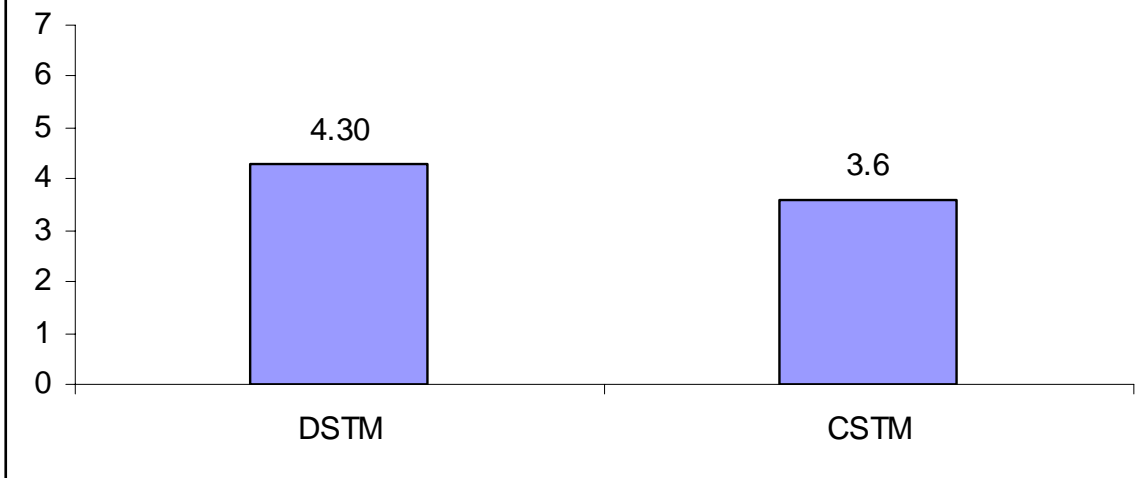
S.D = 3.6

Paired t test value = 13.4

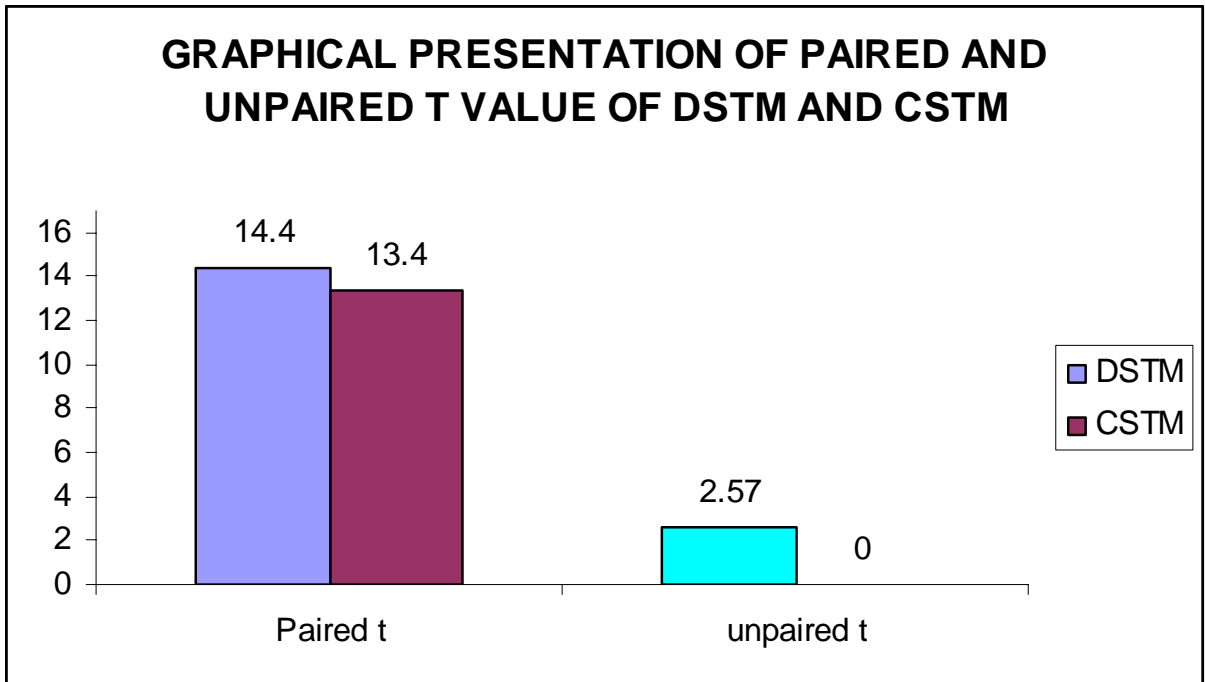
Unpaired t value = 2.57



GRAPHICAL PRESENTATION OF S.D OF DSTM AND CSTM



GRAPHICAL PRESENTATION OF PAIRED AND UNPAIRED T VALUE OF DSTM AND CSTM



V. DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of data in collected from the group dynamic soft tissue mobilization and classic soft tissue mobilization to compare their effectiveness in improving hamstring flexibility collected data were analyzed and tabulated below.

TABLE I

DSTM VS CSTM MEAN AND STANDARD DEVIATION VALUES

Parameters	Mean		S.D	
	DSTM	CSTM	DSTM	CSTM
Sit and reach test	16.3	12.7	4.30	3.6

TABLE II

DSTM VS CSTM PAIRED AND UNPAIRED T VALUE

Parameters	Paired t value		Unpaired t value
	DSTM	CSTM	
Sit and reach test	14.4	13.4	2.57

The table shows the value of paired and unpaired t value of the parameters that was used to assess the hamstring flexibility calculated 't' value $2.57 >$ table value 2.05 .

VI. RESULTS

- The results obtained from statistical analysis indicate that there was an improvement in dynamic soft tissue mobilization in hamstring flexibility.
- The increase hamstring flexibility was seen in all subject received dynamic soft tissue mobilization group and classic soft tissue mobilization.
- By analyzing the mean values, the results showed the subjects who received dynamic soft tissue mobilization are found to be more effective in improving the hamstring flexibility then classic soft tissue mobilization
- By analyzing the value of standard deviation the result showed a significant increase in the subject received dynamic soft tissue mobilization than those who received classic soft tissue mobilization.
- The student t test results shown that dynamic soft tissue mobilization in more reliable than classic soft tissue mobilization in improving the hamstring flexibility in healthy subject.

VII. DISCUSSION

This project is the documentation of the effect of Dynamic soft tissue mobilization on hamstring flexibility in healthy subjects.

A total of 30 students were selected for this study, each using convenience sampling techniques. All the 2 groups were identical before the application of the selected experimental treatments since the obtained t - values are statistically insignificant

During this study, dynamic soft tissue mobilization technique to group-I and classic soft tissue mobilization technique to group-II with an expectation to see whether there is any difference in the outcome measures.

In this study compared the pre-treatment and pos-treatment values of group-I, the results indicated that there is a significant difference in the sit and reach test in the treatment outcome as shown by the t - value. This consistent with the previous studies by [**sport medicine 1995**]

Further, when comparing the pre-treatment and post-treatment values of group-II, there is a significant difference in the Hamstring flexibility which is measured by sit and reach test as shown by obtained t-value. This result consistent with the previous studies by Hooper D. et al (2005)

When comparing the post treatment values of group-I and group-II, subjects in group-I showed significant improvement in the Hamstring flexibility which is measured by sit and reach test as shown by obtained t-values (table-IV) this result is consistent with the previous studies done by Hooper D et al (2005).

This study found that subject who received dynamic soft tissue mobilization achieved significantly greater increase in hamstring flexibility than subject who received only classic soft tissue mobilization.

This study demonstrated that a significant increase in hamstring length could be achieved by identifying a specific area of tightness and targeting treatment to this area using dynamic techniques.

The significant improvement in hamstring flexibility in the subjects who received dynamic soft tissue mobilization technique may be due to

1. The dynamic soft tissue mobilization was 3 minutes longer in duration than the other two interventions. The extra 3 minutes of massage may have influence the results.
2. In the dynamic soft tissue mobilization compound the hamstring muscle growth receives progressive dynamic techniques that work in synchrony as the muscle moves to the end ROM. The dynamic soft tissue mobilization technique eccentrically works the muscle at its functional lengths with the result that hamstring flexibility is optimized.
3. Dynamic STM is a specific structured technique in which the therapist identifies a target area of muscle tightness and focuses the treatment on that specific area while moving it longitudinally under the different muscle contraction parameters.

VIII. LIMITATION

- This study is a small sample study confined to a small number of patient which limits generalization.
- The study in conducted over a shorter period of time. The duration of the study was only 2 months.
- This study demonstrated a significant short term effect on hamstring muscle flexibility but longer term effect need to be established over difference time frames.

IX. RECOMMENDATION

- A similar study can be performed on patient population
- A similar study can be performed with large sample size
- A similar study can be performed for the large duration with follow up
- A similar study can be performed to other muscle groups too.
- For hamstring flexibility in healthy subject. Dynamic soft tissue mobilization can be used as an effective technique to improve muscle length since it is more reliable and accurate.

X. CONCLUSION

Massage is often viewed as a time consuming and a non specific treatment option in clinical practice. The improvements in hamstring flexibility in response to dynamic soft tissue mobilization were achieved with very little additional treatment time compared to classic soft tissue mobilization.

The positive outcome of this study consisted with anecdotal reports on the benefits of dynamic soft tissue mobilization in clinical setting. The unpaired 't' test was used to compare the effectiveness of treatment between two groups.

Based on the statistical analysis there was significant difference in the treatment efficacy in dynamic soft tissue mobilization than Classic soft tissue mobilization.

We here reject the null hypothesis and accepting the alternate hypothesis which states that there was significant difference effects obtained

by the treatment technique between dynamic soft tissue mobilization and classic soft tissue mobilization group.

So it was concluded that dynamic soft tissue mobilization technique is more effective in improving the hamstring flexibility than classic soft tissue mobilization in healthy subject.

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8. **HOPPER *et al.***, concluded significant increase in hamstring flexibility after performing the dynamic soft tissue mobilization program when compare to classic soft tissue mobilization.

APPENDIX

	MEN		WOMEN	
	cm	Inches	cm	inches
SUPER	> + 27	> + 10.5	> + 30	> + 11.5
EXCELLENT	+17 to + 27	+ 6.5 to + 10.5	+ 21 to + 30	+ 8.0 to 11.5
GOOD	+ 6 to + 16	+ 2.5 to + 6.0	+ 11 to + 20	+ 4.5 to 7.5
AVERAGE	0 to + 5	0 to 2.0	-1 to + 10	+ 0.5 to + 4.0
FAIR	-8 to -1	-3.0 to - 0.5	-7 to 0	-2.5 to 0
POOR	-20 to -9	-7.5 to 3.5	-15 to 8	- 6.0 to -3.0
VERY POOR	< -20	< -7.5	< -15	< -6.0

SIT AND REACH TEST



SIT AND REACH BOX



ASSESSMENT CHART

SUBJECTIVE ASSESSMENT

Name :
Age :
Sex :
Occupation :

Chief complaint:

Present medical history:

Past medical history:

Family history:

Personal history:

Socioeconomic status:

Psychological history:

Associated medical problem:

History of pain:

Onset :
Duration :
Nature of pain :
Aggravation factors :
Relieving factor :
Side :
Site :
Severity :

INTENSITY OF PAIN BY VAS

0	1	2	3	4	5	6	7	8	9	10
↓					↓	↓	↓			↓
No pain					Moderate pain					Severe pain

VITAL SIGNS

BP :
HR :
RR :
T⁰ :

ON OBSERVATION

Built :
Swelling :
Gait :

ON PALPITATION

Tenderness :
Spasm :
Muscle wasting :
Warmth :

ON EXAMINATION

Muscle tone :
ROM :
Muscle power :

INVESTIGATION

PROVISIONAL DIAGNOSIS

PT MANAGEMENT

HOME ADVISE