

**“COMPARISON BETWEEN CONVENTIONAL SPINAL
EXERCISES WITH MET AND CONVENTIONAL SPINAL
EXERCISES WITH STRETCHING TO REDUCE PAIN AND
IMPROVE FLEXIBILITY IN LOW BACK PAIN FOR
ATHLETES”**



Registration Number

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**A DISSERTATION SUBMITTED TO
THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY, CHENNAI,
IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE
DEGREE OF MASTER OF PHYSIOTHERAPY**

APRIL 2011

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COLLEGE OF PHYSIOTHERAPY,
TRINITY MISSION AND MEDICAL FOUNDATION,
ULTRA TRUST,
MADURAI,
TAMIL NADU.

Physiotherapy Guide

Medical Guide

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CERTIFICATE

This is to certify that the project entitled **A STUDY ON “COMPARISON BETWEEN CONVENTIONAL SPINAL EXERCISES WITH MET AND CONVENTIONAL SPINAL EXERCISES WITH STRETCHING TO REDUCE PAIN AND IMPROVE FLEXIBILITY IN LOW BACK PAIN FOR ATHLETES”** and was work done by **Ms.E.DIVYA PRASANNA**, a bonafide student of **Master of Physiotherapy (M.P.T.) Final Year student**

The Tamil Nadu Dr. M.G.R Medical University, Chennai.

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PRINCIPAL

**“COMPARISON BETWEEN CONVENTIONAL SPINAL
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Examiners : _____

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Dedicated

To God

My Grandma

And My Parents

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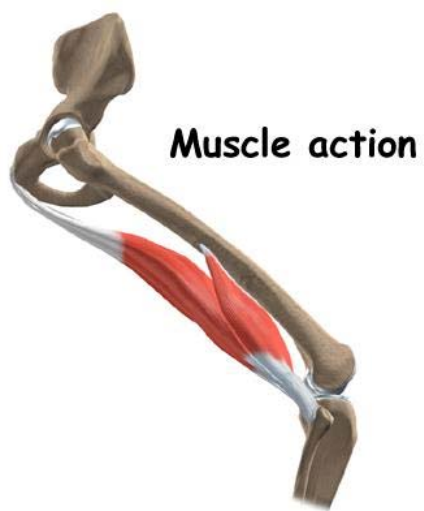
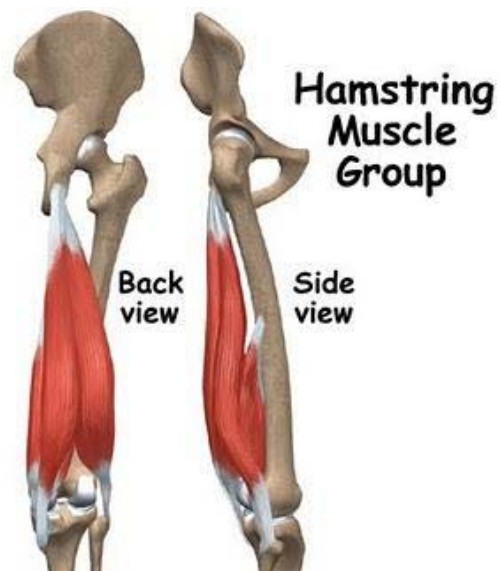
“COMPARISON BETWEEN CONVENTIONAL SPINAL EXERCISES WITH MET AND CONVENTIONAL SPINAL EXERCISES WITH STRETCHING TO REDUCE PAIN AND IMPROVE FLEXIBILITY IN LOW BACK PAIN FOR ATHLETES”

1. INTRODUCTION

“Life is Mobility, Mobility is Life”

Muscle flexibility as the ability of a muscle to lengthen, allowing one joint (or more than one joint in a series) to move through a range of motion and “a loss of muscle flexibility as a decrease in the ability of the muscle to deform” Resulting in decreasing ROM about a joint-
Zachazewski (1989) [13]

Flexibility is a physical fitness attribute and is often evaluated from the joint range of motion (ROM), an essential element of normal biomechanical functioning in sports [1]. Muscle tissue length is thought to play an important role in efficiency and effectiveness of human movement [14].



The lower part of the spine, or the lumbar region, is the region where most people experience back pain. This part of the back carries the weight of the body and the muscles are prone to strain. Inflexibility in the hamstrings can cause back and knee pain and posterior pelvic tilting during weight-training leg exercises ^[17].

Hamstring muscle injuries are one of the most common Musculo-Tendinous injuries in the lower extremity. They occur primarily during high speed or high intensity exercises and have a high rate of recurrence. *Worrel et al* stated that a “lack of hamstring flexibility was the single most important characteristics of hamstring injuries in athletes”^[21].

Muscle energy technique (MET) is defined as a ‘manual therapy procedure which involves the voluntary contraction of patient muscle in a precisely controlled direction, at varying levels of intensity, against a distinctly executed counterforce applied by the operator’. This is also known as **ACTIVE MUSCULAR RELAXATION TECHNIQUE**^[22]. It is claimed to be effective for a variety of purposes including lengthening a shortened muscles, as a lymphatic or venous pump to aid the drainage of fluid or blood and increasing the range of motion^[33].

Physiological principles of Muscle Energy Techniques^[35] are a) Post Isometric Relaxation and b). Reciprocal Inhibition. Critical Components of Muscle Energy Techniques are a) Localization of the Joint, b). Control of Force, c). Balance of Practitioner and Athlete/Patient.

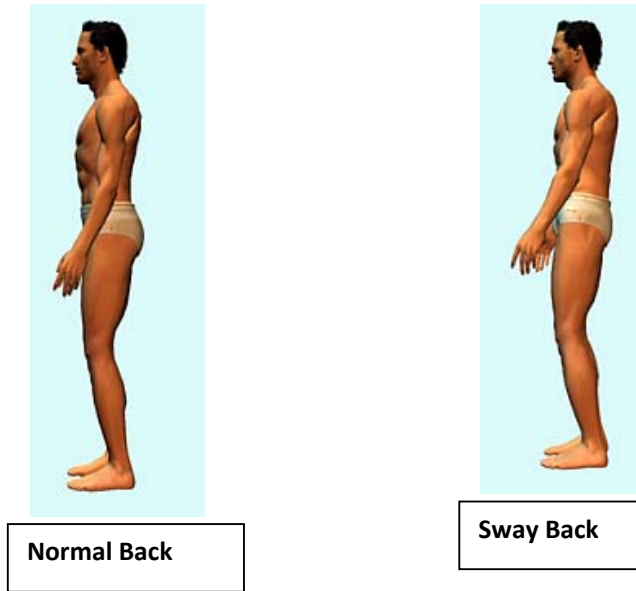
Stretching is used by athletes as a warm up routine, which enhances skilled movements both physiologically by increasing body and muscle temperature and biomechanically by enabling forces to be over greater distance and time^[30].

Every sports person must be fit enough for an event selection. Fitness can be defined easily in a single word as a person's fitness, but it consists of cardio respiratory fitness, muscular strength, endurance, flexibility and range of motion, body composition and nutrition. A person is considered to be fit only if he fulfills all categories.

Physical therapists are very diligent in encouraging athletes to maintain or improve flexibility in order to prevent injury. It would seem that a fine balance between flexibility, tightness and synergistic co-activation of muscle is essential for the prevention of athletic injuries.

This is particularly true for those who have tight, muscles and those engaged in sporting activities that tend to produce muscle imbalances. Such as long distance running (tight hamstring) and basket ball.

PATHOMECHANICS



Normal Back



Top of the long hamstring is attached to the pelvis



Tight hamstrings can cause the hips and pelvis to rotate back



Flattening the lower back and causing back problems



Our spine loses its 'S' shape



Sway Back^[30]

OPERATIONAL DEFINITIONS

STRETCHING:

Is defined as an external force applied either manually or mechanically to lengthen (elongate) shortened soft tissues and structures and there by to increase ROM.

EXTENSIBILITY OF COLLAGEN

It is value of prior to the application of passive stretch designed to mobilize scars or lengthen contractures.

FLEXIBILITY

Flexibility has been defined as the ability of a muscle to lengthen and allows one joint (or more than one joint in a series) to move through a range of motion

MUSCLE ENERGY TECHNIQUE

MET is defined as a 'Manual Therapy Procedure which involves the Voluntary contraction of patient muscle in a precisely controlled Direction, at varying levels of intensity, against a distinctly Executed counterforce applied by the operator'.

STATEMENT OF THE STUDY

Comparison between Conventional Spinal Exercises with MET And Conventional Spinal Exercises With Stretching to Reduce Pain And Improve Flexibility In Low Back Pain For Athletes”

AIM OF THE STUDY

The aim of the study is to compare the effectiveness of stretching and MET to improve the Hamstring flexibility thereby reducing Low Back Pain for Athletes.

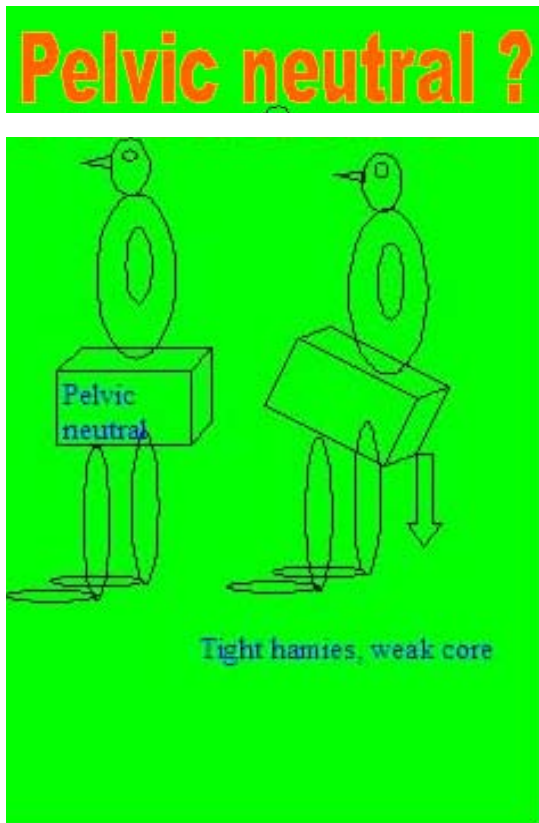
NEED FOR THE STUDY

Low back pain is more common in athletes, which alter the normal mechanics of Spine and Pelvis.

Tight hamstrings can cause the hips and pelvis to rotate back flattening the lower back and causing back problems. Tight hamstring prevent the ipsilateral movement of the pelvis^[12].

Low back pain and pelvic girdle dysfunction, the effects of muscular force transduction are becoming more evident as being an important impairment variable.

The clinician needs to be aware of Newton's third law of 'action-reaction', the effects of *inverse dynamics* and the desire for symmetrical and appropriately timed force dissipation ('damping' and 'propagation') by supporting musculature and are referred to as 'neuromuscular vectors'.



Pain and dysfunction and/or inappropriate physiotherapy can result in excessive stiffness, which compromises the 'fluidity' and range of movement which results in stiffness is the result of non-optimal neuromuscular firing, rather than passive stiffness based on adhesions, scar tissue or degenerative changes. Good clinical assessment with the application of appropriate muscle energy, manual therapy and soft tissue

massage for reduction of pain and muscle spasms, as well as appropriate exercise prescription for strength, endurance and motor control can be used as a management strategy whilst simultaneously ascertaining the 'cause of the cause' of dysfunction.

The subject of this study, however, is stretching the back of the legs, or hamstring muscles, and how that helps prevent or help treat lower back pain. Thus the Purpose of the study is to investigate the effectiveness of Muscle Energy Technique (MET) on tight Hamstring Muscle to increase the Flexibility in Athletes.

Success in sports depends on Athlete's ability to develop and perfect a specific set of coordination and joint range of motion/flexibility.

AIMS AND OBJECTIVES

- 1.** To find out the effectiveness of hamstring stretching along with conventional spinal exercises to reduce the low back pain.
- 2.** To find out the effectiveness of MET in hamstring muscle along with conventional spinal exercises to reduce the low back pain
- 3.** To compare the effectiveness of stretching and MET in hamstring along with conventional spinal exercises to improve the hamstring flexibility thereby reducing the low back pain.

SIGNIFICANCE OF THE STUDY

This study serves as a guideline for Physiotherapists to design an appropriate treatment program for the management of Low Back Pain.

HYPOTHESIS

(i) Null Hypothesis

There is no statistically significant difference between Conventional Spinal Exercises with MET And Conventional Spinal Exercises with Stretching in Reducing Pain and Improving the Hamstring Flexibility in Low Back Pain for Athletes

(ii) Hypothesis

There is statistically significant difference between Conventional Spinal Exercises with MET And Conventional Spinal Exercises with Stretching in Reducing Pain and Improving the Hamstring Flexibility in Low Back Pain for Athletes

2. REVIEW OF LITERATURE

- **AGNUSON S.P. (1998):-**

A single static stretch resulted in 30% visco elastic stress relaxation with repeated stretches made stiffness declined, but returned to the baseline values with in one hour, long term stretching (3 weeks) resulted in increased joint ROM on a result of change in stretch tolerance rather than in the Physical properties.

- **MARIA ZULUAGA (1995):-**

Passive stretching is used to lengthen soft tissues such as muscle, tendon or ligament beyond its resting length. The direction, speed, intensity, and duration of the passive stretch are controlled either by the Physiotherapist or the patient. So that the stretch is applied to the point of discomfort not pain.

- **PATRICK G DE DEYNE ET AL (2001):-**

The increase in ROM after passive stretching may involve biomechanical, neurological and molecular mechanisms and improving ROM may actually be found in the cellular and molecular adaptative mechanism of a muscle fibre.

- **TAYLOR DC ET AL (1990):-**With repetitive stretching (after 4 stretches) there was a little alteration of the muscle tendon length, implying that a minimum number of stretches will lead to more elongation in repetitive stretching. It also states that greater peak tensions and greater energy absorptions occurred as faster stretch rates, suggesting that the risk of injury in a stretching regimen may be related to the stretch rate, and not to actual technique.

- **SEPEGA A A ET AL(1981):-**The muscle tendon unit has been described as having both plastic and elastic properties resulting in the ability to recoil (elastic) or deform permanently (plastic). He also said that on the flexible muscle should be stretched for longer time periods (6- 10 mins) in order to get a significant length again.

- **THOMAS E HYDE :-**

Suggests that if a person is not flexible or tends to have frequent musculoskeletal aches and pains or postural problems a stretching and therapeutic program is very important.

- **MARIA ZULUAGA (1995):-**

Increase in flexibility and decrease in muscle imbalance with a stretching program will help to improve the athletes exercise tolerance and decrease the likelihood of injury.

- **ROY. S. IRWIN , (1982) ; ANDERSON ET AL (1990):-**

Stretching of hamstring preferably dynamic range of motion is helpful in preventing injuries

- **BONDY AND IRION (1997):-**

Indicated from their examinations that 30 and 60 seconds of static stretching were more effective at increasing hamstring muscle flexibility.

- **WILLIAM D STANISH ET AL (1982):-**

Enhanced flexibility achieved through stretching allows the muscle tendon unit greater properties of compliance for a given load, this greater compliance allow the muscle to deform and recoil, achieving the ideals of improved work without structured breakdown.

- **JAMES ZACHAZEWSKI ET AL (1996):-**

Flexibility refers not only to the Range of Motion available in a joint but includes the extensibility of the Musculo-Tendinous unit.

- **YENCHEN LI ET AL (1996) :-**

Suggested that a 8 week programme of hamstring muscle stretching will produce greater forward bending as a result of increased motion of the hips and may alter the pattern of lumbar and hip motion during forward bending.

- **JOHN. V. BASMAJIAN, 1982:-**

Hamstring stretching decreases pain, restores functions and provides increased extension of Hip joint

- **BONDY W D IRION (1994):-**

Said that at increased flexibility of hamstring muscle can be determined by increased ROM of knee extension.

- **WORREL TW (1994):-**

Concluded that increasing hamstring flexibility way an effective method for increasing hamstring muscle performance at selective is kinetic conditions.

- **LIEBENSON (2000) :-**Observed that to prevent musculoskeletal injury and dysfunction the individual needs to avoid undue mechanical stress (excessive adaptive demands), while at the same time improving flexibility and stability in order to acquire greater tolerance to acquire greater tolerance to strain.

- **CHAITOW & DELANY (2005):-**

MET Benefit will usually emerge if any treatment reduces the overall stress load to which the person is adapting (whether this be chemical, psychological, physical, or a combination of these), or if the person's mind-body can be helped to cope adapt more efficiently to that load.

- **BALLANTYNE F ET AL (2003):-**

Suggested that a single application of MET to hamstring produced no biomechanical change to the muscle, but created a change in tolerance to stretch.

- **MOHD. WASEEM, SHIBILI NUHMANI AND C. S. RAM (2009)**

MET group were able to increase the popliteal angle i.e. improvement in the hamstring flexibility. This technique is very simple and can be easily used voluntarily on those who are experiencing lack of muscle flexibility.

- **CATHERINE ORTEGA, EDD, PT, (2007):-**

Therapeutic effects that occur with the MET procedure such as increased joint motion, stretch of shortened fascia, removal of passive congestion, and normalization of muscle length. An added bonus is that these procedures are physiologically and anatomically safe and can be performed in acute stages of pain when patients may have high levels of muscle guarding and pain.

3. MATERIALS AND METHODOLOGY

STUDY DESIGN

Design

Pretest

Experimental design:

Conventional Spinal Exercises along with MET to increase hamstring muscle flexibility in the low back pain

Control design:

Conventional Spinal Exercises along with Stretching to increase hamstring muscle flexibility in the low back pain

Post test

Experimental design:

Conventional Spinal Exercises along with MET to increase hamstring muscle flexibility in the low back pain

Control design:

Conventional Spinal Exercises along with Stretching to increase hamstring muscle flexibility in the low back pain

Subject

Number of subjects: 30

Experimental group: 15

Control group: 15

Place Of Study

Devadoss Multispecialty Hospital-Madurai

Sampling

Simple Random Sampling Technique.

Inclusion Criteria

- Male athletes are included
- Localized back pain
- Duration of Pain less than or equal to 3 months
- All athletes between the age group 20 – 30 years

Exclusion Criteria

- Female athletes
- Sciatica symptoms
- Age > 20 and more than 35
- Cardiac patient
- Pathological diseases like TB etc.,
- Medical Diseases like renal stones, urinary tract infection etc.,

Pilot Study

- ❖ In Pilot study, Pain score and Sit and Reach Test study was undertaken on GD athletes by two Physiotherapists.
- ❖ After checking the reliability, Dissertation was started.

Materials used

Visual Analogue Scale

Inch Tape

Selection of Variables

- Dependent variable – Pain.
- Independent variables – Muscle Energy Techniques, Hamstring Stretching, Conventional spinal exercises.

Duration of Study

The study was conducted over a period of Three (3) months.

Study Method

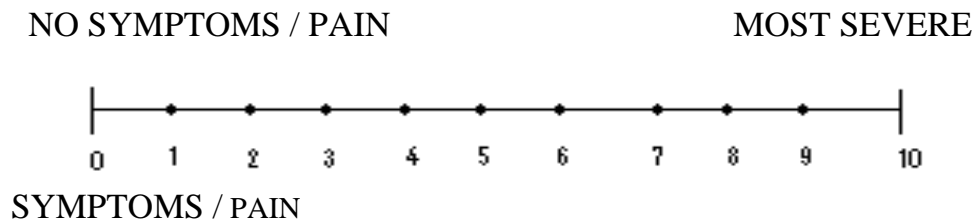
Parameters

Pain

The patient's pain level is assessed by marking on a Numerical rating scale at the start of treatment and end of the treatment.

❖ Numerical rating Scale

The client rates the pain on a scale that has no sub division.



A Numerical rating scale for measuring pain or other symptoms. The patient is instructed to mark the line at the point that corresponds to the degree of pain or severity of symptoms that are experienced.

SIT AND REACH TEST :

The sit and reach test is the most common flexibility test. It measures the flexibility of the **lower back** and **hamstrings** using inch tape measures the distance between middle finger and great toe

1. Ask the Patient to Sit on the floor with your back and head against a wall. Legs should be out straight ahead and knees flat against the floor.
2. Place the box flat against the feet (no shoes). Keep the back and head against the wall stretch your arms out towards the box.



3. Measure the distance between the middle finger and great toe (which is placed on the box).

4. Lean forward slowly as far as possible keeping the fingertips level with each other and the legs flat. Head and Shoulders can come away from the wall. Do not jerk or bounce to reach further.



5. Slowly reach the foot forward 3 times. On the third attempt reach as far as possible and hold for 2 seconds. Training partner measure the distance in centimeters. Repeat twice and compare the best value.

TREATMENT PROCEDURE

This study consists of 30 samples; proper explanation was given to the patients, before performing the assessment, data collection and treatment.

GROUP A:

CONVENTIONAL SPINAL EXERCISES ALONG WITH MET EXERCISES

- ❖ Fifteen samples who satisfies the inclusion criteria were selected from the population by convenient sampling technique.

- ❖ A brief explanation was given to the patient about the condition, treatment and its uses.

- ❖ A separate assessment Performa as used to assess the patient and to take the pretest and post test score of pain score and sit & reach test.

❖ Muscle Energy Technique was then applied to the experimental group. The subject's knee was extended to the first report of hamstring discomfort and a moderate isometric contraction (approx 75% of maximal) of the hamstring muscle was then elicited for a period of five seconds. After a period of three seconds relaxation, the technique was repeated three times (for a total of four contractions).

❖ **METs for hamstring** ^[10]:-

1. Therapist sits or kneels near the side of the patient.
2. Make the patient in supine lying. Bend the hip and knee in 90⁰ and Place one hand on the Ankle and other hand on the Knee.



3. Bring the leg up straight at the knee. Find the barrier point in the thigh or buttock.

4. Take a breath in and hold it, using 25% of maximum effort, push away from the body with the leg, whilst the therapist hands resist, producing an isometric contraction over the next FIVE seconds.

5. Let the breath go quickly, relaxing the leg muscles. During the next THREE seconds pull the leg closer towards the athletes to find the new barrier point.



6. Do no.3 to no.4 several times until the athletes able to get the knee closer to the face. The patient may not be able to keep the knee totally straight, but try the best.

7. Repeat no.1 to no.5 for the next leg.

8. Do the stretch with foot and ankle relaxed it will not be too difficult. Add a little extra, try to bend the ankle so that the toes are pointing towards the face. Then the patient will feel an extra pull in the thigh and calf indicating that the sciatic nerve is being stretched a little more.

❖ Then followed with Conventional Spinal Exercises and home exercises for a period of Three Weeks and application of once a day for the duration of forty minutes.

❖ Finally, post-test score taken after treatment also same as pre test score and reading to be recorded.

GROUP B:

CONVENTIONAL SPINAL EXERCISES ALONG WITH STRETCHING EXERCISES

- ❖ Fifteen samples that satisfy the inclusion criteria were selected from the population by convenient sampling technique.

- ❖ A brief explanation was given to the patient about the condition, treatment and its uses.

- ❖ A separate assessment Performa as used to assess the patient and to take the pretest and post test score of pain score and sit & reach test.

- ❖ The subjects were subjected to stretching passively initially. Conventional Spinal Flexion Exercises followed by Self Stretching for a period of Three Weeks and application of once a day for the duration of forty minutes.

❖ **STRETCHING GUIDELINES** ^[25]

For safety and for maximizing the potential benefits of stretching.

- Breathe. Don't hold your breath.
- Never force a stretch beyond the point of mild discomfort. Never feel any sharp or sudden pain.



- Stretching for a few minutes each day will gradually build flexibility and range of motion.
- Wear loose comfortable clothing.
- Start with 10-15 seconds and extend this by 5 seconds each week until you can hold a stretch for at least 30 seconds.



5. DATA PRESENTATION AND ANALYSIS

GROUP A - PAIN

S.No	Pre Test	Post test	Difference X_1	$d_1 = X_1 - \bar{X}_1$	$d_1^2 = (X_1 - \bar{X}_1)^2$
1	6	1	5	0.6	0.36
2	4	0	4	-0.4	0.16
3	5	2	3	-1.4	1.96
4	5	1	4	-0.4	0.16
5	6	2	4	-0.4	0.16
6	7	1	6	1.6	2.56
7	6	1	5	0.6	0.36
8	5	0	5	0.6	0.36
9	6	2	4	-0.4	0.16
10	7	2	5	0.6	0.36
11	6	2	4	-0.4	0.16
12	5	0	5	0.6	0.36
13	8	4	4	-0.4	0.16
14	7	2	5	0.6	0.36
15	5	2	3	-1.4	1.96
		Total	66		9.6

GROUP B – PAIN

S.No	Pre test	Post test	Difference X_2	$d_2 = x_2 - \bar{x}_2$	$d_2^2 = (x_2 - \bar{x}_2)^2$
1	8	3	5	1.6	2.56
2	5	2	3	-0.4	0.16
3	4	1	3	-0.4	0.16
4	3	0	3	-0.4	0.16
5	7	3	4	0.6	0.36
6	6	3	3	-0.4	0.16
7	4	1	4	0.6	0.36
8	3	0	3	-0.4	0.16
9	3	0	3	-0.4	0.16
10	4	1	3	-0.4	0.16
11	6	3	3	-0.4	0.16
12	8	4	4	0.6	0.36
13	3	0	3	-0.4	0.16
14	4	1	3	-0.4	0.16
15	7	3	4	0.6	0.36
		Total	51		5.6

GROUP A – SIT & REACH TEST

S.No	Pre test	Post test	Difference X_1	$d_1 = X_1 - \bar{X}_1$	$d_1^2 = (X_1 - \bar{X}_1)^2$
1	12	3	9	1.4	1.96
2	13	3	10	2.4	5.76
3	10	1	9	1.4	1.96
4	11	3	8	0.4	0.16
5	12	3	9	1.4	1.96
6	9	2	7	-0.6	0.36
7	9	2	7	-0.6	0.36
8	8	2	6	-1.6	2.56
9	7	1	6	-1.6	2.56
10	6	0	6	-1.6	2.56
11	6	0	6	-1.6	2.56
12	8	1	7	-0.6	0.36
13	9	2	7	-0.6	0.36
14	12	3	9	1.4	1.96
15	12	4	8	0.4	0.16
		Total	114		25.6

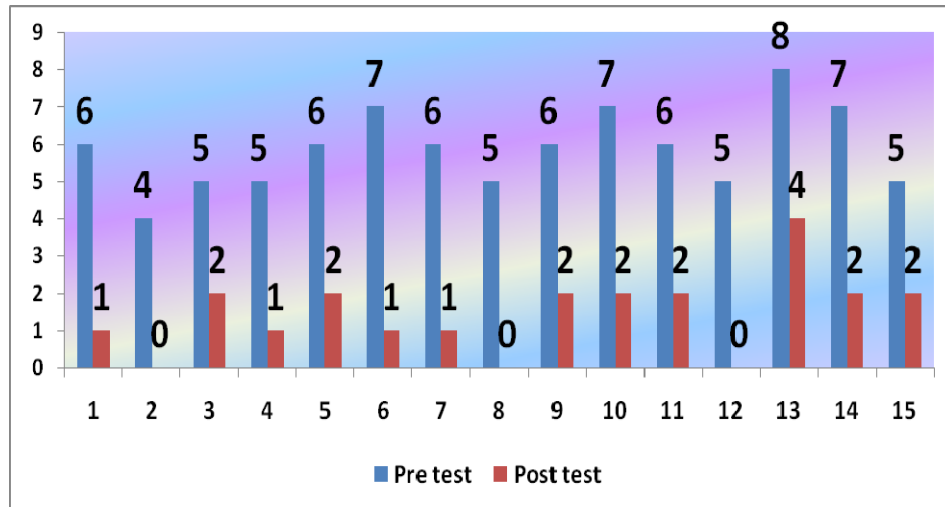
GROUP B - SIT & REACH TEST

S.No	Pre test	Post test	Difference X_2	$d_2 = x_2 - \bar{x}_2$	$d_2^2 = (x_2 - \bar{x}_2)^2$
1	6	1	5	-0.07	0.0049
2	8	4	4	-1.07	1.1449
3	12	4	8	2.93	8.5849
4	6	2	4	-1.07	1.1449
5	11	4	7	1.93	3.7249
6	9	3	6	0.93	0.8649
7	5	0	5	-0.07	0.0049
8	6	1	5	-0.07	0.0049
9	10	4	6	0.93	0.8649
10	7	2	5	-0.07	0.0049
11	9	5	4	-1.07	1.1449
12	7	2	5	-0.07	0.0049
13	8	4	4	-1.07	1.1449
14	9	4	5	-0.07	0.0049
15	8	5	3	-2.07	4.2849
		Total	76		22.9335

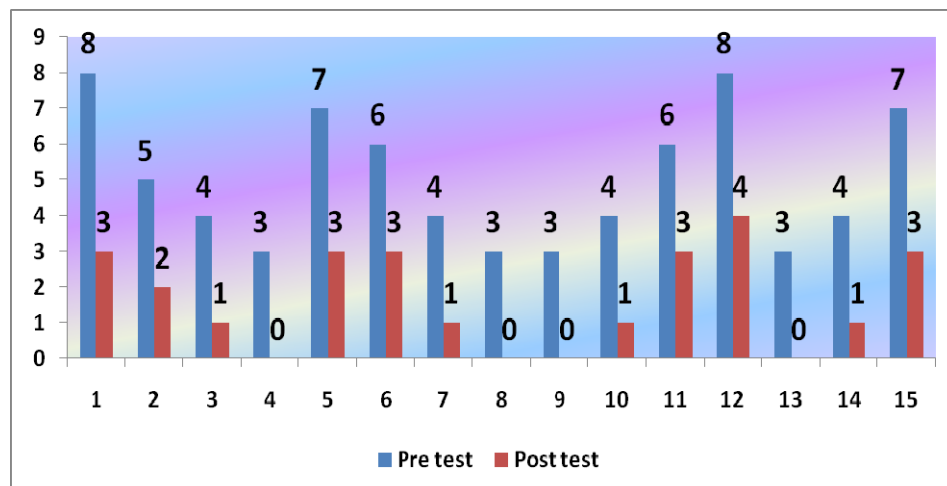
GRAPHICAL REPRESENTATION

PRE AND POST TEST SCORES

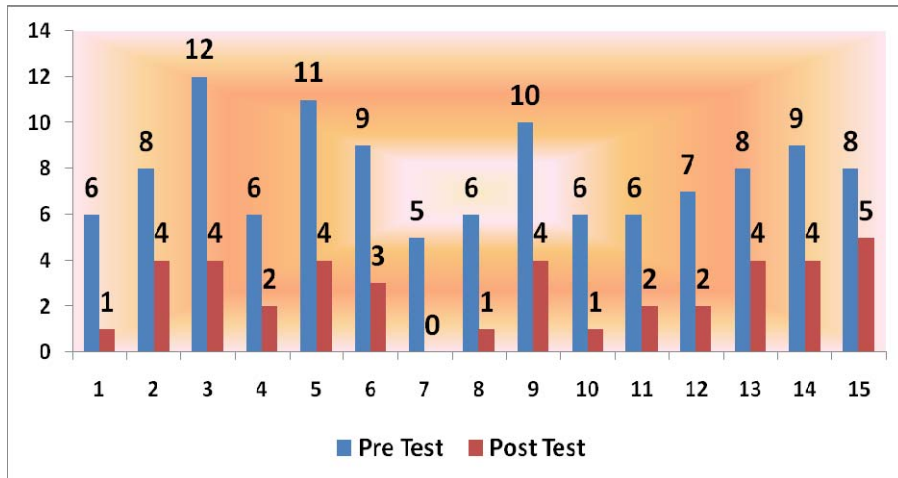
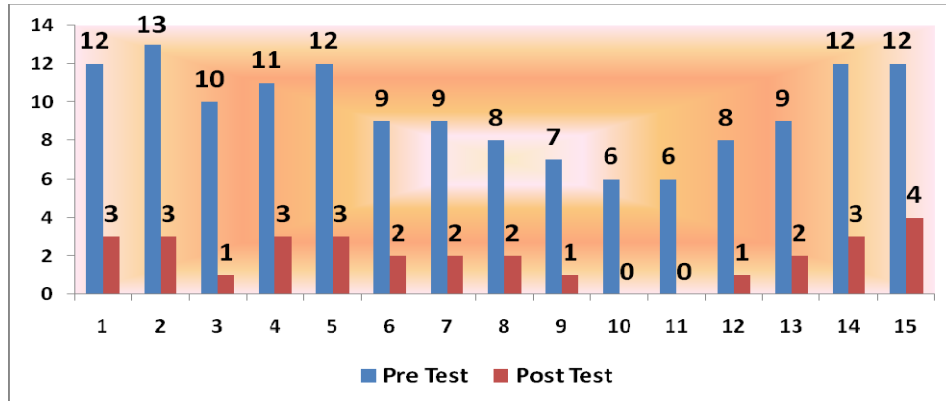
GROUP A:- PAIN



GROUP B:-PAIN



GROUP A:-SIT & REACH



GROUP B: SIT & REACH

STATISTICAL TOOLS

Formula for paired - t – test

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$SE = \frac{S}{\sqrt{n}}$$

$$t = \frac{\bar{X}}{S / \sqrt{n}}$$

X = Pain relief score obtained And Sit & Reach Test Score obtained

\bar{X} = Average pain relieve score for the population. And Average sit & reach test score for the population

n = Number of subjects.

SD = Standard deviation.

SE = Standard error.

t = Critical ratio.

Formula for independent - t - test

$$s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

$$SE = s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$t = \frac{\overline{X}_1 - \overline{X}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

X_1 = Pain relief Score for Group A. And Sit & Reach Test Score for Group A

X_2 = Pain relief Score for Group B. And Sit & Reach Test Score for Group B

\overline{X}_1 = Average Pain relief score of Group A. And Average Sit & Reach Test Score for Group A

\overline{X}_2 = Average Pain relief score of Group B. And Average Sit & Reach Test Score for Group B

n_1 = Number of Subjects in Group A.

n_2 = Number of Subjects in Group B.

s_1 = Standard deviation of Group A.

s_2 = Standard deviation of Group B.

SE = Standard error.

t = Critical ratio.

5. RESULTS AND DISCUSSION

RESULTS

Paired 't' test results-Pain

Group A (conventional spinal exercises along with met exercises)

t - calculated value	t - table value
20.580	2.145

t calculated value > t – table value.

20.580

(for 14 degrees of freedom at P = 0.05 level of significance)

Hence research hypothesis is accepted.

Group B (conventional spinal exercises along with stretching exercises)

t - calculated value	t – table value
20.821	2.145

t - calculated value > t – table value.

20.821

(for 14 degrees of freedom at P = 0.05 level of significance)

Hence research hypothesis is accepted

Paired 't' test results-Sit & Reach

Group A (conventional spinal exercises along with met exercises)

t - calculated value	t - table value
21.714	2.145

t calculated value > t – table value.

$$21.714 > 2.145$$

(for 14 degrees of freedom at P = 0.05 level of significance)

Hence research hypothesis is accepted.

Group B (conventional spinal exercises along with stretching exercises)

t - calculated value	t – table value
15.364	2.145

t - calculated value > t – table value.

$$15.364 > 2.145$$

(for 14 degrees of freedom at P = 0.05 level of significance)

Hence research hypothesis is accepted.

Independent 't' test results: Pain

(Comparison between conventional spinal exercises along with MET exercises / conventional spinal exercises along with stretching exercises)

t - calculated value	t – table value
3.7175	2.05

t – calculated value > t – table value.

$$3.718 > 2.05$$

(For 29 degrees of freedom at P = 0.05 level of significance)

Hence research hypothesis is accepted.

Independent 't' test results: Sit & Reach Test

(Comparison between conventional spinal exercises along with MET exercises / conventional spinal exercises along with stretching exercises)

t – calculated value	t – table value
5.260	2.05

t – calculated value > t – table value.

$$5.260 > 2.05$$

(For 29 degrees of freedom at P = 0.05 level of significance)

Hence research hypothesis is accepted.

DISCUSSION

- ❖ This study was done with 30 samples. The subjects were selected with mechanical low back pain strain.

- ❖ In Group A, the study was done with 15 Samples and was treated with conventional spinal flexion exercises and METs to Hamstring muscle.

- ❖ Muscle Energy Techniques helps the athletes to improve the flexibility and restore the strength of he muscle.

- ❖ Post isometric relaxation helps in reducing the muscle spasm and maintain the muscle length.

- ❖ In Group B, the study was done with 15 Samples and was treated with conventional spinal flexion exercises and Stretching of Hamstring muscle.

- ❖ The pain reduction and improvement in hamstring flexibility were measured as variables in this study.

- ❖ The effectiveness and therapeutic outcome were measured and analyzed by statistical interference.

- ❖ The statistical results were shows that Hamstring extensibility helps in reduction of low back pain and maintains the normal mechanics of lumbar spine and pelvis.

- ❖ This study also states that, hamstring muscle stretching will produce greater forward bending as a result of increased motion of the hips and may alter the pattern of lumbar and hip motion during forward bending and was supported by *YENCHEN LI ET AL (1996)^[11]*

- ❖ AGNUSON S.P. (1998) supported that A single static stretch resulted in 30% visco elastic stress relaxation but returned to the baseline values with in one hour, thus he did long term stretching (3 weeks) which resulted in increased joint ROM on a result of change in stretch tolerance rather than in the Physical properties.

- ❖ Increase in flexibility and decrease in muscle imbalance with a stretching program will help to improve the athletes exercise tolerance and decrease the likelihood of injury was supported by MARIA ZULUAGA (1995) .

- ❖ BONDY AND IRION (1997) identified that 30 and 60 seconds of static stretching were more effective at increasing hamstring muscle flexibility.

- ❖ CATHERINE ORTEGA, EDD, PT, (2007) in his research he found the Therapeutic effects that occur with the MET procedure such as increased joint motion, stretch of shortened fascia, removal of passive congestion, and normalization of muscle length. He has found that An added bonus is that these procedures are physiologically and anatomically safe and can be performed in acute stages of pain when patients may have high levels of muscle guarding and pain.

- ❖ When a joint has restricted movement, no amount of massage will correct this problem until these restrictions are first addressed and removed. Muscle Energy Technique helps to restore the full range of movement to frozen joints and aids in the strengthening of the associated muscles.

- ❖ Improving and maintaining the flexibility in our hamstrings can remove tension from our pelvis and allow it to return and remain in its natural position. This allows our spine to resume its neutral 'S' shape where it is strong and healthy. The flexibility of our hamstrings and their contribution to relief from lower back pain and injury requires regular hamstring stretching.

- ❖ **Godges JJ** et al. suggest that (1) six treatment sessions of passive stretching were sufficient to improve hip extension ROM; (2) 3 weeks of exercises performed daily improved trunk flexor muscle performance; and (3) training of isolated tasks, such as hip flexibility or trunk strengthening activities, did not produce the desired outcome in the economy of walking or running.

6. SUMMARY AND CONCLUSION

SUMMARY

- ❖ 80 percent of people who present with lower back pain have tight hamstrings as the root of their problem By Dr.Ben Kim.

- ❖ More susceptible to tearing. If you force a muscle to go further than it can normally go at speed it is likely to tear.

- ❖ Tight hamstrings can cause the hips and pelvis to rotate back flattening the lower back and causing back problems.

- ❖ If muscles have tightened up then blood has been squeezed out of them therefore muscles are working at less than 100 % of capacity and performance will be down as a result.

- ❖ The flexibility of our hamstrings and their contribution to relief from lower back pain and injury requires regular hamstring stretching.

- ❖ Regular sports massage and stretching to improve muscle condition will not only reduce the likelihood of injury but may also improve sporting performance ^[40].

CONCLUSION

- ❖ According to Hall & Brody (1999) the stimulus for sarcomere length changes may be the amount of tension along the myofibril or the myotendon junction, with high tension leading to an addition of sarcomeres and low tension causing a decrease.
- ❖ Researchers have reported immediate hamstring length and ROM increases from 3⁰ (Ballantyne et al 2003) ^[34] to 33⁰ (Magnusson et al 1996c) ^[16] following MET or similar methods.
- ❖ It has been suggested that hamstring strength should be 60% to 70% that of the antagonist quadriceps to help prevent hamstring injuries was supported by Greg Gardner Ed.D., et al.

❖ **MET** reduces the overall stress load to which the person is adapting and or person's mind-body can be helped to cope adapt more efficiently to that load was determined by **CHAITOW & DELANY (2005)**.

❖ **BALLANTYNE F ET AL (2003)** Suggested that a single application of MET to hamstring produced no biomechanical change to the muscle, but created a change in tolerance to stretch. Thus elastic property of an muscle is maintained .

❖ MET group were able to increase the popliteal angle i.e. improvement in the hamstring flexibility. This technique is very simple and can be easily used voluntarily on those who are experiencing lack of muscle flexibility was supported by **MOHD. WASEEM, SHIBILI NUHMANI AND C. S. RAM (2009)**.

- ❖ To prevent musculoskeletal injury and dysfunction the individual needs to avoid undue mechanical stress, at the same time improving flexibility and stability in order to acquire greater tolerance to strain is maintained by Muscle Energy Techniques.

- ❖ Muscle Energy Technique is used by athletes as a preventive measure to guard against further muscle and joint injury and reduce the spasm and maintain the muscle length which helps in reducing pain and improving the flexibility of Low Back.

7. LIMITATIONS AND RECOMMENDATIONS

LIMITATIONS

- ❖ Study was done for the male athletes only.
- ❖ Age group limited to 20 to 30 yrs
- ❖ As MET principles is combined with isometrics, cardiac patients excluded.

RECOMMENDATIONS

- ❖ Study can be done with female athletes also.
- ❖ Along with MET, core stability exercises with swiss ball also helps in strengthening the back.
- ❖ Prior to MET, Trigger Point Release helps the hamstring to restore the flexibility.

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9. APPENDIX: I

PROFORMA

“Comparison Between Conventional Spinal Exercises With MET And Conventional Spinal Exercises With Stretching To Reduce Pain And Improve Flexibility In Low Back Pain *For Athletes*”

Reg.No :-

Name: -

Age: -

Sex:-

Occupation:-

Address:-

Chief Complaints/ Present History:-

Past History:-

Repeated Episodes of Back Pain:-

Treatment Underwent:-

Orthosis Used:-

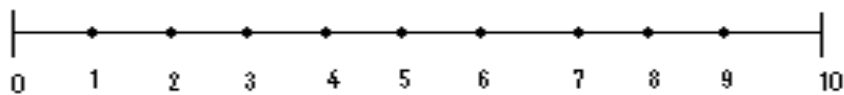
Athlete's Experience:-

EXAMINATION

Pain:

NO SYMPTOMS / PAIN

MOST SEVERE



SYMPTOMS / PAIN

EXAMINATION

Sit & Reach Test:

Measures	Pretest	Post test
Pain (VAS)		
Sit & Reach Test		

The following table is data from the American College of Sports Medicine (1995) for performance in the sit and reach test:

Sit and Reach Test Scores								
Percentile Rank	Men				Women			
	20-29 years		30-39 years		20-29 years		30-39 years	
	in.	cm	in.	cm	in.	cm	in.	cm
99	>23.0	>58	>22.0	>56	>24.0	>61	>24.0	>61
90	21.75	55	21.0	53	23.75	60	22.5	57
80	20.5	52	19.5	50	22.5	57	21.5	55
70	19.5	50	18.5	47	21.5	55	20.5	52
60	18.5	47	17.5	44	20.5	52	20.0	51
50	17.5	44	16.5	42	20.0	51	19.0	48
40	16.5	42	15.5	39	19.25	49	18.25	46
30	15.5	39	14.5	37	18.25	46	17.25	44
20	14.5	37	13.0	33	17.0	43	16.5	42
10	12.25	31	11.0	28	15.5	39	14.5	37
01	<10.5	<27	<9.25	<23	<14.0	<36	<12.0	<30

PHYSIOTHERAPY MANAGEMENT:

FIRST WEEK:

AFTER THREE MONTHS:

CONSENT FORM

I have been informed about the procedure and purpose of the study. I have understood that I have the right to refuse my consent or withdraw it any time during the study without adversely affecting my treatment.

I am aware that being subjected to this study I will have to give my time for assessment and treatment and this assessment do not interfere with the benefit.

I -----, the undersigned give my consent to be a participant of this investigation / study program / clinical trail.

Signature of the Guide

Signature of Athlete

(Name & Address)