



# THE IMMEDIATE EFFECT OF FOAM ROLLING IN PARASPINAL MUSCLE SPASM AND PAIN IN UNDERGRADUATE PHYSIOTHERAPY STUDENTS WITH GENERALIZED MECHANICAL LOW BACK PAIN.

**Dr. Ketaki Kurulkar** Student Of Modern College Of Physiotherapy,Pune,Maharashtra, India.

**Dr.Chetali Paliwal** Assistant Professor Modern College Of Physiotherapy,Pune Maharashtra, India.

**Dr. Sucheta Golhar** Principal Modern College Of Physiotherapy ,Pune Maharashtra, India.

## Abstract

**Objective :** Aims to find the immediate effect of foam rolling in paraspinal muscle spasm and pain in undergraduate physiotherapy students with generalised mechanical low back pain.

**Methodology:** Study had begun with the presentation of synopsis to the ethical committee in PES MCOP. A consent form was taken from the final years and interns from the various colleges in and around the city. 50 subjects were selected on the basis of their inclusion and exclusion criteria . Pre NPRS score analysis was done, pre MMST score analysis for flexion and extension was done . Foam rolling protocol was given to subjects for immediate effect. Post NPRS score and post MMST score for flexion and extension were analyzed. Data entered and analyzed.

**Result :** Paired Test was done . There was significant effect of foam rolling on paraspinal muscle spasm and pain . P value obtained was ( $< 0.0001$ ) and T value was ( 11.44, 14.127, 11.782 for NPRS, MMST for flexion and extension respectively.)

**Conclusion :** There was significant immediate effect of foam rolling in paraspinal muscle spasm and pain in undergraduate physiotherapy students with generalised mechanical low back pain.

**Keywords :** Foam rolling, pain , muscle spasm, mechanical low back pain.

## 1. INTRODUCTION

World-wide estimates of lifetime prevalence of low back pain vary from 50 to 84 percent. Occupational LBP relates to exposure to workplace hazards and incurs high cost to society in terms of health care, loss of productivity, workplace as well as individuals pain and sufferings. Thus, prevention of occupational LBP is a key research concern<sup>(1)</sup>

Mechanical low back pain refers to back pain that arises intrinsically from the spine, Intervertebral discs , surrounding soft tissues . This includes lumbosacral muscle strain , Disc herniation, lumbar spondylosis, spondylolisthesis, vertebral compression fractures.Repetitive trauma and overuse are common causes of chronic mechanical low back pain.

LBP is commonly treated by physiotherapists. however, physiotherapists themselves have been reported as being sufferers. These professionals routinely perform some activities that could be a risk factors for development of back pain like manual therapy such as soft tissue mobilization, transferring dependent patients, assisting patients in gait, providing manual resistance, assisting with mat activities, lifting heavy equipment<sup>(2)</sup>

Students aged 20 and 21 were more at a risk of LBP than younger or older students. Students aged 20-21 mostly reflected those students who had entered the physiotherapy program straight from high school, and were in the final year of the program. The physiotherapy students are 2.51 times more likely to have in a sample composed of medical and physiotherapy students. These findings suggests that preventive activities should be performed during the undergraduate physiotherapy program in order to alleviate or minimize the impact of LBP in these students.<sup>(2)</sup>

In recent years, self-myofascial release (SMR) has been widely used in clinical and sports settings. SMR is a self-treatment method involving the application of compressive forces to soft tissue. It claims to mimic the effects of manual therapy techniques and aims to address the soft tissue dysfunction.<sup>(3)</sup> The foam roller is a device commonly used for SMR, is also a popular device in sports and physical therapy.

Rolling induces pressure and friction on the treated muscle, skin, and fascia, and compression of muscle and surrounding fascial tissues may stimulate the activity of contractile cells, affecting tissue hydration or the mechanical properties of muscle fibers, thereby altering the stiffness of the tissue. Stable cross bridges, formed between actin and myosin, are also thought to be one of the factors affecting muscle stiffness.<sup>(3)</sup>

Commercial foam roller available in two sizes

standard (6-inch x 36 inch)

half size (6-inch x 18 inch)

## 2. NEED OF STUDY

Considering the high prevalence of non-specific mechanical low back pain in the undergraduate physiotherapy students (Lifetime-45.5%, 12Month-32.5%, 1Month-17.7%, 1Week-11.5%) there is a need to study the immediate effect of foam roller in reducing paraspinal muscle spasm and pain.

These students are potentially exposed to the same LBP occupational risks due to poor working postures, frequent manual handling activities.

People who report low back pain have often reduced ROM.

Despite years of research directed at the prevention of low back pain in adults, the incidence remains the high and the need for early intervention has been identified.

Thus, the study was conducted.

## 3. AIM

To reduce the paraspinal muscle spasm and pain in undergraduate physiotherapy students.

## 4. OBJECTIVE

To reduce the paraspinal muscle spasm and pain in undergraduate physiotherapy students.

To study the immediate effect of foam roller in reducing pain by using NPRS.

## 5. HYPOTHESIS

**Null hypothesis(H0):** There will be no immediate effect of foam roller in paraspinal muscle spasm and pain in undergraduate PT students.

**Alternate hypothesis (H1):** There will be an immediate effect of foam roller in paraspinal muscle spasm in undergraduate PT students.

**Alternate hypothesis (H2):** There will be an immediate effect of foam roller in reducing pain in undergraduate PT students.

## 6. METHODOLOGY

SAMPLE SIZE: 50

STUDY DESIGN: Experimental study

SAMPLING METHOD: Convenient sampling.

STUDY POPULATION: Undergraduate PT students (both males and females between 18 to 25 years.)

STUDY SETTING: Undergraduate PT students in and around colleges.

TREATMENT DURATION: 9 to 10 Min.

STUDY DURATION: 6 month

## 7. CRITERIA

### INCLUSION CRITERIA:

- Individuals age 18 to 25 years<sup>(1,11)</sup>
- Both males and females
- Students of final year and interns in undergraduate physiotherapy course<sup>(1,11)</sup>
- Works for 3-7 Hours daily<sup>(1,11)</sup>
- Back pain for 3 to 6 weeks.<sup>(10)</sup>
- Pain intensity 4 to 7 on NPRS<sup>(9)</sup>

### EXCLUSION CRITERIA:

- Recent surgery of pelvis, spine
- Malunited fracture of spine, upper limb.
- Deformities of spine.
- Tumor, infection to spine.
- Neurological conditions such as radiculopathy, sciatica. Subjects currently taking any physiotherapy for low back pain.
- Menstruating females.

## 8. MATERIAL

- Pen
- Paper
- Measuring tape
- Foam roller
- Yoga mat
- Stop watch
- Consent form
- Numerical pain rating scale.

## 9. OUTCOME MEASURES

### 1) NUMERICAL PAIN RATING SCALE (NPRS): –

- The Numeric Pain Rating Scale (NPRS) (an outcome measure) that is a unidimensional measure of pain intensity in adults in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of his/her pain.
- Reliability: -High test–retest reliability has been observed in both literate and illiterate patients with rheumatoid arthritis (  $r = 0.96$  and  $0.95$  respectively ) before and after medical consultation.
- Validity: -For construct validity, the NPRS was shown to be highly correlated with the VAS in patients with rheumatic and other chronic pain conditions (pain>6 months): correlations range from  $0.86$  to  $0.95$ <sup>[19]</sup>



**2) MODIFIED- MODIFIED SCHOBER TEST:** –Modified –modified Schober test is one of the renowned methods for measuring lumbar range of motion.

- Measurement of lumbar flexion: -



(Fig 1.1)



( Fig 1.2)

The volunteers were instructed to remove their shoes and disrobe, exposing their back from gluteal fold to mid-thoracic spine with left and right PSIS fully exposed. (As shown in fig 1.1)

The therapist knelt behind the standing volunteers and identified both the PSIS with her thumb. Inferior margins of the volunteer's PSIS were marked with body marker and a ruler was used to locate and mark a midline point on sacrum (inferior mark). Then the final mark (superior mark) was marked on the lumbar spine 15 cm above the midline sacral mark (inferior mark).<sup>(8)</sup>The therapist aligned the tape measure between two skin marks with zero at inferior mark and 15cm at superior skin mark. The measuring tape was kept firmly against the volunteer's skin while the volunteers were asked to bend forward with the instruction "Bend forward as far as you can while keeping the knee straight". At the end of flexion ROM, the distance between two marks were noted. (As shown in fig 1.2)

-Measurement of lumbar extension: -

- The same landmarks and procedure described for the flexion technique were used for measuring lumbar extension. With the volunteers in the erect standing position, with their eyes directed horizontally, arms at their sides, and feet placed on paper footprint, the therapist lined up the measuring tape between the markings. The therapist gives instructions to the patients "Keep the palms of your hand behind the buttocks and bend backward as much as you can"

-When the volunteers bent backward into full lumbar extension, the new distance between the superior and inferior skin markings was measured using the tape and the change in the distance between the marks was used to indicate the amount of ROM of lumbar extension. (As shown in the Fig 1.3)- The normative values for MMST flexion and extension are  $6.85 \pm 1.18$  cm and  $2.42 \pm 0.74$  cm respectively.-Although these values were different for different age strata and genders, MMST extension values showed an inverse correlation with age and were found to be decreased significantly with increasing age.<sup>(6)</sup>



( Fig 1.3:) -Tape measure alignment at the end of lumbar extension range of motion.

## 10.PROCEDURE

The project will be started with a presentation of synopsis and ethical clearance from the ethical committee of PES Modern College of Physiotherapy will be taken. Participants will be selected accordingly to inclusion and exclusion criteria and will be explained about the study.

Consent form will be taken from participants.

NPRS score will be taken before and after the treatment session which should be greater than or equal to 7.

The spinal flexion and extension ranges will be calculated with the help of measuring tape before and after the treatment session with the help of modified –modified Schober test.

## 11.FOAM ROLLER PROTOCOL

Before self MFR 5 min warm up exercises will be given. (Light jogging, stretching)The foam rolling protocol, which includes 5 sets of 10 cephalocaudal rolls with each set lasting 30 sec and 15 sec rest in between them.

The verbal instructions should be given to the subjects to roll with the the dorsal aspect of the trunk from the supine position against the floor along the central and lateral surfaces of the lumbar spine using a medium hardness cylindrical foam roller as shown in the figure (a) and (b).<sup>(8)</sup>

Total duration of 9 to 10 min.

Warm up – 5 min

No of sets – 5

Time duration of each set – 30 sec

Rest interval in between each set – 15 sec

No of rolls in each set – 10 rolls

Time duration of each roll – 3 sec.



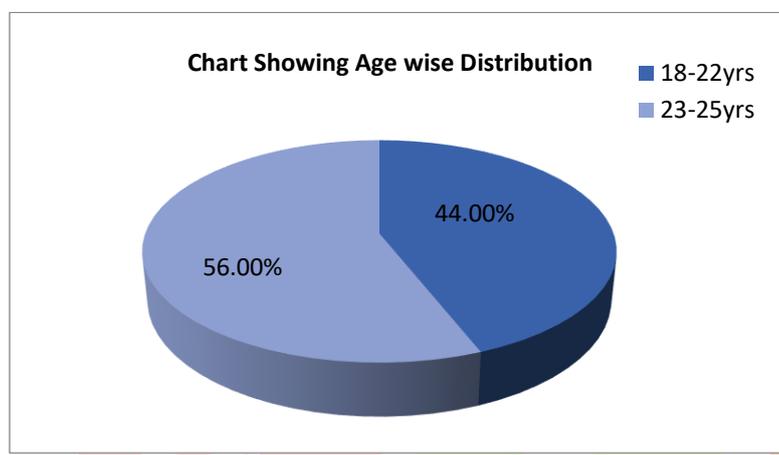
(a)



(b)

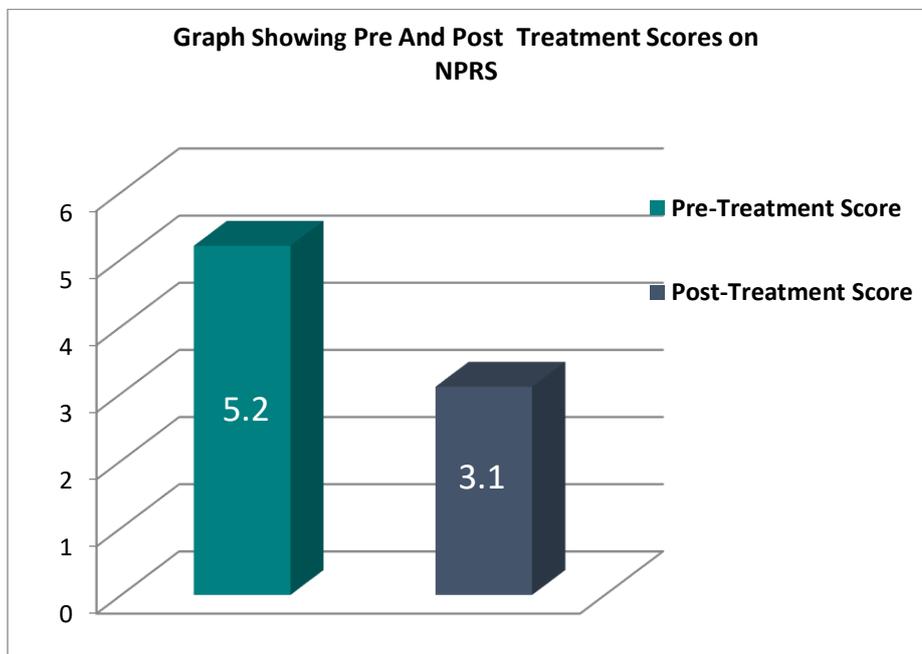
**12.DATA ANALYSIS**

**A. AGE :**



**B. NUMERICAL PAIN RATING SCALE :**

PARAMETERS	PRE TEST		POST TEST		T VALUE	P VALUE	RESULT
	MEAN	SD	MEAN	SD			
NPRS	5.2	±1.107	3.1	±1.581	11.444	<0.0001	EXTREMELY SIGNIFICANT

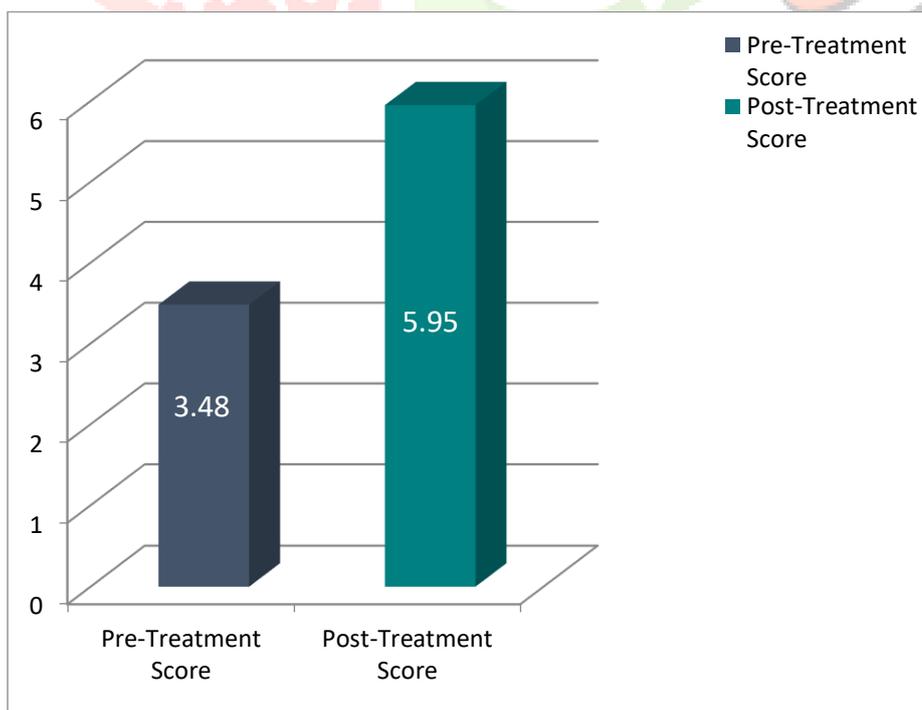


**C. MODIFIED MODIFIED SCHOBER TEST :**

**MMST FOR FLEXION:**

PARAMETERS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	RESULT
	MEAN	SD	MEAN	SD			
MMST	3.48	±0.925	5.95	±1.006	14.127	<0.0001	EXTREMELY SIGNIFICANT

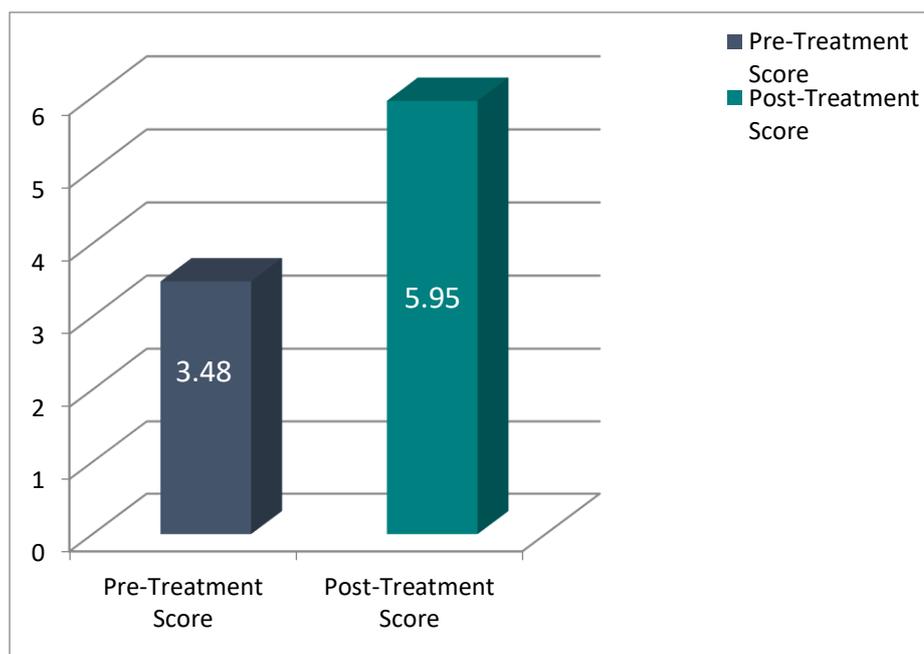
Graph shows pre and post treatment scores of MMST for flexion.



MMST FOR EXTENSION:

PARAMETERS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	RESULT
MMST	MEAN	SD	MEAN	SD	11.782	<0.0001	EXTREMELY SIGNIFICANT
	3.61	±0.497	2.21	±0.647			

Graph shows pre and post treatment scores of MMST for extension.



### 13. RESULT

This study evaluated 50 undergraduate PT students of age 18 to 25 years according to inclusion and exclusion criteria.

Paired t-test was done to compare the pre and post NPRS values in undergraduate PT students with generalized mechanical low back pain, which showed P value <0.0001 which is considered extremely significant .

Paired t-test was done to compare the pre and post treatment values of MMST in undergraduate PT students with generalized mechanical low back pain, which showed P value for flexion and extension <0.0001 which is considered extremely significant.

### 14. DISCUSSION

In this study, total 50 individuals both males and females participated according to inclusion and exclusion criteria.

The objective of the current study was to study the immediate effect of foam rolling in paraspinal muscle spasm and pain in undergraduate PT students.

The result showed that there is significant effect of foam rolling in reducing pain and spasm of paraspinal muscles .

In recent years, self-myofascial release (SMR) has been widely used in clinical and sports settings. SMR is a self-treatment method involving the application of compressive forces to soft tissue. It claims to mimic the effects of manual therapy techniques and aims to address the soft tissue dysfunction<sup>(3)</sup>

The foam roller is a device commonly used for SMR, is also a popular device in sports and physical therapy.

The foam rolling induces pressure and friction on treated muscles, skin, fascia, and compression of muscle and surrounding fascial tissues may stimulate the activity of contractile cells, affecting tissue hydration or the mechanical properties of muscle fibers, thereby altering the stiffness of tissue .<sup>{2}</sup>

The friction between foam roller and tissue causes warming effect on fascia, thereby breaking up some fibrous adhesions which results in restoration of soft tissue extensibility and flexibility<sup>(13)</sup>

The reduction in pain may be due to increased blood flow which removes waste products and due to activation of cutaneous receptors which blocks the nociceptive stimulus<sup>(13)</sup>

In our study, we found that the foam rolling is extremely significant in reducing paraspinal muscle spasm and pain immediately.

The study was done by Chang on Effects of self myofascial release using a foam roller on the stiffness of the gastrocnemius –Achilles tendon complex and ankle dorsiflexion range of motion, conclude that a single foam roller intervention on the calf can increase the ankle dorsiflexion ROM and reduce the stiffness of the gastrocnemius. <sup>(2)</sup>

The study was done by Ashish. J.Prabhakar and Charu Eapen on Immediate effect of foam roller on the pain and ankle range of motion in patients with plantar fasciitis: RCT. Which concludes both stretching and foam rolling techniques helped in reducing pain and increasing the ROM . However , the effectiveness of foam roller was superior to stretching in terms of increase in PPT at gastrocnemius and soleus<sup>(13)</sup>

The study was done by Maria Fonta, Elias Tsepis, Mandalidis on Acute effects of Static-Self Stretching Exercises and Foam Roller Self –Massaging on the Trunk Range Of Motions and Strength of the Trunk Extensors. Which concludes that a single 7-min SSSE session and a 7-min FRSM sessions were equally effective in acutely increasing the range of trunk movements . In the light of the information, healthcare providers can recommend the use of foam roller as an alternative relaxant means to maintain or increase the mobility of the trunk and the strength of the trunk extensor muscles <sup>(8)</sup>

## 15. Conclusion

This study shows that there is an immediate effect of foam rolling in reducing paraspinal muscle spasm and pain in undergraduate physiotherapy students.

## 16. LIMITATION

The samples collected from few physiotherapy colleges could not be able to collect from various, distinct colleges due to time constraint.

## 17. FUTURE SCOPE

The same protocol should be implemented in different populations like IT professionals, elderly etc. Comparative study can be done between effectiveness of conventional physiotherapy and foam rolling in this population.

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