

Effect Of Instrument Assisted Soft Tissue Mobilization On Delayed Onset Of Muscle Soreness: A Pilot Study

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Abstract:

Introduction: Soft tissue mobilisation is one of manual therapy technique used to treat muscle tightness, trigger points release. Soft tissue mobilization can also be done with the help of instruments. The aim of this study was to determine the efficacy of instrument assisted soft tissue mobilization for delayed onset muscle soreness.

Methods: Total twelve individuals underwent the complete treatment. All participants were regularly involved in various physical activities. Convenient sampling method was applied for sample collection. The participants who have experienced muscle soreness post any physical activity and sports were recruited for the intervention. Before the application of the intervention, pre-test and post-test pain measurements were obtained.

Results: Subjects post a strenuous physical activity or sport, who had a muscle soreness at rectus femoris muscle, were included and analysed pre and post test data. Compared pain perception through two outcome measures, analysed with paired t test. Results have shown significant different between pre and post outcome measures.

Conclusions: This pilot study, results suggested inclusion of IASTM technique as a treatment protocol for delayed onset of muscle soreness showed the effective results.

Keywords: Delayed onset of muscle soreness, Instrument assisted soft tissue mobilization, Pain Pressure Threshold

Introduction:

Muscle soreness is commonly experienced by all sports persons. Delayed onset of muscle soreness (DOMS) occurs usually after sudden eccentric muscle activity. After a strenuous muscle activity DOMS is experienced after 8-10 hours post exercise and it peaks 24 hours to 72 hours after exercise. ⁽¹⁾ DOMS is experienced by downhill running, plyometrics and resistance training. ⁽²⁾ These kinds of injuries will cause damage to the cell membrane, results in inflammatory reaction within the muscle. DOMS is experienced by people irrespective of the fitness level, as a reaction to the strenuous unexpected physical activity and the force

created during the activity. ⁽³⁾ Other causative factors for soreness are muscle tightness, angle of contraction, contraction speed and velocity, fatigue. DOMS will lead to impaired physical activity due to cause pain and inflammation. As it reduces the performance of a sports person, it grabs the attention of the coach, physical therapist, and sports person in a path of search for preventive and management techniques for soreness. ⁽⁴⁾ There are number of treatment techniques and strategies to treat DOMS. Non steroid anti-inflammatory drugs, cryotherapy, stretching activities help to treat DOMS. ⁽⁵⁾ Although it is a common problem faced by all athletes, there is a paucity of research in the preventive and management techniques application. Recent research attention is focused on instrument assisted soft tissue mobilization (IASTM); it has shown the effectiveness on the muscle performance. This study is focused on the application of this IASTM to reduce the impact of muscle soreness and improve the pain sensitivity.

Methods and Materials

Participants: Fourteen young individuals were included in this study; two participants did not continue treatment. Total twelve individuals underwent the complete treatment. All participants were regularly involved in various sports like badminton, football, and cricket. Convenient sampling method was applied for sample collection. All participants were recruited to the study based on the chief complaint as muscle soreness. Sample inclusion criteria was mainly the individuals who experienced delayed onset of muscle soreness post any athletic activity, young adults aged between 15-30 were recruited. Exclusion criteria was individuals, who had a history of musculoskeletal conditions like low back pain, discogenic conditions, neurological conditions, recent injury, recent surgery were excluded from the study. After scrutinising for inclusion and exclusion criteria, sample were instructed about the treatment and taken sign on written informed consent. All the rights of participants were protected and taken care.

Study design: A pre and post experimental study design was followed for the study. The participants who have experienced muscle soreness post any physical activity and sports were recruited for the intervention. All participants received instrument assisted soft tissue mobilization for delayed onset of muscle soreness. All subjects were asked to complete the questionnaire about their general health status, which includes demographic data, present complaint information, medical history, previous injuries details. Before the application of the intervention, pre-test data of subjective pain measurement with Numeric Pain Rating Scale (NPRS) and objective measurement with Pain Pressure Threshold (PPT) were measured for everyone. IASTM treatment was applied for 3 continuous days. Later Post invention test data of NPRS and PPT was obtained from everyone.

Intervention: Application of the IASTM technique was done in supine position, IASTM edge tool was utilized. A small amount of friction reducing emollient cream applied on muscle sore area. Initially with the help of the edge tool assessment and examination was done. Soreness point was identified in assessment with the help of the tool. Later IASTM technique was applied in between 30-90 degrees angles depending on the depth and area of soreness for 90 seconds. ⁽⁶⁾ Sore area is treated with light constant pressure in long, smooth motion sweeping

strokes. Post IASTM application stretching of sore muscle was instructed for 30 seconds and minimum of 3 repetitions. Informed participants to apply cryotherapy for 10 minutes every day.

Outcome measures: The outcome measures used for this study are Numeric Pain Rating Scale (NPRS) and Pain Pressure Threshold (PPT) to evaluate the pain perception. After the sample recruitment, these two outcome measures were taken for the record before application of the intervention. Post application of the intervention for 5 days, both outcome measures scores was recorded. An NPRS scale helped to analyse the individual sample pain perception subjectively. PPT was applied at the pain location to analyse the pain perception with objective measurement.

Statistical Analysis:

Data analyses were performed with SPSS for windows, version 20. To compare the data, paired t test was used to find out the comparison of pre and post data for NPRS and PPT score for 12 samples.

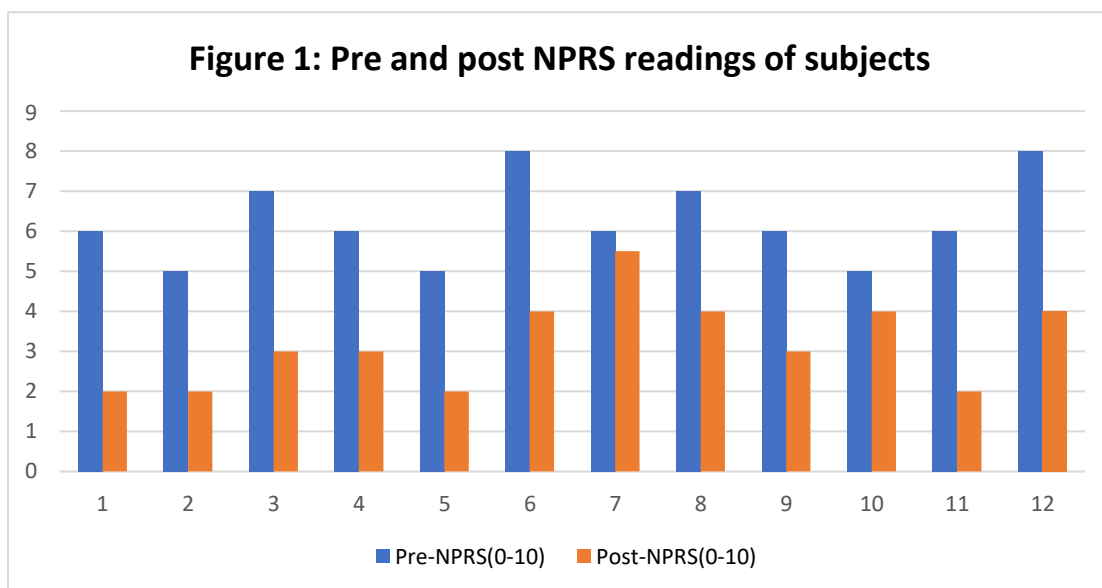
Ethical Approval: The current research is related to human use has been compiled with all the ethical regulations and institutional policies and followed tenets of Helsinki Declaration. It has been approved by the institutional ethical committee.

Informed Consent: Informed consent has been obtained from all individuals included in this study.

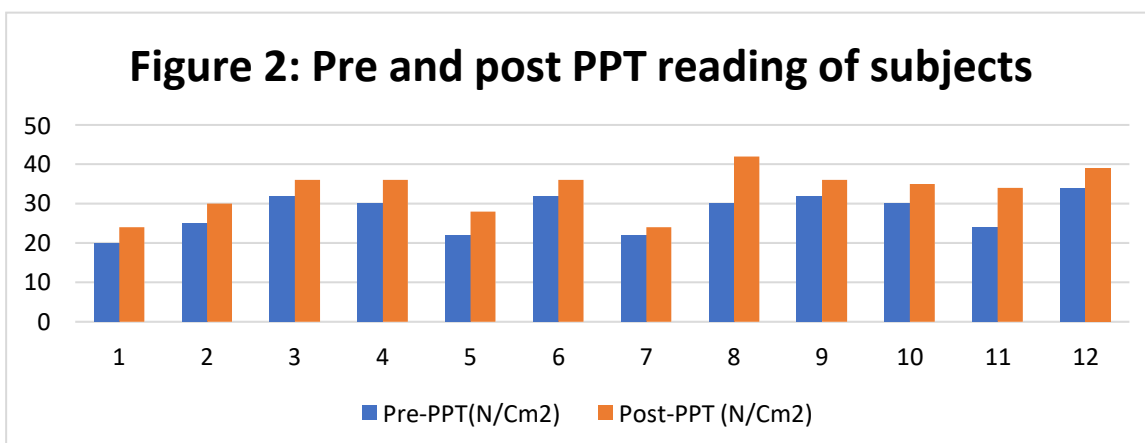
Results:

A total of 12 subjects were participated in the pilot study. Among them 7 were males and 5 were females. The mean age of the study population was 19.5 years. Subjects post a strenuous physical activity and sports, which had muscle soreness at rectus femoris muscle, their pre-test outcome measure were recorded. After the intervention post-test outcome measures were also recorded. Normality test was conducted for the pre and post-test NPRS and PPT values by Kolmogorov Smirnov test. As the scores followed normal distribution, parametric test was applied for the analysis. Mean values of NPRS pre and post for females were 6.50 and 2.83, for males were 6.0 and 3.58. Mean values of PPT pre and post for females were 27.0 and 32.83, for males were 28.50 and 33.83. Standard deviation difference of NPRS for females and males were 0.52 and 1.36. Standard deviation difference of PPT for females and males were 2.23 and 3.44.

The result of this study helps to understand the effect of IASTM on DOMS condition. As before the application of IASTM pre data was collected related NPRS and it is compared with post data of NPRS. Even though it is a subjective measurement; it has shown the positive response from the participants. As the pain perception is reduced after the application of IASTM and home advice of cryotherapy, figure 1 shows the significant reduction in the NPRS readings of 11 participants. Among all one participant NPRS reading were shown not much variation.

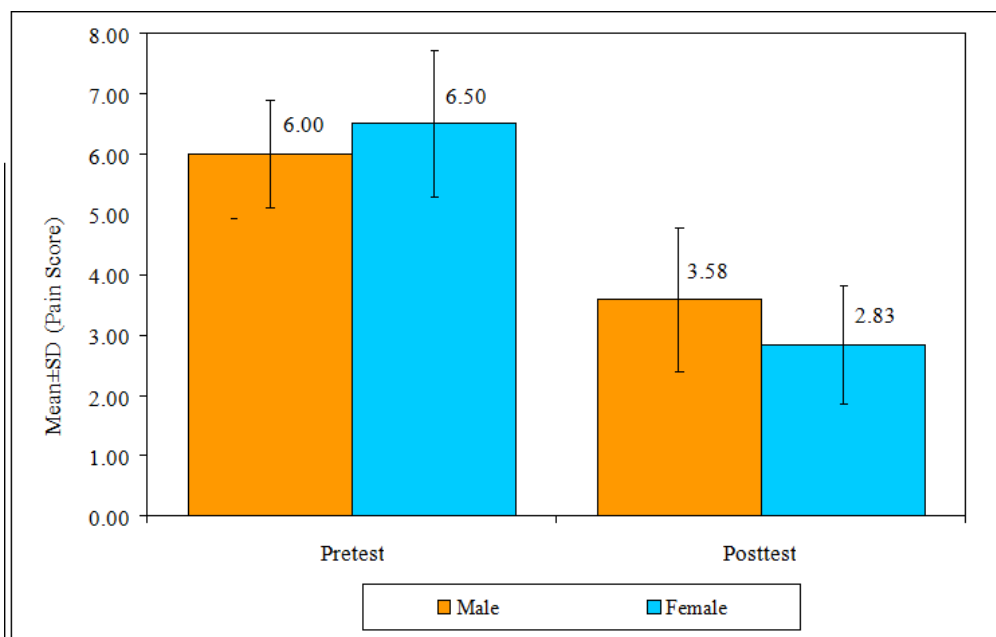


Pressure algometer helps to quantify the pain pressure threshold in the muscle. The pressure algometer is designed to measure the deep pain pressure threshold and tenderness resistance. In this current study, PPT was measured through the algometer, kept on specific reference point on the rectus femoris muscle, which helped to identify the threshold of pain. ⁽¹²⁾ When on reference pressure algometer was pressed with a rubber disk which has an area of 1 cm². The reading was taken in N/cm². The results of study in relation to pain pressure threshold, the recording of the pain pressure algometer were shown an objective variation in the pain perception.



The comparison of the pain perception through NPRS outcome measures in shown in figure I and found statistically significant at p=0.05.

Figure 3: Results of pre and post treatment NPRS values.



The comparison of the pain perception through PPT outcome measures is shown in figure II and found statistically significant at $p=0.05$. Figure II indicates the results of pre and post treatment PPT values.

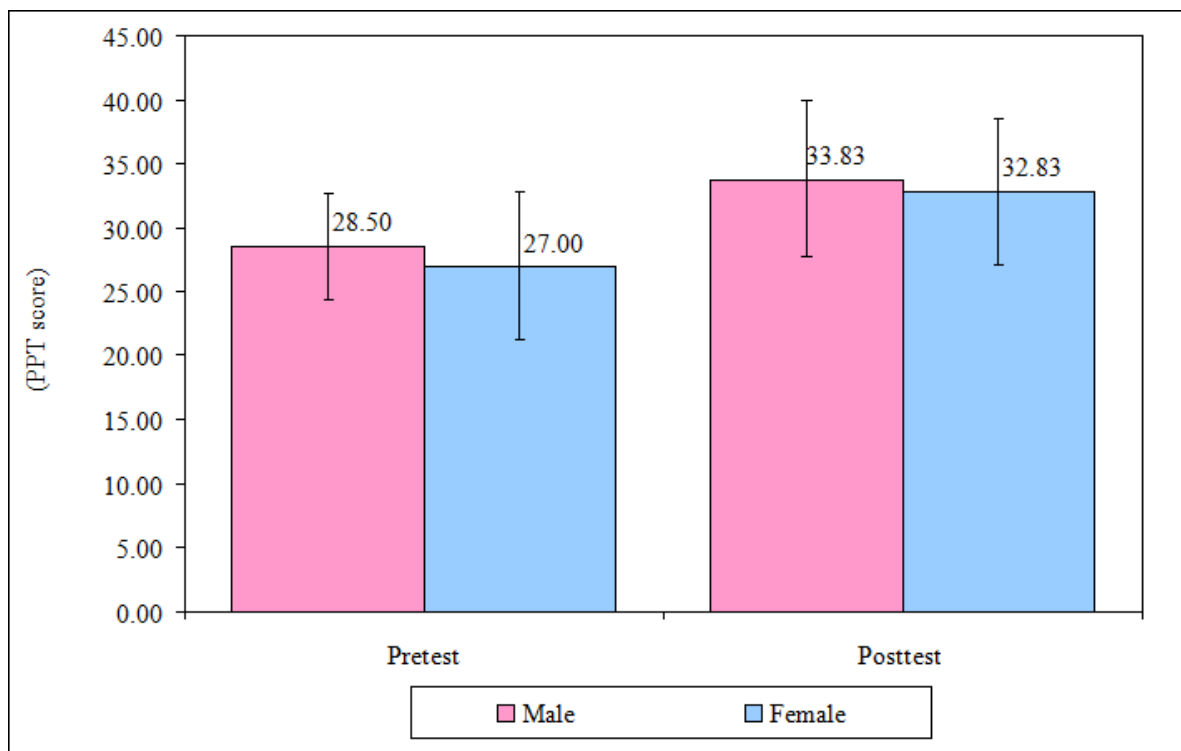


Figure 4 represent the pre and post values pain pressure threshold.

Karl Pearson's correlation coefficient is applied to analyse pre and post NPRS and PPT reading to know the correlation among the significant changes with the application of IASTM technique. The result of the test shows the positive correlation between both pre and post outcome measures, which significantly shows the impact of IASTM technique in treating DOMS.

Discussion:

Delayed onset of muscle soreness is very commonly observed in all the sports person post any strenuous activity. There are two common types of muscle soreness, one which is felt during and immediately after the strenuous exercises, another type builds up soreness after 24 hours of activity. Delayed onset of muscle soreness is such second type of the soreness. ⁽⁷⁾ Delayed onset of soreness at rectus femoris muscle is very commonly observed post some sporting activities like cycling, running, squatting exercises, and jumping activities etc. ⁽⁸⁾ There number of theories and mechanism which explain the development of delayed onset of muscle soreness. ⁽⁹⁾ From the past decades, even though it is a very common kind of a problem faced by many sports' person, there are less therapeutic techniques to prevent and avoid recurrence of DOMS and treat it quickly. There were few methods for treating the DOMS by application of cryotherapy techniques, stretching exercises, compressive therapy, foam rolling; electro myo-stimulation techniques were applied. ⁽¹⁰⁾ Instrument assisted soft tissue mobilization is one of the myofascial techniques, which help to release the tightness in the muscle fibres and encourages the circulation. Post IASTM technique application, functional improvement increases. ⁽¹¹⁾

IASTM technique is an advanced intervention for soft tissue mobilization, primarily helped to identify and reduce the symptoms of scar tissue, soft tissue restrictions and adhesions. IASTM has also shown the efficacy in reducing the pain and improving muscle function in acute conditions. ^(12,13) In some conditions, a single treatment session also showed the significant results in active and passive range of motion. ⁽¹⁴⁾ When IASTM technique is coupled with stretching and cryotherapy it is intended to improve effectively connective tissue function. ⁽¹⁵⁾ In this study, both pre and post scores were analysed. The mean, standard deviation, standard error was calculated for the both the outcome measures. As this is on one group study, paired t test was applied to know the results of pre and post variables data. In the results, both the subjective measure NPRS and objective measure PPT has shown the positive correlational results towards the application of IASTM on DOMS.

Many studies were done on the application of IASTM technique on chronic conditions and improving the range of motion, very less studies are available to know the efficacy of IASTM technique on acute conditions and DOMS. In addition, further research studies must try to evaluate and compare the most advance soft tissue release techniques with IASTM technique.

Limitations of the study:

This study was conducted on the small sample size. Their physical activity levels were also varying. It recommends the application of IASTM on the larger sample to create stronger evidence on the application of the IASTM technique with more objective measurements to validate the variables.

Conclusion:

The results from the current pilot study suggest that Instrument assisted soft tissue mobilization technique shows the effective results on Delayed onset of muscle soreness condition. Further research is required to provide and verify the significance of the technique for more evidence.

Clinical Relevance

The Study shows the clinical relevance of the application of IASTM technique for Delayed onset of muscle soreness on a smaller sample.

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Conflict of interest: There is no conflict of interest.

Disclosure statement:

No author has any financial interest or received any financial benefit from this research.

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