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Comparative Study of Instrument Assisted Soft Tissue Mobilisation Vs Ischemic Compression in Myofascial Trigger Points on Upper Trapezius Muscle in Professional Badminton Players

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Abstract

Study design: Pre-post experimental study design. **Background:** The presence of trigger points over trapezius muscle is one of the major reasons of injuries in badminton players. Trigger points affect the flexibility of muscles which if untreated leads to dysfunctions. This alters the biomechanics of badminton gameplay. **Objective:** Hence, present study was undertaken to find out and compare the effects of Instrument Assisted Soft Tissue Mobilization and ischemic compression in trapezius trigger points in badminton players. **Procedure:** In this study, 30 participants were recruited based on inclusion and exclusion criteria. They were divided in 2 groups of 15 each. Each intervention was administered to them for a period of 2 weeks, 2 sessions per week in respective groups. Pre and post assessment was taken using following outcome measures-NPRS, pain pressure threshold and cervical range of motion. **Results:** There was significant increase in the pain pressure threshold of the players and the cervical range of motion in the IASTM group. There was decrease in the NPRS findings in the IASTM group. **Conclusion:** The results suggested that IASTM showed better results than ischemic compression in relieving trapezius trigger points.

Keywords: *trapezius, trigger points, Instrument Assisted Soft Tissue Mobilization (IASTM), ischemic compression.*

Introduction

Tightness of muscle and reduction of range of motion are common in team sports like cricket, football etc. This increases the incidence of muscular injuries in sports. It has been demonstrated that reduced joint range of motion in upper and lower extremities decreases movement efficiency. Therefore, maintaining and regaining normal Range of Motion (ROM) is of utmost importance for injury prevention and performance improvement[1].

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The prevalence of myofascial trigger points in overhead athletes with posterior shoulder tightness is unknown and this investigation may be beneficial, particularly to clinicians as they examine biomechanical dysfunctions and (or) musculoskeletal pain of patients. Myofascial trigger points (MTrPs) are common, often causing pain, lack of mobility, and other physical conditions that can impair daily function[2].

The trapezius is a large muscle originating from the neck and inserting in the thorax on the dorsal side of the neck and trunk. It consists of three parts: descending (superior), ascending (inferior), and middle. The muscle attaches to the medial third of superior nuchal line; external occipital protuberance, nuchal ligament, and spinous processes of C7 - T12 vertebrae. The insertion of the muscle is on the outer part of the clavicle bone and different parts of scapula. It is supplied by Spinal root of

accessory nerve (CN XI) (motor) and cervical nerves (C3 and C4) (pain and proprioception)[3].

Badminton is an individual sport which doesn't involve human contact and requires high level of power, agility and speed from movements in varied positions. It is a racquet sport which is played between two or four people, with a game which demands actions of short duration and high intensity. Badminton is a complex sport in which performance is assessed considering many factors. It is characterized by high-intensity, intermittent actions. Shoulder pain and stiffness was the most common injury sustained by amateur badminton players. Badminton involves lower risk in comparison to other racquet sports. In injuries associated to badminton, research says that 11-31% of injuries are located in the upper limbs. The majority i.e.74% of injuries in badminton are overuse injuries and the upper extremities account for 19-32%. This dysfunction results in abnormal scapular biomechanics that occur as a result of create imbalance between the agonist and antagonist muscles and predispose the shoulder to injuries[4,5,6].

Trigger point are found in the tight bands of the muscle and are localised, painful and can be quite easily identified. The spots can produce symptoms like referred pain, referred tenderness, motor dysfunction and autonomic phenomenon[7,8].

(IASTM) is developed recently for MTrPs. This is a type of enhanced Chinese medicine technique named Gua Sha. IASTM instruments are made of steel with the goal of releasing and reforming soft tissue restrictions. It helps the healing process by creating a micro trauma, breaking down collagen cross linkages, increasing blood flow and cellular regeneration[9].

Apart from stretching, instrument assisted soft tissue mobilization (IASTM) is widely used recently in sports physiotherapy for increasing joint mobility. It is a effective as a non-invasive technique and hence has gained popularity in recent times. IASTM tool helps the physiotherapists to diagnose and treat any soft tissue dysfunctions. There is a study done by Laudner et al. (2014) suggested that application of IASTM to posterior shoulder provides improvement in range of motion in baseball players[10]. It has been found out that the effects of IASTM-treated soft tissue structures have shown increased fibroblast recruitment and activation in injured tendon and improved biomechanical, histological and vascular properties in the healing ligament. Case reports and pilot studies using IASTM have also demonstrated promising outcomes for diagnoses such as patellar tendinopathy, chronic ankle pain, plantar fasciitis, post-natal calf pain, knee pain, carpal tunnel syndrome, cumulative trauma disorders, and lateral epicondylitis/ epicondylosis[11].

Ischemic compression is another manual therapy technique which is commonly used as a way of relieving TrPs. It involves applying direct sustained finger pressure to the TrP with an adequate force over stipulated time duration, to reduce the blood supply and relieve the tension within the affected muscle. The pressure is gradually applied, maintained, increased and the gradually released[12].Travell and Simons7 originally recommended 'ischaemic compression' for trigger points (TrPs) with thumb pressure firm enough to cause the skin to blanch[13].

Method

Ethical clearance was obtained from the Institutional Ethical Committee. 30 participants meeting the inclusion and exclusion criteria and who were willing to participate in the study were included.

Inclusion Criteria-

- Professional badminton players.
- 18-30 years of age
- Both genders included
- Playing for at least 1 year
- Positive jump sign

Exclusion Criteria-

- Open wounds in upper back area
- Skin infections
- Cervical and upper limb Fractures
- Hypersensitive skin

The subjects were then assessed for the outcome measures using NPRS, Pain pressure threshold using pressure algometer and Cervical lateral flexion and rotation range of motion pre-intervention. After this procedure, Instrument Assisted Soft Tissue Mobilization and Ischemic Compression was administered to Group A and Group B respectively for a period of 2 weeks;

4 sessions per week post which patients were assessed again for the said outcomes.

After permission from the ethical committee, the permission to screen the participants was taken from the respective authority. Badminton academies of the surrounding areas were approached for the same. An informed consent was taken from each participant and an explanation of the study was be given.

Participants those who were willing to participate in the study were screened according to the inclusion and exclusion criteria. Players fulfilling the inclusion criteria were included in the study.

The patients were be divided into Group A(IASTM group) and Group B(ischemic compression group)by lottery method. They were assessed on basis of positive jump sign on palpation and the most painful trigger point was located. Each session lasted for 15 minutes. Each group was given 2 weeks of treatment, 2 sessions per week (4 sessions). There was a gap of 3 days before the consequent session.

Participants were assessed with respect to pre treatment and post treatment in the following outcome measures:

1. Numerical Pain Rating Scale (NPRS)

2. Cervical range of motion for rotation and lateral flexion on dominant side.

3. Pressure Algometer.

Procedure in group A:

Patients were assessed on the basis of positive jump sign on the upper trapezius muscle for location of trigger points. The procedure of IASTM was explained to the patient. The areas of treatment will be adequately exposed. Range of motion for neck, NPRS score and pain tolerance score on pressure algometer will be recorded pre treatment on 1st session and post treatment on 4th session. Moisturizer will be applied to reduce friction before each session. IASTM will be given for maximum 8-10 strokes or till the appearance of local erythema. Ice pack will be given to participants after treatment to guard against muscle soreness.

Procedure for group B:

Patients will be assessed on the basis of positive jump sign on the upper trapezius muscle for location of trigger points. Procedure for ischemic compression will be explained to them. The area of treatment will be adequately exposed. Range of motion for neck, NPRS score and pain tolerance score on pressure algometer will be recorded pre treatment on 1st session and post treatment on 4th session. Ischemic compression technique will be given for 90 sec over the trigger point.

Post treatment recordings of the outcomes will be taken at the end of 4 sessions. After completion of the treatment, post intervention readings will be taken and analysed strongly.

Fig 1: Application of IASTM

Fig 2: Application of ischemic compression

Results

A total of 30 subjects were recruited for the study. They were evaluated before and after at 2 weeks. The demographic characteristics of the participants were presented in Table 1. There is a positive significant difference in mean difference of cervical range of motions, the pre and post assessment of these ranges

show an increase of range of motion ($p<0.001$). In the present study, the intragroup analysis of mean NPRS and pain pressure threshold values in the subjects which revealed significant improvement at 2 weeks ($p<0.001$) and also revealed significant decrease in the mean difference of NPRS and pain pressure threshold scores between the pre and post assessment of the subjects.

Table 1: Gender and Age distribution of subjects in study group

GENDER			**AGE**	
Gender	**No. of Patients**	**Percentage (%)**	**Group**	**Average age**
Male	26	86.66	A	21
Female	4	13.33	B	20.86
Total	**30**	**100**		

Table 2: Comparison of pre and post assessment Cervical Range of Motions (ROM), NPRS and pain pressure threshold in group A.

	NPRS	**Pain pressure threshold**	**Cervical Range of Motion**	
			Rotation	**Lateral Flexion**
Pre	5.66	2.74	61.93	46.93
Post	3	3.56	69.53	53.13
p value	<0.001			

Table 3: Comparison of pre and post assessment Cervical Range of Motions (ROM), NPRS and pain pressure threshold in group B.

	NPRS	**Pain pressure threshold**	**Cervical Range of Motion**	
			Rotation	**Lateral Flexion**
Pre	5.13	2.14	67.06	48
Post	3.46	2.57	72.26	52.4
p value	<0.001			

Discussion

In the present study we have evaluated the effects of newly developed IASTM technique versus ischemic compression on the myofascial trigger points on upper trapezius muscle in badminton players. The finding of the present study is IASTM produced better results with respect to pain, pain pressure threshold and mobility of the cervical spine. The difference between the pre intervention and post intervention readings was strongly statistically significant.

Clinicians have reported that IASTM is a type of soft tissue mobilization technique to relieve myofascial adhesions, borders, tightness, fibrous nodules, crystalline deposits, and scar tissue more effectively and can reach the tissues deeper in the body where the hands are not capable of reaching that effectivey[14].Cyriax proposed the theory of deep friction massage and cross fibre massage upon which the theory of IASTM is based on[15]. IASTM

brings about a local minor trauma to soft tissue, which causes haemorrhagic changes in the capillaries and other thin vessels, which stimulates the body's inflammation process and starts the body's healing process and reparative system[16]. This inflammatory process restarts the healing process by increasing the supply of blood, nutrients, and fibroblasts to the area, thus enhancing collagen formation, deposition, and maturation[10]. Two more factors have to be considered:

1. Increase in the length of sarcomere.
2. Increase in the blood flow to trigger points[9].

The above changes take place due to the dragging procedure of the IASTM and the creation of micro trauma. This leads to localised vasodilation and start the healing of the soft tissue.

While applying ischemic compression technique, sustained thumb pressure is given over the trigger point over a period of one minute to 90 seconds. The pressure over the trigger point is gradually increased as the pain tolerance. This causes increase in blood flow to the trigger points. The healing process thus starts with the increase in flow of nutrients to the treated area. The increase in local blood flow could cause the observed increase in dialysate glucose after trigger point release because changes in dialysate glucose can be directly related to changes in local blood flow. Simons hypothesized that there is localized ischemia in the zone around the trigger point which results in the shortage of glucose and oxygen for proper function. Supporting the above mentioned hypothesis, the current data states that in on relaxation of the trigger point nodule, there is increased flow of nutrients through blood, which allows for the increased perfusion of substrate and supply of oxygen to muscle to match with energy demands of cell required to regain normal function [9].

IASTM involves the use of a tool which is used to diagnose and treat myofascial restrictions. The scraping over the skin which occurs as a result post IASTM intervention might have greater local vascular changes as compared to ischemic compression. This caused greater amount of healing in the underlying soft tissues. On the other hand, IASTM being a newer form of treatment could have increased the curiosity level of the participants regarding its effects and method of application. IASTM is applied in a linear fashion over the affected area. This could have caused greater tissue stretch hence greater improvement in mobility of the cervical spine. Zeynab et al reported a case study to find out the effects of IASTM technique on upper trapezius trigger points. He reported increase in the pain pressure threshold and decrease in disability (NDI) in his case study[9].

On the contrary, ischemic compression technique being a comparatively conventional technique was familiar to participants. The method of application of ischemic compression doesn't involve any kind of tissue stretch and is a very localised treatment. Hence the local vascular changes could be lesser as compared to IASTM.

Hugh Gemmell et al did a study on Immediate effect of ischaemic compression and trigger point pressure release on neck pain and upper trapezius trigger points and found no statistically significant results though their results were clinically significant[25]. The study compared to manually applied techniques unlike in our study.

The above mentioned factors can be associated with the results of the study.

Conclusion

In the current study, application of IASTM once in 3 days for 2 weeks to trigger points in upper trapezius muscle produced significant increase in both lateral flexion and rotation of cervical spine. Also, it improved the pain pressure threshold of players which was measured with pressure algometer. Also, it decreased the pain measured by NPRS. These findings were more statistically and clinically significant when compared with ischemic compression technique. Our study concludes that IASTM is more effective in treating badminton players with upper trapezius trigger points than ischemic compression technique.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from Institutional Sub-Ethics Committee of Dr. D. Y. Patil College of Physiotherapy, Pune.

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