"A COMPARATIVE STUDY BETWEEN TWO SOFT TISSUE MANIPULATIONS IN ATHLETES WITH PATELLAR TENDINOPATHY "

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Citation of the Article

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ABSTRACT

BACKGROUND & PURPOSE: Patellar Tendinopathy or Jumpers Knee is a common musculoskeletal disorder that frequently affects athletes who train and compete at all levels. It is a clinical diagnosis of pain in anterior part of the knee of and dysfunction in the patellar tendon. There are no comparative studies between the soft tissue manipulations of Active Release Technique (ART) and Strain Counter-strain technique for patellar Tendinopathy in athletes. So purpose of the study was to know the efficiency of Active Release Technique and Strain Counter-strain technique in athletes with patellar Tendinopathy.

METHODOLOGY: A comparative trail with 24 male and female competitive runners between the ages 15 to 40 years were randomly assigned to 2 groups. Active Release Technique (n=12), Strain Counter-strain technique (n=12). Pain, Range of Motion and knee disability were recorded pre- treatment i.e, on the 1st day and post treatment i.e, on the end of 4th week by using Visual Analogue Scale to assess pain, Goniometer to assess Range of Motion and Victorian Institute of Sports Association scale for patellar Tendinopathy questionnaire to assess disability. Comparison of data with in the group and between groups of the pre and post values was done statistically using students 't' test.

RESULTS: The results revealed that with in group analysis in the 2 groups showed extremely significant improvement in terms of pain, range of motion and disability (p value) where as when between groups was analyzed, Group A (Active Release Technique) showed significant improvement compared to Group B (Strain Counter- strain Technique).

CONCLUSION: The study showed beneficial results in Active Release Technique group than the other group which was measured in terms of relief in pain, increase in range of motion and disability reduction.

KEYWORDS:

Active Release Technique, Strain Counter- strain, visual analogue scale, Goniometer, Victorian Institute of Sports Association scale for Patellar Tendinopathy Questionnaire, Patellar Tendinopathy.

I . INTRODUCTION

The patellar tendinopathy (PT) is an overload injury, common in elite athletes[(i)], being much more frequent and recurrent in sports involving jumps[(ii)]. The prevalence of unilateral and bilateral PT is different between genders; bilateral tendinopathy is twice commonly men than in women; however, unilateral tendinopathy presents equivalent prevalence[(iii)] Proximal patellar tendon pain (patellar tendinopathy) occurs typically in sports characterised by high demands on force and power of the leg extensor muscles, such as running, basketball, volleyball, tennis and soccer.Patellar tendinopathy implies both structural changes and symptoms. Running athletes repetitively load the extensor tendon apparatus, during both takeoff and landing, and functionaloverload is believed to be a cause of patellar tendinopathy. Elite athletes have a very high prevalence of JK, between 40% and 50%[(iv)]. The morbidity associated with JK can be significant, with perhaps as many as 33% of athletes unable to participate in sport for more than6 months[(v)]. Some data also suggest that perhaps as many as 50% of athletes with JK may retire prematurely from their sport as a result of their knee impairment[(vi)].

The patellar tendon is a tendon that extends down from the Quadriceps muscle in the thigh to incorporate the patella (the knee cap) and attach into the tibia (the shin bone), providing extension at the knee joint. The patellar tendon is also called the patellar ligament because it connects the patella to the tibia.The knee joint consists three bones, the femur, the tibia, the fibula and also the patella which is a sesamoid. The quadriceps muscles are connected to the patella with a shared tendon and there is also a tendon that connects the bottom of the patella to the tibia, called the patellar tendon. This tendon is extremely strong and allows the quadriceps muscle group to straighten the leg. The patellar tendon is made of tough string-like bands. These bands are surrounded by a vascular tissue lining providing nutrition to the tendon. The patellar tendon is also a ligament[(vii)].

The structure of patellar ligament is a strong, flat, ligament, about 5 cm in length, which originates on the apex of the patella distally and adjoining margins of the patella and the rough depression on its posterior surface; below, it inserts on the tuberosity of the tibia; its superficial fibers are continuous over the front of the patella with those of the tendon of the quadriceps femoris. The medial and lateral portions of the quadriceps tendon pass down on either side of the patella to be inserted into the upper extremity of the tibia on either side of the tuberosity, these portions merge into the capsule, as stated above, forming the medial and lateral patellar retinacula. The posterior surface of the patellar ligament is separated from the synovial membrane of the joint by a large infra-patellar pad of fat, and from the tibia by a bursa. It is also sometimes called the "patellar tendon"[(viii)]

In chronic tendinopathy a failed healing process results in a painful and weakened tendon,which is then less capable of performing its most important functions, namely absorbing and transducing forces. Repetitive microtrauma caused by overuse give rise to degenerative abnormalities in the tendon like changes in collagen structure and neurovascular proliferation.9 There is no inflammatory process. The histopathology is a tendinosis, not a tendinitis. Vasculoneural ingrowth might play a role in the concomitant pain in tendinopathies[(x)].

The patellar ligament not only helps keep the kneecap in its proper position but also assists in the bending of the leg at the knee. Damage to this ligament can include a complete rupture (tearing). This leads to the patella losing all support from the tibia. As a result, the leg will not extend properly. People suffering from a ruptured patellar ligament will not be able to stand, as the knee will buckle under the weight of their body.

Patellar tendinopathy occurs from over use of patellar tendon. Over time the strain on the tendon causes structural changes within the tendon.

These are the most common causes of patellar tendinitis:

- a rapid increase in the frequency of training,
- sudden increase in the intensity of training,
- transition from one training method to another,
- repeated training on a rigid surface,
- improper mechanics during training,
- genetic abnormalities of the knee joint, and/or
- poor base strength of the quadriceps muscles[(xi)].

The pain usually is located in the section of the patellar tendon. During physical activity, it may feel sharp especially when running or jumping. After the workout it will feel like a dull ache. There is swelling and tenderness in and around the patellar tendon. The knee will often feel 'tight' when moved towards flexion[(xii).]

Thickness of the tendon may be noted also in all stages. Pain in the patellar tendon may be reproduces with resisted knee extension. The symptomatic evaluation should include history, age and any recent growth spurts, location of pain, and special tests[(xiii)]. Kennedy Scale can be used to evaluate a chronic patellar tendinopathy [(xiii)] (xiv).

Phase 1: pain after activity
Phase 2: pain at the beginning and after activity
Phase 3: pain at the beginning, during and after activity, but the performance is not affected
Phase 4: Pain at the beginning, during and after activity,

The key physical finding in patellar tendinopathy is tenderness at the inferior pole of the patella or in the main body of the tendon when the knee is fully extended and the quadriceps relaxed. When the knee is flexed to 90 degrees, thus putting the tendon under tension, tenderness significantly decreases and often disappears altogether. The diagnosis for patellar tendinopathy is X-ray and MRI scan. The differential diagnosis for patellar tendinopathy are :-

Patellar subluxation or dislocation
Tibial apophysitis (Osgood shlatter)
Jumpers knee (patellar tendonitis)
Patellofemoral pain syndrome (chondromalacia patellae)

The examination of patellar tendinopathy can be assessed through two clinical signs. In the "passive extension – flexion sign" the patient lies supine on the examination table. The anterior aspect of the extended knee is palpated to define the point of maximal tenderness. In the case of patellar tendinitis, tenderness to palpation of the tendon is most often located at the origin of the tendon at the inferior pole of the patella. Once the point of maximal tenderness is identified, the knee is flexed to 90° and pressure is again applied to the tendon. For the "standing active quadriceps sign", the patellar tendon is palpated along its course while the patient stands. The point of maximal tenderness identified. The patient is then asked to stand only on the involved extremity with 30° of knee flexion and the tendon was re-palpated. In both these tests, the patient should note a marked reduction of tenderness to palpation when the knee is flexed or the quadriceps contract, in order to confirm the diagnosis of patellar tendinitis.

The surgical management of patellar tendinopathy includes several different operative procedures and postoperative rehabilitation protocols. The choice of surgical treatment of patellar tendinopathy appears to be based on the surgeon's preference[(xvi).] The conservative treatment of patellar tendinopathy recorded in the literature includes combinations of rest,[(xvii)] exercise, especially eccentric exercise,[(xviii)] modalities including ultrasound, heat, and cryotherapy,[(xix)] frictions,[(xx)] biomechanical adjustment,[(xxi)] and pharmaceutical treatment.[(xxii)] Many of these treatments are based on "clinical experience" rather than appropriately analysed data.

Some of the studies about patellar tendinopathy previously are Marsha Rutland, et al,2010, conducted a study on evidence–supported rehabilitation of patellar tendinopathy While various rehabilitation techniques exist to treat patellar tendinopathy, eccentric exercise has been found to be safe and effective.

Michelle Ghiglier, et al, 2013, conducted a study on is augmented soft tissue mobilization effective in treating tendon disorders Augmented soft tissue mobilization may be a valuable tool for relieving pain in patients with tendon disorders.

Aliza Rudavsky, et al, 2015, conducted a study on Physiotherapy management of patellar tendinopathy (jumper's knee) , the most important factors in managing athletes with patellar tendinopathy are to educate them about how to modify loading according to symptoms, to ensure that they understand how to increase or decrease loading appropriately, and to assess and modify intrinsic and extrinsic factors that may be contributing to overload.
Bryan Murtaugh, et al, 2013, conducted a study on Eccentric Training for the Treatment of Tendinopathies research regarding the mechanisms for eccentric training for tendinopathy as well as outline a specific eccentric program to follow in the treatment of painful tendinopathy.[(xxiii)]

Konstantinos Katzis, et al, 2015, conducted a study on Patellar Tendinopathy Rehabilitation Device mechanism is our patellar-tendon rehabilitation device along with the Super Physio-Mario Serious Game. This work encapsulates the essence of a multi-disciplinary project that aims at improving the current patellar-tendon rehabilitation techniques.

Peter Malliaras, et al, 2013, conducted a study on Achilles and Patellar Tendinopathy Loading Programmes There is little clinical or mechanistic evidence for isolating the eccentric component. [(xxiv)]

Recently Drover JM, et al. 2004 in his study about Influence of active release technique on quadriceps inhibition and strength: a pilot study concluded that ART protocols did not reduce inhibition or increase strength in the quadriceps muscles of athletes with anterior knee pain. Further study is required.

There are few studies regarding the treatment of patellar tendinopathy using Active Release Technique and the Strain Counter- strain technique individually. But there is no study by using both the techniques in the treatment. Thus, the aim of this study was to assess the effectiveness of Active Release Technique versus Strain Counter- strain technique in patellar tendinopathy athletes.

AIMS:

To find out the efficiency of Active Release Technique and Strain Counter- strain technique in pain for athletes with patellar tendinopathy.

To find out the efficiency of Active Release Technique and Strain Counter- strain technique in Range of Motion for athletes with patellar tendinopathy .

To find out the efficiency of Active Release Technique and Strain Counter- strain technique in disability for athletes with patellar tendinopathy.

OBJECTIVES:

To find out the efficiency of Active Release Technique and Strain Counter- strain technique in pain for athletes with patellar tendinopathy by using Visual Analouge Scale.

To find out the efficiency of Active Release Technique and Strain Counter- strain technique in Range of Motion for athletes with patellar tendinopathy by using Goniometer.

To find out the efficiency of Active Release Technique and Strain Counter- strain technique in disability for athletes with patellar tendinopathy by using Victorian Institute of Sports Association scale for patellar tendinopathy questionnaire.

MATERIALS AND METHODOLOGY

Study design – Comparative study
Sampling technique – Randomly selected by coin toss method for assigning participants into 2 groups.
Sample size – 24 running athletes (12 each group).
Duration of study – 4 weeks
Source of Data –The subjects will be considered for this study only after they signed on an approved concern form.

Inclusion Criteria :
Age group: 15 – 40 years.
Both male and female participants with clinical diagnosis of patellar tendinopathy.
No previous patellar pain & VAS 4-7
Participants willing to participate in the study.

Exclusion Criteria :
Participants with knee open wounds
History of recent fractures, surgeries.
Patella variations.
Uncooperative patients.

Outcome Parameters :
Pain is measured using VAS.
ROM is measured by using Goniometer.
Disability is measured by using VISA – P scale.

Materials used for the study :
Treatment Couch
Pillow
Chair
Towel

METHODOLOGY :

The present study was done on 24 individuals. All the individuals were randomly divided into two groups. Group A received ART technique and Group B received SCS technique for 5 – 6 times daily for 4 weeks. Pain, ROM and disability scores are recorded before and after treatment protocols. Pain was assessed using Visual Analogue Scale, ROM was assessed using Goniometer and Disability was assessed by using VISA – P questionnaire.

PROCEDURE

Active Release Technique (Group A) for 5 – 6 repetitions. Therapist locates the areas of tension or adhesion in a specific tissue. Then the tissue is taken from a shortened position to a lengthened position while using a manual contact to maintain tension along the fibers of that tissue.

In treatment with ART the clinician uses compressive, tensile and shear forces applied by manual (hand) touch to address repetitive strain, cumulative trauma injuries and constant pressure tension lesions. During ART therapy the practitioner applies deep digital tension at the area of tenderness. The patient is then instructed to actively move the tissue of the injury site through the adhesion site from a shortened to a lengthened position.

Strain Counter strain technique (Group B) for 5 – 6 repetitions. Strain and Counter strain as a "passive positional procedure that places the body in a position of greatest comfort, thereby relieving pain by reduction and arrest of inappropriate proprioceptor activity that maintains somatic dysfunction."Pressure being applied to them as the body or body part is carefully positioned in such a way as to remove or reduce the pain felt in the palpated point. When the position of ease is attained in which pain vanishes or markedly eases from the palpated tender point, the stressed tissues are felt to be at their most relaxed. While using SCS, the position of ease should be held for not less than 90 seconds, after which a very slow return is made to neutral. No 'new' or additional pain should be caused by the positioning of the tender point tissues into ease.

Pre treatment and post treatment values of pain, ROM and VISA-P were recorded and after 4 weeks of treatment period these measures were statistically analysed by using students 't' test.

STATISTICAL ANALYSIS

FIGURE - 1

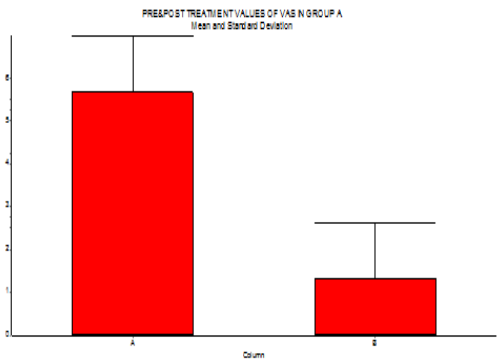

TABLE -1

S.NO	PRE	POST
MEAN	5.667	1.333
S.D	1.303	1.303
S.E.M	0.3761	0.3761
P VALUE	< 0.0001 considered extremely significant	

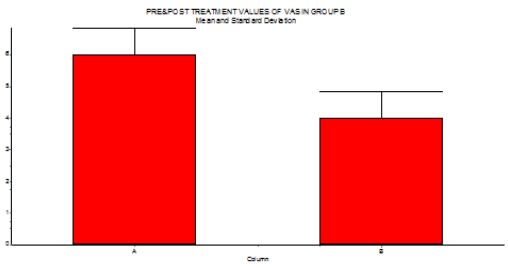

FIGURE -2

S.NO	PRE	POST
MEAN	6.000	4.000
S.D	0.8528	0.8528
S.E.M	0.2462	0.2462
P VALUE	< 0.0001 considered extremely significant.	

TABLE-2

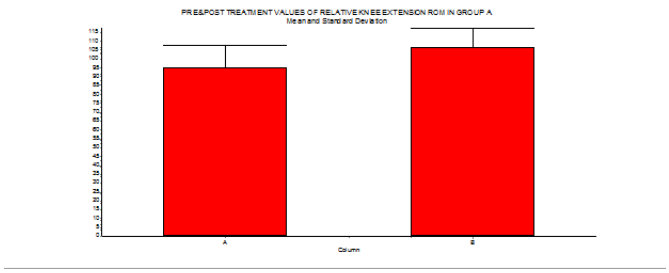

FIGURE-3

S.NO	PRE	POST
MEAN	95.000	106.67
S.D	12.792	10.731
S.E.M	3.693	3.098
P VALUE	0.0242 considered significant.	

TABLE-3

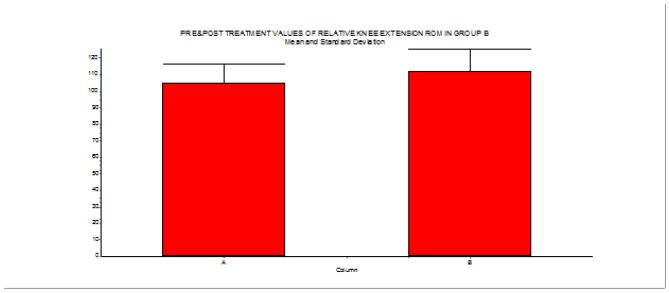

FIGURE-4

S.NO	PRE	POST
MEAN	105.00	112.08
S.D	11.282	13.561
S.E.M	3.257	3.915
P VALUE	0.1781 considered not significant.	

TABLE-4

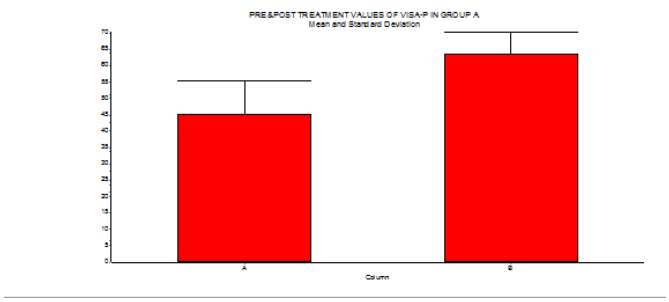

FIGURE-5

S.NO	PRE	POST
MEAN	45.333	63.667
S.D	10.245	6.457
S.E.M	2.958	1.864
P VALUE	<0.0001 considered extremely significant.	

TABLE-5

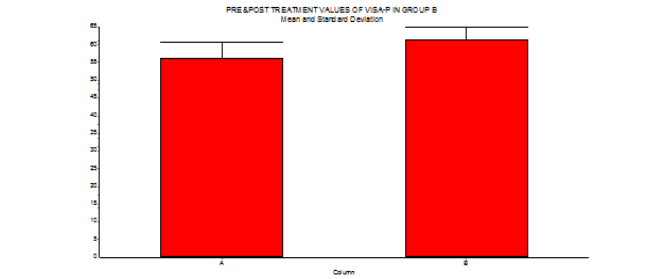

FIGURE-6

S.NO	PRE	POST
MEAN	56.333	61.333
S.D	4.372	3.551
S.E.M	1.263	4.670
P VALUE	0.0056 considered very significant.	

TABLE-6

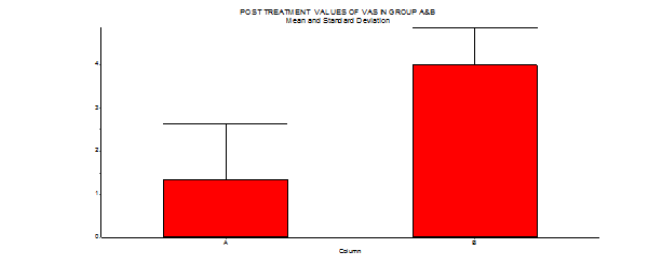

FIGURE-7

S.NO	PRE	POST
MEAN	1.333	4.000
S.D	1.303	0.8528
S.E.M	0.3761	0.2462
P VALUE	<0.0001 considered extremely significant	

TABLE-7

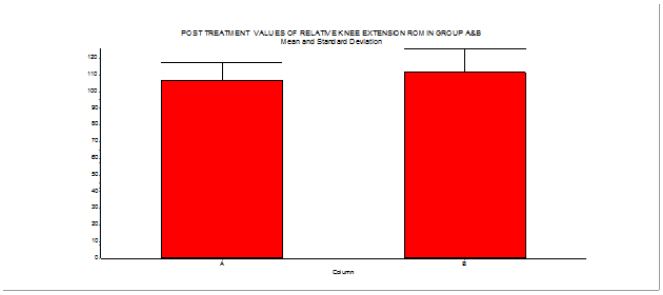

FIGURE-8

S.NO	PRE	POST
MEAN	106.67	111.67
S.D	10.731	13.707
S.E.M	3.098	3.957
P VALUE	0.3306 considered not significant.	

TABLE-8

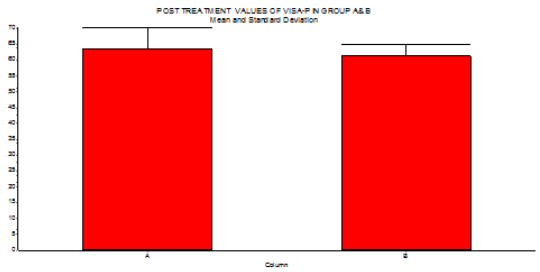

FIGURE-9

S.NO	PRE	POST
MEAN	63.667	61.333
S.D	6.457	3.551
S.E.M	1.864	1.025
P VALUE	0.2846 considered not significant.	

TABLE-9

RESULTS

Unpaired t – test was used to compare pain, ROM and disability scores between ART and SCS technique. The improvement in scores was measured by the difference between pre and post values of outcomes. The mean differences of ART in VAS is considered extremely significant (p value is < 0.0001), relative knee extension is considered significant (p value is 0.0242) and VISA – P is considered extremely significant (p value is < 0.0001). The mean difference of SCS technique in VAS is considered extremely significant (p value is < 0.0001), relative knee extension is considered not significant (p value is 0.1781) and VISA – P is considered very significant (p value is 0.0052).

DISCUSSION

The purpose of this study was to determine the effectiveness of Active Release Technique and Strain Counter- strain technique in decreasing the pain, improving the range of motion and decreasing the disability in runners with Patellar Tendinopathy. Pre and post treatment values of VAS, goniometer and VISA-P were recorded. Although the study shows improvement in both the groups, decrease pain,increase ROM and decrease disability is more significant in Group-A.

VAS showed p value 0.2846 considered extremely significant in Group-A in decreasing pain where as when compared Group-B.

Michelle Ghiglieri DPTc,et al, 2013[xxv], conducted a study on Is augmented soft tissue mobilization effective in treating tendon disorders EFFECTIVE . Augmented soft tissue mobilization may be a valuable tool for relieving pain in patients with tendon disorders. Current evidence does not support improvement in function. More research needs to be completed to form clinical guide lines for treatment.

Ha°kan Alfredson, J Cook et al, 2007[xxvi], conducted a study on A treatment algorithm for managing Achilles tendinopathy: new treatment options. Achilles tendinopathy is a condition that can be effectively treated by the primary care practitioner. There are many simple and easily applied conservative treatment options that can relieve most tendon pain. Most of those who fail to respond to conservative care will find relief from surgical treatment.

Aliza Rudavsky, Jill Cook et al, 2015[xxvii], conducted a study on Physiotherapy management of patellar tendinopathy (jumper's knee) Research has increased our understanding of patellar tendinopathy and pathology but there is still more to discovered Currently, the most important factors in managing athletes with patellar tendinopathy are to educate them about how to modify loading according to symptoms, to ensure that they understand how to increase or decrease loading appropriately, and to assess and modify intrinsic and extrinsic factors that may be contributing to overload where soft tisuue manipulations are advantageous than loading exercises.

Goniometer showed p value 0.3306 considered extremely significant in Group A in increasing range of motion where as when compared to Group B.

Marsha Rutland, et al,2010[xxviii], conducted a study on Evidene-supported rehabilitation of patellar tendinopathy and concluded that A combination of active rest, education, eccentric exercise, progressing the training regime by 10% weekly, and modifying activity have all been found to be effective in tendinopathy treatment.

Konstantinos Katzis, et al, 2015[xxix], conducted a study on Patellar Tendinopathy Rehabilitation Device - Have fun with Serious Games Simple mechanisms can be developed using off-the-shelf devices to solve complex everyday problems. Such a mechanism is our patellar-tendon rehabilitation device along with the Super Physio-Mario Serious Game. Both parts have been tested and showed that they can perform the proposed clinical trial.

Drover JM, et al, 2004[xxx], conducted a study on Influence of active release technique on quadriceps inhibition and strength: a pilot study in which the sample consisted of 9 athletes (4 male athletes, 5 female athletes) who were identified as suffering from unilateral anterior knee pain. The treatment intervention consisted of the Active Release Technique treatment protocols for anterior knee pain. Concluded that ART protocols did not reduce inhibition or increase strength in the quadriceps muscles of athletes with anterior knee pain but ROM is increased.

Even in this study also ART showed more improvement in ROM of knee than strain counter strain technique.

VISA-P questionnaire showed P value 0.2846 considered extremely significant in Group A in decreasing disability where as when compared to Group B.

Anna Frohm, et al, 2007[xxxi], conducted a study on Eccentric treatment for patellar tendinopathy: a prospective randomised short-term pilot study of two rehabilitation protocols. It is a Prospective, randomised clinical trial two-legged eccentric overload training twice per week, using the new device (Bromsman), was as efficient and safe as the present standard daily eccentric onelegged rehabilitation-training regimen using a decline board.

J. Zwerver 2008[xxxii], conducted a study on Patellar tendinopathy (jumper's knee): a common and difficultto-treat sports injury Patellar tendinopathy is a common overuse injury of the patellar tendon with a very negative impact on the career of an athlete. Up to now no single treatment exists that guarantees a quick and symptom-free return to the original sports level. Therefore, a prolonged rehabilitation program to restore the balance between load and loading capacity and to promote regeneration of the tendon is the best treatment.

F Abat et al, 2014[xxxiii], conducted a study on Patellar tendinopathy: a critical review of current therapeutic options Larger randomised controlled trials on the various treatment options and even comparative studies between them are needed to determine what the treatment of choice for patellar tendinopathy should be. Larger RCTs on the various treatment options and even comparative stud¬ies between them are needed to de¬termine what the treatm ent of choice for patellar tendinopathy should be. In this study also ART is showed marked improvement than SCS in relation to VISA-P suggesting knee disability can be treated by it.

Thus the present study shows that ART is better than SCS in decreasing pain, improving ROM and knee disability level.

CONCLUSION

In conclusion the results of the current study demonstrated that the effectiveness of two manual therapy protocols in decreasing the pain, increasing the ROM and decreasing the disability in patellar tendinopathy athletes after application of 5 – 6 repetitions for 12 sessions for 4 weeks suggested that the improvements regarding pain, ROM and disability after SCS technique is not significant when compared to ART technique.

SUMMARY

Manual therapy is a popular method of treatment in patellar ligament injuries and muscle repair following any activity, however the manual therapy prior to activity is also an option and is often used in sports medicine. 5 – 6 repetitions for 12 sessions for 4 weeks of manual therapy for patellar tendinopathy showed deleterious effect regarding pain, ROM and disability. Considering the effects of manual therapy, this experimental study was done on 24 subjects and are equally divided into two groups consisting of 12 subjects in each group. Group A received ART and Group B received SCS technique. VAS, ROM and VISA-P values were measured before and after the treatment protocols. After analyzing the results statistically it is suggested that ART is beneficial than SCS technique in decreasing pain, increasing ROM and decreasing disability in patellar tendinopathy.

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