

**A COMPARITIVE STUDY BETWEEN MYOFASCIAL TRIGGER POINT  
RELEASE AND SELF STRETCHING WITH INTERMITTENT ICING IN  
IMPROVING THE FOOT AND ANKLE FUNCTION OF HOCKEY  
PLAYERS WITH PLANTAR HEEL PAIN**

**Dissertation**

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**In partial fulfillment for the degree of**

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**(SPORTS PHYSIOTHERAPY)**



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**CHERRAAN'S COLLEGE OF PHYSIOTHERAPY**

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**Coimbatore, Tamilnadu, India.**

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**CERTIFICATE**

The work embodied in the thesis entitled ” **A COMPARITIVE STUDY BETWEEN MYOFASCIAL TRIGGER POINT RELEASE AND SELF STRETCHIG WITH INTERMIDDENT ICING IN IMPROVING THE FOOT AND ANKLE FUNCTION OF HOCKEY PLAYERS WITH PLANTAR HEEL PAIN**” submitted to the **Tamilnadu Dr.MGRMedical University, Chennai** in the partial fulfillment for the degree of **Master of physiotherapy**, was carried out by candidate bearing register number of 271650123 at Cherraan’s college of physiotherapy, Coimbatore under my supervision.This is an original work done by her and has not been submitted in part or full for any other degree/diploma at this or any other university/institution. The thesis is fit to be considered for evaluation for award of the degree of Master of Physiotherapy.

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## **DECLARATION**

I hereby declare and present my project work entitled “” **A COMPARITIVE STUDY BETWEEN MYOFASCIAL TRIGGER POINT RELEASE AND SELF STRETCHIG WITH INTERMIDDENT ICING IN IMPROVING THE FOOT AND ANKLE FUNCTION OF HOCKEY PLAYERS WITH PLANTAR HEEL PAIN”** The outcome of the original research work undertaken and carried out by me, under the guidance of Professor. **Mr.Chinnachamy,MPT (Sports)**, Cherraan’s college of physiotherapy, Coimbatore.

I also declare that the material of this project work has not formed in anyway the basis for the award of any other degree previously from the Tamilnadu Dr. MGR Medical University.

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# **A COMPARITIVE STUDY BETWEEN MYOFASCIAL TRIGGER POINT RELEASE AND SELF STRETCHING WITH INTERMITTENT ICING IN IMPROVING THE FOOT AND ANKLE FUNCTON OF HOCKEY PLAYERS WITH PLANTAR HEEL PAIN**

## **1. INTRODUCTION**

The history of the game of hockey has its roots well laid in the world's early civilizations. One of the oldest known sports, the game is believed to be in existence about 1200 years before the Ancient Games of Olympia. Right from Arabs, Greeks, Romans, Persians to Ethiopians, everyone played a variation of the game. While some played it just for recreation, the others were of the opinion that hockey would make them better warriors. Even though many ancient civilizations played hockey in different variations, the modern game of hockey, the field hockey, developed in the British Isles in the 19th century.

A popular English school game, hockey was introduced in India by British Army regiments and the game soon found to be favour among the native Indians. Spreading internationally, the popularity of the game was especially effervescent in India and Pakistan. It was during this time that the London Hockey Association was formed and the rules for playing hockey were standardized. In 1924, the International Hockey Federation (FIH) was formed and three years later, the International Federation of Women's Hockey followed.

A common problem for hockey players is calf muscle tightness, especially during training periods. The symptom is a gradual tightness of the calf muscle during training or running. A hockey player's calf muscle may have gradually tightened up over a period of time through poor flexibility and stretching, or biomechanical problem in their running style.



The heel can absorb 110% of body weight during walking and 200% of body weight during running. Dorsiflexion of the toes applies traction stress at the origin of the plantar fascia. A contracture in the triceps surae can increase the traction load at the origin of plantar fascia during weight-bearing activities.

Plantar heel pain among hockey players is usually due to overuse and poor biomechanics. However, muscle strength imbalance and muscle tightness have also been indicated as causes of plantar heel pain. Other possible contributing factors to plantar heel pain include loss of plantar fat pad with advancing age, increased body-weight.

The heel bone is the largest of the 26 bones in the human foot, which has 33 joints, more than 100 tendons, muscles, and ligaments. Like all bones, it is also subjected to outside influences that can affect its integrity and its ability to keep us on our feet.

Plantar heel pain is a common orthopaedic problem that can cause discomfort and a limp because of the difficulty in bearing weight.

The etiology of this condition is multiple and therefore, a careful clinical evaluation is necessary for its proper management. Nonsurgical or conservative care is successful in most cases McPoil et al, (2008).

Significant history was isolated plantar heel pain, pain with initial weight-bearing after periods of rest, Morning pain and barefoot walking or ill-fitting shoes.

According to Romulo Renan, et al (2011) soft tissue manual therapy can further improvement for management for heel pain.

Trigger point or muscle knots, are described as hyperirritable spots in skeletal muscle that are associated with palpable nodules in taut bands of muscle fibers. Trigger points believe that palpable nodules are small contraction knot and common cause of pain.

Pain in the arch of the foot is frequently diagnosed as plantar fasciitis. Like heel pain, trigger points in the calf muscles are frequently responsible for this type of foot pain, though trigger points in the small muscles of the foot may also contribute to this pain.

Though the calf muscles are very strong, they are easily overloaded by everyday activities. The trigger points that develop in these muscles refer pain to the foot for one reason: to get you off your feet and allow the overloaded calf muscles to recover.

There are Six muscles group that contain trigger points that refer pain to the foot.

- The gastrocnemius
- The soleus
- The tibialis anterior are the commonly involved muscles.

The calf muscle attaches into the foot by the achilles tendon into the back of the heel. When the calf muscle is tight it limits the movement of the ankle joint. When ankle joint motion is limited by the tightness of the calf muscle it forces the subtalar joint to pronate excessively.

Excessive subtalar joint pronation can cause several different problems to occur in the foot. Therefore it makes sense that reduction of the tightness of the Achilles tendon and calf muscles will have a positive effective on heel pain.

Foot and ankle ability is self-reported outcome instrument developed to assess physical function and performance for individuals with foot and ankle related impairments.

Myofascial release is a soft tissue mobilization technique. If the condition is treated in the acute stage, then symptoms will be aggravated. If treated in the chronic stage, the symptoms will alleviate. Myofascial release techniques stem from the foundation that fascia, a connective tissue found throughout the body, reorganizes itself in response to physical stress and thickness along the lines of tension. By myofascial release there is a

change in the viscosity of the ground substance to a more fluid state which eliminates the fascia's excessive pressure on the pain sensitive structure and restores proper alignment. Hence this technique is proposed to act as a catalyst in the resolution of plantar fasciitis.

Cryotherapy is the application of ice over a body part and is allowed to reduce the local temperature and thus alters the thermoregulation mechanism. Effective and suitable application of ice will create a change in the physiological function locally and enhance the healing of injured part. By using the traditional ice therapy, we can alter the methods of application and analyse the effects of these new methods.

The present study was undertaken with the intention to compare myofascial trigger point release and self-stretching with intermittent icing treatment and to compare myofascial trigger point release and self-stretching with intermittent icing treatment. So I divided the patients into two groups that is group A(Control group), group B(Experimental group).

## **1.1NEED FOR THE STUDY**

Plantar heel pain not only cause pain and discomfort but also affects the physical foot and ankle functions of the hockey players and their results in deconditioning.

Previous studies have reported that stretching of the calf musculature and the plantar fascia are effective management strategies for plantar heel pain.

Few studies are available to analyse the effect of soft tissue therapy for plantar heel pain in athletic population.

So this study was conducted in order to compare either Myofascial trigger point release or self-stretching with intermittent icing as a useful intervention in the management to improve foot and ankle function for plantar heel pain in hockey players.

## **1.2 STATEMENT OF THE PROBLEM**

A study to compare myofascial trigger point release and self-stretching with intermittent icing in improving foot and ankle functions in hockey players with plantar heel pain

## **1.3 OBJECTIVE OF THE STUDY**

- To determine the efficacy of physiotherapeutic techniques in improving foot and ankle function of hockey players with plantar heel pain.
- To systematically compare the efficacy of myofascial trigger point and self stretching with intermittent icing in improving foot and ankle functions of hockey players with plantar heel pain
- To systematically assess the literature and present the best available evidence for improving the foot and ankle function in hockey players with plantar heel pain

## **1.4 HYPOTHESIS**

The following hypothesis are framed for this study

### **1.4.1 HYPOTHESIS**

H<sub>1</sub> There may not be significant difference in pain following the treatment of myofascial trigger point releases among hockey players with plantar heel pain

H<sub>2</sub> There may not be significant difference in foot and ankle function following the treatment of myofascial trigger point releases

H<sub>3</sub> There may not be significant difference in pain following the treatment of self stretching with intermittent icing among hockey players with plantar heel pain

H<sub>4</sub> There may not be significant difference in foot and ankle functions following the treatment of self stretching with intermittent icing among hockey players with plantar heel pain

H5 There may not be significant difference in pain between myofascial trigger point release and self stretching with intermittent icing in improving the foot and ankle functions of hockey players with plantar heel pain

H6 There may not be significant difference in foot and ankle function between myofascial trigger point release and self stretching with intermittent icing in improving the foot and ankle functions of hockey players with plantar heel pain

## **1.5 OPERATIONAL DEFINITIONS**

**Plantar heel pain:** This is the most common type. the cases of heel pain is multiple. The causes may include tightness of calf muscle, minor strains and sprains in the ligaments surrounding the heel

**Myofascial trigger point release:** Can be defined as the facilitation of the mechanical, neural, and psycho physiological adaptive potential as interfaced via the myofascial system (samkegerreis 1994)

Trigger points or muscle knots are described as hyperirritable spots in skeletal muscle that are associate with palpable nodules in taut bands of muscle fibres. trigger points believe that palpable nodules are small contraction knot and common cause of pain (Romulo renan et al 2011).

**Stretching:** It is the therapeutic maneuver designed to lengthen (elongate) pathologically shortened soft tissue structures and thereby to increase the range of motion.(**Carolyn Kishner**)

**Intermittent icing:** Cryotherapy is the application of ice over a body part and is allowed to reduce the local temperature and thus alters the thermoregulation mechanism. Effective and suitable application of ice will create a change in the physiological function locally and enhance the healing of injured part.( CM Bleakley 1987, Mac Auley

DC 1994)

**VAS: Visual analogue scale** is a psychometric response scale which is used in questionnaires, it is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. When responding to VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between two end points on a ten centimetre scale. The value 0 (zero) indicates no pain; while 10(ten) indicates excruciating pain(huskisson 1976, scott1977, downie 1978, melzack 1983, price 1983)

**FAAM: Foot and Ankle Ability Measure** is a region-specific, non-disease-specific outcome instrument that possesses many of the clinometric qualities recommended for an outcome instruments. Evidence of validity it support the use of FAAM is available in individuals with a wide array of ankle, a foot disorder. However, addition evidence to support the use of the FAAM for those with chronic ankle inability is needed. (christoper 2008)

## **II. REVIEW OF LITERATURE**

### **SECTIONS**

- SECTION - A : Studies on Plantar heel pain related to Hockey players**
- SECTION –B : Studies On Myofascial Trigger Point Release Related to  
plantar heel pain**
- SECTION – C : Studies On Stretching Related To Plantar Heel Pain**
- SECTION – D : Studies On Intermittent Icing Related To Plantar Heel Pain**
- SECTION - E : Studies On Criterian Measures**

## **SECTION A: Studies on Plantar heel pain related to Hockey players**

**David Liddle, et al., (1994):** Formulated that Plantar heel pain is common in both athletic and non-athletic population. In athletic population excessive plantar heel force and pressure are intrinsic risk factors that may play a contributory role in plantar heel pain in hockey players.

**Hunter G et al., (2002):** formulated that Following injury, the ability of soft tissue to tolerate the demands of functional loading decreases. A major part of the management of soft tissue dysfunction lies in promoting soft tissue adaptation to restore the tissue's ability to cope with functional loading. Specific soft tissue mobilization (SSTM) uses specific, graded and progressive application of force by the use of physiological, accessory or combined techniques either to promote collagen synthesis, orientation and bonding in the early stages of the healing process, or to promote changes in the viscoelastic response of the tissue in the later stages of healing.

**Guyton, et al., (2000):** Explored that, When tension develops in a muscle the Golgi tendon organ fires, inhibits alpha motor neuron activity and increases tension in the muscle tendon

## **SECTION –B: Studies On Myofascial Trigger Point Release Related to plantar**

**heel pain Brain young et al, (2004):** They stated case study to describe impairment based physical therapy treatment approach for 4 patients with plantar heel pain. 4 patients completed a course of physical therapy based on the impairment-based model. All 4 patients received Myofascial trigger point and stretching. 2 Patients were treated with custom orthosis, 1 patients received on strengthening exercise program additionally and they concluded that based on the above treatment program, complete pain relief and full return to activities



**Chang-Zern et al, (1993):** Studied that the immediate effectiveness of treatment on an active myofascial trigger point with physical medicine modalities, including spray and stretch, hydrocollator superficial heat, ultrasound deep heat, and deep pressure soft tissue massage. 84 hockey players with myofascial pain syndrome and 24 normal subjects were studied. Pain threshold of the active pressure algometer before and after the treatment with each one of the above mentioned modalities and placebo sham ultrasound. The results shows that all 4 therapeutic modalities can be effectively applied for the treatment of myofascial pain syndrome to obtain an immediate increase of pain threshold of an active myofascial trigger point, although the stretch therapy is more effective than the thermotherapy.

**Christian lemburg, et al., (2008):** Stated that the trigger points that hockey players are likely to experience differ according to their postural style, since different muscle are involved in the movement pattern and requirements of different activities. For example foot pain, referred from the calves..

**Davies Clairet, et al., (2004):** Stated that Most of the common everyday pain is caused by myofascial trigger point and that ignore basic concept could invariably leads to false diagnosis and failure to deal effectively with pain.

**Elizabeth et al, (2007):** Studied that, this study is to investigate the criteria adopted by experts to diagnose myofascial trigger point (MTrP) pain syndrome. We conclude that there is as limited consensus to definition in respect of myofascial trigger point pain syndrome. Further research is needed to test the reliability and validity of diagnostic criteria. Until reliable diagnostic criteria have been established, there is a need for greater transparency in research papers on how a case of MTrP pain syndrome is defined, and claims for effective interventions in treating the condition should be viewed.

**Gordon M. Wyant, et al., (1979):** Stated that Trigger point are distinct area of focal hyperirritability which give rise to areas of referred pain in well-defined areas of the musculoskeletal system, sometimes remote from the pain itself and not related to it by anatomically definable pathway.

**Hugh Gemell, et al., (1988):** They conducted the study about Ischemic compression is superior to ultrasound in immediately reducing pain in patient with non specific neck pain and upper trapezius trigger points.

**Hing CZ, et al., (1996):** They defined that Myofascial pain syndrome is a common painful muscle disorder caused by myofascial trigger points. Trigger points are discrete, focal, hyperirritable spots located in a taut band of skeletal muscle. The spots are painful on compression and can produce referred pain, referred tenderness, motor dysfunction, and autonomic phenomena. Active trigger point causes pain at rest. It is tender to palpation with a referred pain pattern that is similar to the patient's pain complaint.

**Jan Dommerholt, et al., (2006):** Stated that ,Ischemic compression therapy provides alternative treatment using either low pressure and a long duration (90s) or high pressure and short duration (30s) for immediate pain relief and MTrP sensitivity suppression.

**Perry H Jedian, et al., (1996):** Studied that one of the most common causes of plantar fasciitis is tightness of the calf muscle and Achilles tendon. More importantly muscle tightness is usually traced to trigger points

**Perry et al., (2006):** Stated that pain in the arch of the foot is frequently diagnosed as plantar fasciitis. Like heel pain, trigger points in the calf muscles are frequently responsible for this type of foot pain, though trigger points in the small muscles of the foot may also contribute to this pain. Though the calf muscles are very strong, they are

easily overloaded by everyday activities. The trigger points that develop in these muscles refer pain to the foot for one reason: to get you off your feet and allow the overloaded calf muscles to recover.

**Winer JH et al., (2001):** They Stated trigger point muscle therapy, or myotherapy, can be a very effective method of decreasing pain and increasing mobility and flexibility. The muscles are most frequently the major source of musculoskeletal pain and dysfunction, often mistakenly presumed to be solely the effect of arthritis.

**Travel and simons ., (1999):** They explored that many cases of heel pain were mistakenly believed to be plantar fasciitis are actually due to a trigger point in the calf muscle. If heel pain is due to a trigger point in the calf, no treatment of the plantar fasciitis will stop the pain. The trigger point that causes heel pain is in the soleus muscle, a part of the calf muscle group. There are a couple more trigger points in the soleus that can become activated, but the one that refers pain to the heel is the most distal, located furthest down leg.

## **SECTION – C : STUDIES ON STRETCHING RELATED TO PLANTAR HEEL PAIN**

**Benedict, et al., (2003):** A prospective, Randomized study to find-out tissue-specific Plantar fascia-stretching exercise enhances outcomes in hockey players with chronic heel pain. 101 patients who diagnosis of chronic proximal plantar fasciitis for a duration of at least 10 months and divided into 2 groups, all players received plantar fascia tissue-stretching program and Achilles tendon-stretching respectively. The results shows a program of non-weight-bearing stretching exercise specific to plantar heel fascia is superior to the Achilles tendon-stretching exercise for the treatment of plantar fasciitis.

**Becker, et al.,(2000)** : Stated that, if a slow stretch force applied to muscle, the Golgi tendon organ fire and inhibits the tension in the muscle, allowing the parallel elastic component (the sarcomere) of the muscle to lengthen.

**Joel A Radford (2007):**They conducted the study, When used for the short-term treatment of plantar heel pain, a two-week stretching program provides no statistically significant benefit in 'first-step' pain, foot pain, foot function or general foot health compared to not stretching.

**Kishner and Colby et al (2002):** They Stated that adequate mobility of soft tissues and joints is thought to be an important factor in prevention of injury (or) reinjure to soft tissues.

**Romulo Renum, et al., (2009).** They found that the sarcomeres by direct pressure combined with active stretching of the involved muscle may equalise the length of sarcomeres and consequently decrease the pain and increase the physical performance

**Pawlak, et al., (1998)** : They stated that Muscle tightness is a limiting factor for optimal physical performance and an important intrinsic factor for sports injury.

**Pearson K, et al., ( 2000):** They stated that, when tension develops in a muscle the golgi tendon organ fires, inhibits alpha motor neuron activity, and decreases tension in the muscle tendon unit being stretched. If a low intensity, slow stretch force is applied to muscle, the stretch reflex is less likely to be activated as the golgi tendon organ fires and inhibits tension in muscle, allowing the parallel elastic component (the sarcomeres) of the muscle to remain relaxed and lengthen.

**Sarhmann.S et al (1997) :** They stated that muscle tightness and hyper tonicity has a significant impact on the neuromuscular control. Muscle tightness affects the normal length tension relationship.

**Richard et al, (2005):** They explored that calf muscle stretching programs are used to increase dorsiflexion range of motion at the ankle. On this study 19 women age group between 65 to 89 was selected and grouped into two. The stretching group showed increased maximal dorsiflexion range of motion. Eight week stretching program most likely increased the maximal length, length extensibility and passive resistive force of calf muscles.

#### **SECTION –D: STUDIES ON INTERMITTENT ICING RELATED TO PLANTAR HEEL PAIN**

**Mac Auley Dc et.al:** Conclude that a 10 minutes application of ice time is most effective in reducing the pain and swelling associated with soft tissues injury and minimize further injury.

KarunakaraRget.al. They conducted studies show that repeating ice application after an initial 20 minute application for 2 repetitions of 10 minutes off and 10 minutes on, lowers the blood flow (VC) significantly more than a single 20 minute ice application

**Minnesota Rugby Union:** Recommends intermitted icing may be beneficial for up to seven days. Where minor injuries, it needs 24 hours of icing.

**Kessler R M et.al. :**They suggested that cold relives pain through gate control mechanism by interfering with pain transmission at the second order neurons in the dorsal root ganglion of the spinal cord.

**Houttet.al.:**They concluded that the cryotherapy is essential for initial and lateral rehabilitation of ligament injuries.

**CM. Bleakley et.al. :**They concluded in his study that intermittent application may enhance the therapeutic effect of ice in pain relief after acute soft tissue injury.

#### **SECTION-E : STUDIES ON CRITERIA MEASURES**

**Anne Margee Kelly, et al., (1998):** They conducted a prospective descriptive study to determine the minimum clinically significant in VAS pain scores for acute pain. 152 adult hockey players at 20-minute intervals to a maximum of three measurements and data were composed based on gender, age more than or less than 50 years. The results shows significant difference in VAS pain and No significant difference in minimum significant VAS score were found between gender, age and cause of pain groups.

**Christoper et al, (2008).:** Explored that the Foot and Ankle Ability Measure (FAAM) is a region-specific, non-disease-specific outcome instrument that possesses many of the clinometric qualities recommended for an outcome instruments. Evidence of validity it support the use of FAAM is available in individuals with a wide array of ankle, a foot disorder. However, addition evidence to support the use of the FAAM for those with chronic ankle inability is needed.

**Mazaheri M, et al., (2010):** Stated that FAAM scores were greater in individuals who rated their function as normal or nearly normal compared with those who rated as abnormal or severely abnormal for SPORTS but not for ADL (P=0.15).The Persian version of FAAM is a reliable and valid measure to quantify physical functioning in patients with foot and ankle disorders.

**Martin RL, et al., (1998):** Stated that there is no universally accepted instrument that can be used to evaluate changes in self-reported physical function for individuals with leg, ankle, and foot musculoskeletal disorders. This study was designed to provide validity evidence for interpretation of FAAM scores; they concluded that FAAM is a reliable, responsive, and valid measure of physical function for individuals with a broad range of musculoskeletal disorders of the lower leg, foot, and ankle.

**Polly, et al., (2008):** Studied that; reliability of the visual analogue scale for measurement of Acute pain in emergency department (ED). Intra-class correlation coefficients and Bland-Altman analysis were used to assess reliability of paired VAS measurement was obtained. The results show reliability of the VAS for acute pain measurement is sufficient to assess acute pain.

**John Gallagher, et al., (2001) :** Studied that, observational cohort study, a clinical important change in pain severity measures on visual analogue scale. At 30-minute intervals during a 2-hour period, patients marked a VAS. The results show Ninety-six patients were used in this study, providing 332 paired pain measurements and 141 paired measurements were noted, this data are proved minimum changes in acute pain that is clinically significant.

## **III.METHODOLOGY**

### **3.1 STUDY DESIGN**

Pre test-post test study comparative in nature

### **3.2 STUDY SETTING**

Study was conducted at **Nehru stadium - Hockey team Coimbatore**, Tamilnadu, under the guidance of Shasti Sports Institute.

### **3.3 STUDY DURATION**

Total duration was six months. Individuals received the treatment for duration of one week.

### **3.4 SUBJECTS**

30 hockey players with clinical diagnosis of plantar heel pain, who fulfill the predetermined inclusive and exclusive criteria were selected and divided into 2 groups by simple random sampling method. Each group consists of 15 patients. Groups are named as group A, and B.

### **3.5 CRITERIA FOR SELECTION**

#### **3.5.1 INCLUSIVE CRITERIA**

- Male hockey players
- Age group between 18 and 25 years
- Minimum one years of continuous performance
- Clinical diagnosis of unilateral plantar heel pain
- Specific controls for subjects included the time of testing, activities of daily living, nutritional factors, and psychological status can be controlled during the study.



### **3.5.2 EXCLUSIVE CRITERIA**

- Subjects with
  - Neurological problems.
  - Any recent injuries to lower limbs.
  - Any recent surgery in lower limbs.
  - Psychologically unstable players.
- Red flags to manual therapies
  - Tumour in lower limb
  - Fractures in lower limb
  - Rheumatoid arthritis
  - Osteoporosis
  - Severe vascular disease.
  - Calcaneal spur
  - TA calcification
- Previous manual therapy interventions for the foot region.

## **3.6 VARIABLES**

### **3.6.1 INDEPENDENT VARIABLES**

- Myofascial trigger point release.
- Self-Stretching & Intermittent icing

### **3.6.2 DEPENDENT VARIABLES**

- Pain
- Foot and ankle functions

### 3.7 ASSESMENT TOOL

- Visual analogue scale
- Foot and ankle ability measures (FAAM)

### 3.8 PROCEDURE

A total of 30 hockey players with a clinical diagnosis of plantar heel pain were randomly divided into 2 groups of 15 each using random sampling method.

#### GROUP A

Group A Control Group receives self-stretching & intermittent icing protocol only

#### SELF-STRETCHING & INTERMITTENT ICING

All participants were instructed to do self-stretching & intermittent icing protocol; these include calf muscles and plantar fascia-specific exercise & were treated with intermittent application of ice therapy in the form of ice cube massage for 10 minutes and the ice cube was removed and the ankle was rested for 10 (ten) minutes.

- **Standing gastrocnemius stretch:** In standing, with the affected foot away from the wall, patient leaned forward, while keeping the heel on the floor; the affected knee was kept in full extension.



- **Standing Soleus stretch:** In standing, with the affected foot away from the wall, patient leaned forward, while keeping the heel on the floor; the affected knee was bent.



- **Plantar fascia stretch:** In sitting, affected foot over the contra lateral thigh, the person places fingers over the base of the toes, and pulls the toes up towards shin.

Holding time – 20 seconds

Resting time – 20 seconds

Intensity – 6 times / 3 mins



## **GROUP B**

Group B- Experimental group receives Myofascial trigger point release protocol only.

### **MYOFASCIAL TRIGGER POINT THERAPY**

Hockey players were examined for the presence of active Trigger points in the gastrocnemius and Soleus muscle.

- Ischemic compression over the trigger point until an increase in muscle resistance was predicted by therapist.
- The pressure was maintained until the therapist perceived release of the taut band.
- Trigger point tension and the process was repeated for 90 seconds, 3 repetitions and followed by massage (longitudinal stroke).



## IV. DATA ANALYSIS AND RESULTS

### STATISTICAL TOOL

#### Paired 't' test

The following statistical tool is used to compare pre test and post test values within the groups.

#### Formula: Paired t-test

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$
$$t = \frac{\bar{d}\sqrt{n}}{S}$$

Where,

$d$  = difference between the pre test versus post test

$\bar{d}$  = mean difference

$n$  = total number of subjects

$S$  = standard deviation

#### Unpaired 't' test:

The unpaired 't' test was used to compare post test values between the two groups.

**Formula: Unpaired t-test**

$$S = \sqrt{\frac{\sum(X_1 - \bar{X}_2)^2 + \sum(X_2 - \bar{X}_2)^2}{n_1 + n_2 - 2}}$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S} \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where,

$\bar{x}_1$  = mean of Group A

$\bar{x}_2$  = mean of Group B

$\Sigma$  = sum of the values

$n_1$  = number of subjects in Group A

$n_2$  = number of subjects in Group B

S = standard deviation

Level of significance: 5%

## 4.1 DATA ANALYSIS

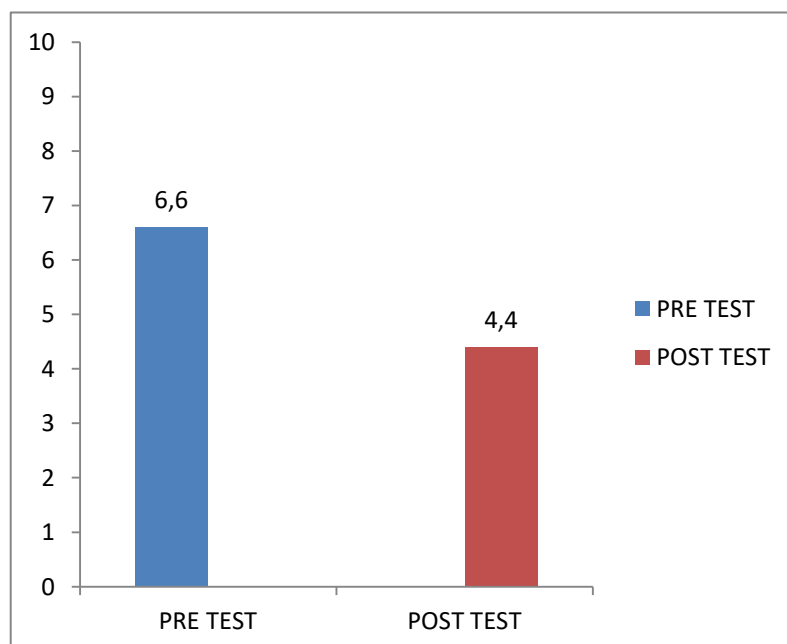
**TABLE – I**

Comparison of mean values, mean differences, standard deviation and Paired ‘t’ test values of pain of Group A.

Test	N	Mean	Standard Deviation	T-Value
PRE TEST	15	6.60	1.12	5.7822
POST TEST	15	4.40	1.40	

**Bar Diagram Fig – I**

**PRE AND POST TEST VALUES OF GROUP A (VAS)**



Using Paired ‘t’ test with 19 degrees of freedom and 5% at level of significance,

the calculated 't' value is 5.78 which is greater than table 't' value 1.7613.

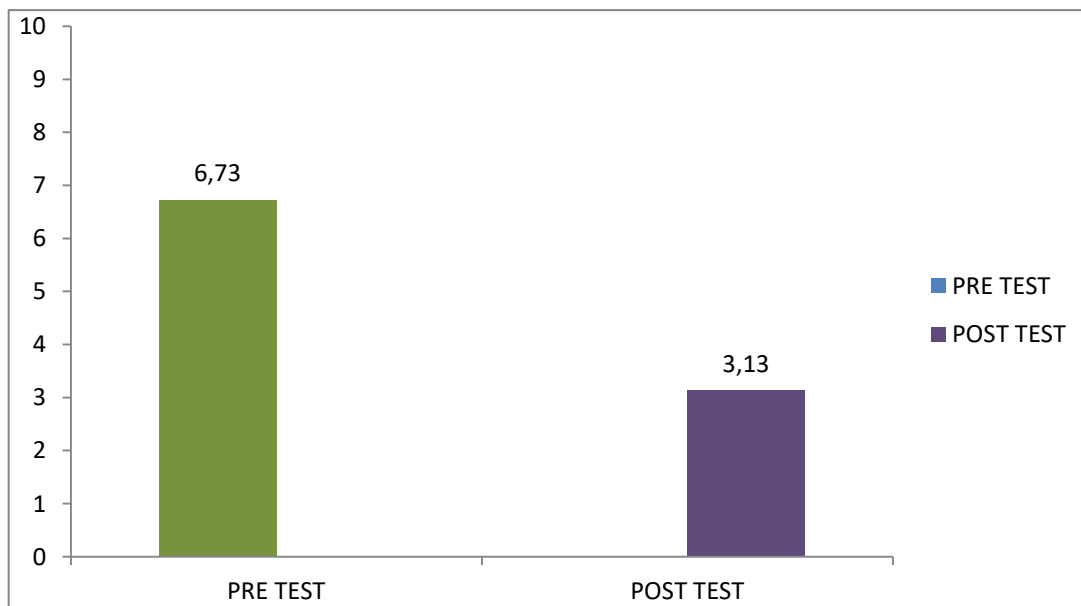
**TABLE - II**

Test	N	Mean	Standard Deviation	t-Value
PRETEST	15	6.73	1.10	18.9237
POST TEST	15	3.13	0.74	

Comparison of mean values, mean differences, standard deviation and Paired 't' test values of pain of Group B.

**Bar Diagram Fig - II**

**PRE AND POST TEST VALUES OF GROUP B (VAS)**



Using Paired 't' test with 19 degrees of freedom and 5% at level of significance, the calculated 't' value is 18.9237 which is greater than table 't' value 1.7613.



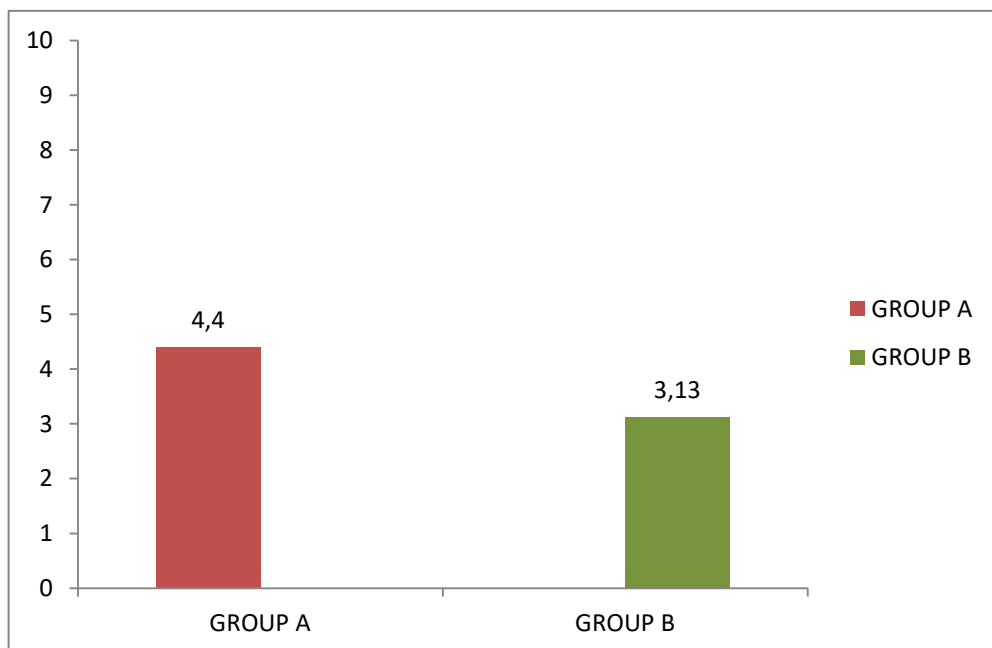
**TABLE – III**

Groups	N	Mean	Standard Deviation	T-Value
GROUP A	15	4.40	1.40	3.0880
GROUP B	15	3.13	0.14	

Comparison mean values, mean differences, standard deviation and Unpaired ‘t’ test pain values of Group A and Group B.

**Bar Diagram Fig -III**

**POST TEST VALUES OF GROUP A AND GROUP B (VAS)**



Post test values of Group A and Group B is analysed by Unpaired ‘t’ test. The calculated ‘t’ value is 3.0880 which is greater than table ‘t’ value 1.7011 at 5% level of significance.

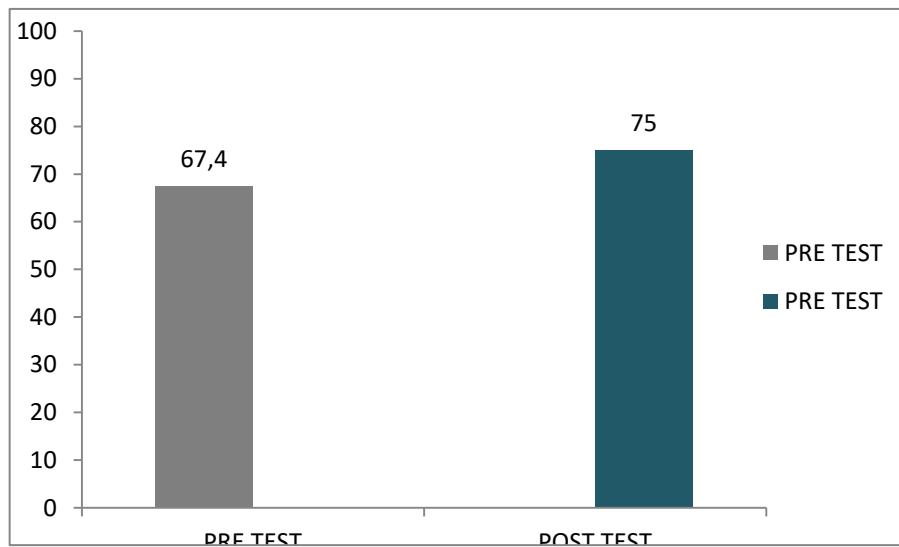
**TABLE – IV**

Comparison of mean values, mean differences, standard deviation and Paired ‘t’ test foot and ankle function values of Group A .

Test	N	Mean	Standard Deviation	T-Value
PRE TEST	15	67.40	6.73	11.7671
POST TEST	15	75.00	1.75	

**Bar Diagram Fig -IV**

**PRE AND POST TEST VALUES OF GROUP A (FAAM)**



Using Paired ‘t’ test with 19 degrees of freedom and 5% at level of significance, the calculated ‘t’ value is 11.76 which is greater than table ‘t’ value 1.7613.

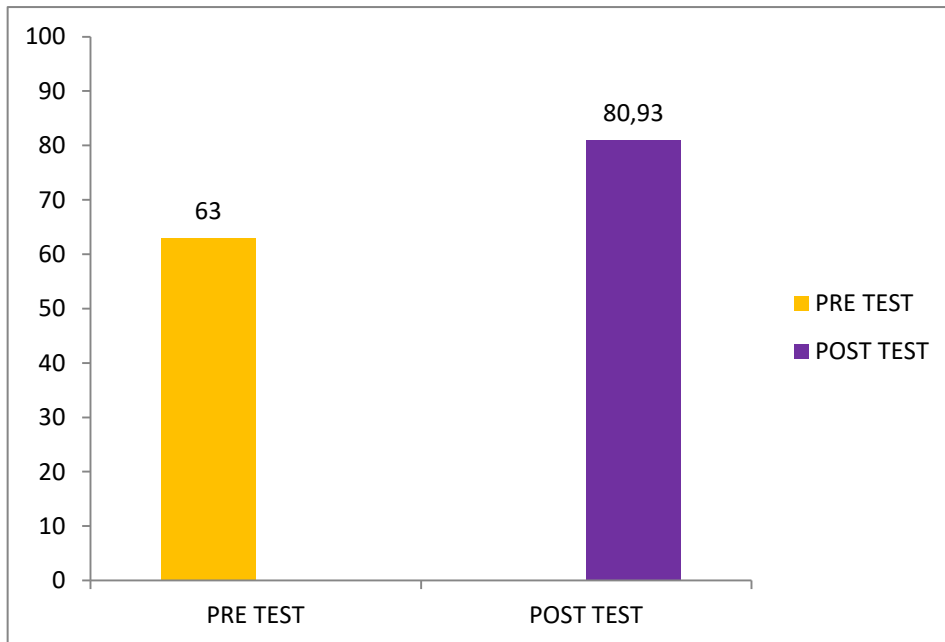
**TABLE – V**

Comparison of mean values, mean differences, standard deviation and Paired ‘t’ test foot and ankle function values of Group B.

Test	N	Mean	Standard deviation	T-value
PRE TEST	15	63.00	4.64	12.4043
POST TEST	15	80.93	6.33	

**Bar Diagram Fig -V**

**PRE AND POST TEST VALUES OF GROUP B (FAAM)**



Using Paired ‘t’ test with 19 degrees of freedom and 5% at level of significance, the calculated ‘t’ value is 12.4043 which is greater than table ‘t’ value 1.7613.

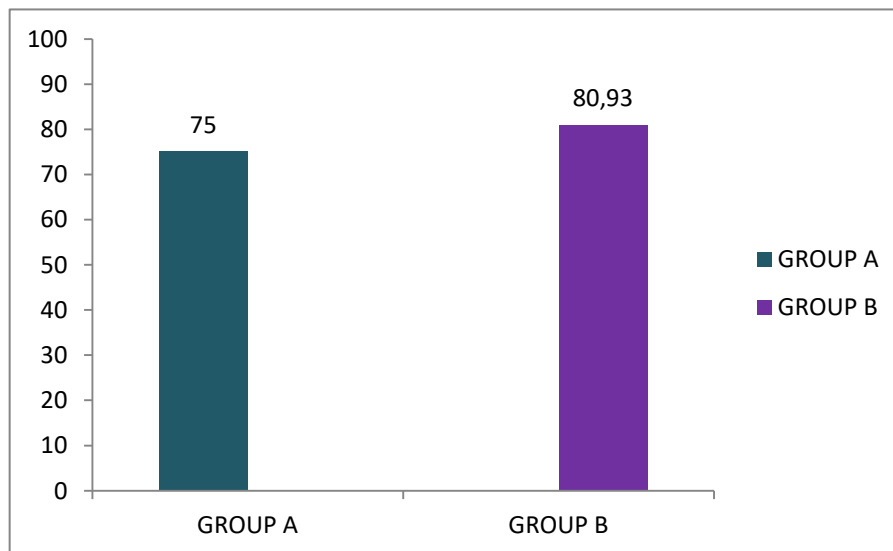
**TABLE - VI**

Comparison of mean values, mean differences, standard deviation and unpaired 't' test foot and ankle function values of Group A and Group B.

<b>Groups</b>	<b>N</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>T-Value</b>
GROUP A	15	75.00	5.67	2.7043
GROUP B	15	80.93	6.33	

**Bar Diagram Fig -VI**

**POST TEST VALUES OF GROUP A & GROUP B (FAAM)**



Post test values of Group A and Group B is analysed by Unpaired't' test. The calculated't' value is 2.7043 which is greater than table't' value 1.7011 at 5% level on **S**

## 4.2 RESULTS

In the table I & IV the pre test and post value of Visual Analogue Scale and Foot and Ankle Ability Measures were assessed for the stretching group. The results show that there was significant decrease in reduction of pain and increase in the physical performance for plantar heel pain hockey players.

In the table II & V the pre test and post value of Visual Analogue Scale and Foot and Ankle Ability Measures were assessed for the myofascial trigger point release and self-stretching with intermittent icing group. The results showed that there was significant decrease in reduction of pain and increase in the physical performance for plantar heel pain hockey players

In the table III & VI the post test value of both Visual Analogue Scale and Foot and Ankle Ability Measures show that there is significant difference in between self-stretching with intermittent icing and myofascial trigger point release The analysis of the post test values shows that there is decrease in reduction of pain and increase in the foot and ankle function between the groups for plantar heel pain in hockey players.

Post test values of Group A and Group B is analysed by Unpaired 't' test. In table III and Figure III he calculated 't' value is 3.0880 which is greater than table 't' value 1.7011 at 5% level of significance.

Post test values of Group A and Group B is analysed by Unpaired 't' test. In table

## **DISCUSSION**

### **5.1 DISCUSSION ON FINDINGS**

Plantar heel pain is common in both hockey and non-hockey player population. In hockey player population excessive plantar heel force and pressure are intrinsic risk factors that may play a contributory role in plantar heel pain in hockey players David Liddle, (1994)

In this study the subject in all the two groups were identical in their performance level before they entered into this study.

Statistical tool paired t test and unpaired t test were used in this study. Paired 't' test showed that both control group and experimental group had significant effect on foot and ankle function and pain for plantar heel pain in hockey players. In the unpaired 't' test results showed that there was a significant difference between the control and experiment group in ankle and foot function and pain for plantar heel pain in hockey players.

In the short term treatment of plantar heel pain there is no significant benefit in foot In function and foot health compared to stretching & intermittent icing (Joel Radford). This statement says that the stretching alone may reduce the pain but there is not significant improvement in foot function

### **5.2 DISCUSSION ON HYPOTHESIS**

H1 In the hypothesis the researcher stated that there may not be significant difference in pain following the treatment of myofascial trigger point release among hockey players with plantar heel pain

The present study revealed that there is significant difference in pain following

treatment of myofascial trigger point among hockey players with plantar heel pain , so the hypothesis has been rejected

H2 In the hypothesis the researcher stated that there may not be significant difference in ankle and foot function following the treatment of myofascial trigger point release among hockey players with plantar heel pain

The present study revealed that there is significant difference in foot and ankle function following treatment of myofascial trigger point among hockey players with plantar heel pain , so the hypothesis has been rejected

H3 The present study revealed that there may not be significant difference in pain following the treatment of self stretching with intermittent icing among hockey players with plantar heel pain

The present study revealed that there is significant difference in pain following treatment of self stretching with intermittent icing among hockey players with plantar heel pain , so the hypothesis has been rejected

H4 The present study revealed that there may not be significant difference in foot and ankle function following the treatment of self stretching with intermittent icing among hockey players with plantar heel pain

The present study revealed that there is significant difference in foot and ankle function following treatment of self stretching with intermittent icing among hockey players with plantar heel pain , so the hypothesis has been rejected

H5 The present study revealed that there may not be significant difference in pain between myofascial trigger point and self stretching with intermittent icing among hockey players with plantar heel pain

The present study revealed that there is significant difference in pain between



myofascial trigger point and self stretching with intermittent icing among hockey players with plantar heel pain , so the hypothesis has been rejected

H6 The present study revealed that there may not be significant difference in foot and ankle function between myofascial trigger point and self stretching with intermittent icing among hockey players with plantar heel pain

The present study revealed that there is significant difference in foot and ankle function between myofascial trigger point and self stretching with intermittent icing among hockey players with plantar heel pain , so the hypothesis has been rejected

## **VI. SUMMARY AND CONCLUSION**

The aim of the study is to compare myofascial trigger point release and self-stretching with intermittent icing for plantar heel pain in hockey players.

30 hockey players with a minimum of five year experience in playing hockey were selected in the age group between 18 and 25 years and the subjects were allotted into two groups, according to inclusion criteria.

Group A received self-stretching & intermittent icing ; Group B received Myofascial trigger point release. The pre-test and post-test were taken before and at the end of the treatment.

Statistical analysis was done by using paired and unpaired't' test. Paired't' test was used to find out the improvement within the group. Unpaired't' test was used to find out the difference between two groups.

The results of the study showed that there is a reduction of pain and increasing foot and ankle function in hockey players with plantar heel pain in both the Group A and Group B. When comparing both Group A and Group B it was concluded that myofascial trigger point release showed better improvement in hockey players with plantar heel pain.

### **CONCLUSION**

It is concluded that myofascial trigger point treatment programme showed better improvement in the reduction of pain in hockey players with plantar heel pain than

Group A

It is concluded that the myofascial trigger point treatment programme showed better improvement in foot and ankle function among hockey players with plantar heel pain than Group A

## **VII. LIMITATIONS AND RECOMMENDATIONS**

- Absences of true control/sham or placebo group.
- These study only a short-term effects and further recommendation is to maintain at a long-term follow-up.
- Additionally, we did not successfully collect enough data on home exercise compliance to allow for analysis.
- Strengths of this study include an adequate sample size to detect between group differences and a very low dropout rate.

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## VIII.ANNEXURE

### ANNEXURE -I

#### ASSESSMENT CHART

I) **Subjective Examination:-**

- a) **Name** :
- b) **Age** : **Yrs**
- c) **Sex** : **M/F**
- d) **Occupation** :
- e) **Chief complaints** :
- |                                 |         |
|---------------------------------|---------|
| Dislocation of Ankle Joint      | Yes /No |
| Hyper mobility                  | Yes/ No |
| Recent fracture around the feet | Yes/ No |
| Neurological disorders          | Yes/ No |
| Hypomobility                    | Yes/ No |
- f) **Weight** : **kgs**
- g) **Height** : **cms**

(ii) **History collection:-**

a) **Present Medical history**

Any fracture or dislocation of Ankle or foot - Yes/No

b) **Past Medical history:-**

Fracture complication of the Ankle and foot - Yes/No



**(iii) OBJECTIVE EXAMINATION:**

**(a) On Observation:**

- General body built
- Musculature
- Deformity
- Tropic changes
- External appliances

**(b) On Palpation:**

- Temperature
- Swelling
- Bony prominence
- Local tenderness
- Oedema or effusion
- Nodules
- Scar tissue
- Muscle spasm

**(h) On Examination:**

**PAIN ASSESSMENT (USING VAS)**

- On set -
- Duration -
- Site of pain -
- Type of pain -
- Nature of pain -
- Aggrevating factors -
- Relieving factors -

## USING VAS



## SENSORY EXAMINATION:

- ❖ Temperature
- ❖ Pressure

## MOTOR EXAMINATION:

Muscle power assessment – Calf Muscles, Intrinsic Muscles -

Joint range of motion - Ankle dorsiflexion -

- 1<sup>st</sup> MTP Joint extension

## (vi) DIAGNOSIS

- X – Ray
- Medical Imaging
- **Special Tests**

- |    |                   |                               |                               |
|----|-------------------|-------------------------------|-------------------------------|
| a) | Point tenderness  | <input type="checkbox"/> + ve | <input type="checkbox"/> - ve |
| b) | Self stretch Test | <input type="checkbox"/> + ve | <input type="checkbox"/> - ve |
| c) | Haglund syndrome  | <input type="checkbox"/> + ve | <input type="checkbox"/> - ve |

(v) AIMS :

(vi) Means :

(vii) Home Program :

## ANNEXURE -II

### Foot and Ankle Ability Measure (FAAM)Activity of daily living

S.No		NO DIFFICULTY	MODERATE DIFFICULTY	EXTREME DIFFICULTY	UNABLE TO DO	N/A
1	Standing					
2	Walking on even Ground					
3	Walking on even ground without shoes					
4	Walking up hills					
5	Walking down hills					
6	Going down stairs					
7	Walking on uneven ground					
8	Steeping up					

	and down curbs					
9	Stepping up and down curbs					
10	Squatting					
11	Coming up on your toes					
12	Walking initially					
13	Walking 5 minutes or less					
14	Walking approximat ely 10 minutes					
15	Walking 15 minutes or greater					
16	Home responsibilit y					

17	Activities of daily living					
18	Personal care					
19	Light to moderate work (standing, walking)					
20	Heavy work (push/pullin g, climbing, carrying)					
21	Recreational activities					

## Foot and Ankle Ability Measure (FAAM)

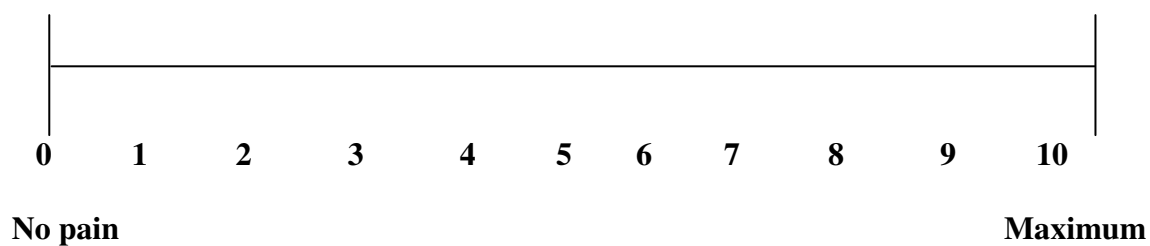
### Sports Subscale

S.No		NO DIFFICULTY	MODERATE DIFFICULTY	EXTREME DIFFICULTY	UNABLE TO DO	N/A
1	Running					
2	Jumping					
3	Landing					
4	Starting and stopping quickly					
5	Cutting/ Lateral Movement					
6	Ability to perform Activities with Your Normal technique					
7	Ability to participate In your desired sport As long as you like					

## ANNEXURE-III

### VISUAL ANALOGUE SCALE

VAS is to measure the severity of pain response that patient experience before and immediately after the completion of treatment. It consists of 10cm horizontal line with 2 ends enabled as no pain (0) and severe pain (10) The patient mark the point on the line corresponds to the severity of pain the patient experiences. The distance in centimetre from the 0 level in VAS to the level to the level marked by the patient was measured as a numerical index of severity of pain.



## ANNEXURE-IV

### DATA CHART

VISUAL ANALOGUE SCALE				
Group A			Group B	
S.No	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
1	5	3	8	4
2	8	5	7	3
3	6	3	5	2
4	6	5	5	3
5	7	4	6	2
6	8	6	8	3
7	7	2	8	4
8	5	4	7	3
9	5	4	5	2
10	6	6	7	3
11	8	6	7	4
12	8	5	6	3
13	7	6	8	4
14	7	2	7	4
15	6	5	7	3



## DATA CHART

FOOT AND ANKLE ABILITY MEASURE				
Group A			Group B	
S.No	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
1	68	72	59	77
2	60	68	58	82
3	70	74	69	79
4	62	73	68	89
5	65	74	65	77
6	61	70	55	75
7	69	74	63	85
8	60	72	62	83
9	62	73	59	86
10	73	81	61	76
11	74	80	57	74
12	81	87	70	84
13	75	81	71	95
14	59	66	64	81
15	72	80	66	71

## ANNEXURE-V

### I. PATIENT CONSENT FORM

Mr/ Mrs, Ms..... has injured with following ailment..... and has present in the clinic for the treatment & I give my consent in full consciousness for carrying out a project on me. The researcher has explained me in detail about his project and after understanding clearly about it and its effects and other consequences. I give my consent for carrying out the same.

**Signature of the observer**

**Signature of the patient**

**Place:**

**Date:**