Chapter 1

Introduction
Chapter- I

INTRODUCTION

1.1. SPORTS

Sports are the highest products of civilization and the most accessible, lived experimental sources of the civilizing spirit; Sport is as old as human society itself. It has been a part of civilized societies throughout history. It is an institution, which has its own traditions and values. Being an active and involved sports person, the vigorous physical activities are used individually as specific complex of sports skills. Their involvement is encouraged by a connection of internal satisfaction along with physical activity itself and externally rewards occurred through involvement in games.

With the increasing competitiveness and rising standard in sports, the talent search has become important, as young talent needs to be spotted out at an early age and nurtured with the right kind of scientific training in order to get excellent performance if she has not been chosen for the sport at the right time.

Ever since sport began, athletes have been trying to get the most out of their training. However, it was not until the last few decades, that levels of sport performance exhibited a spectacular increase. Records that once were imaginary can now be regular. At the same time, the amount of training of modern competitors is considerably higher than that used in the past. This would not be possible without the concurrent evolution in training methodology. The necessity of superior performances in competition has impelled coaches to introduce increasingly effective and sophisticated training methods.

The sports performance or any other type of human performance is not a complex of one unit or event or human character. single system or aspect of human
personality. On the contrary, it is the product of the total personality of the sports person. Sports training therefore, directly aims at improving the personality of sportspersons. No wonder, therefore, sports training is an educational process.

1.2. PHYSIOTHERAPY

Physical therapy (PT), mostly known as Physiotherapy, is a primary care specialty in western medicine that, by using mechanical force and movements [Biomechanics or Kinesiology], Manual therapy, exercise therapy, electrotherapy and various physical therapies who practice evidence based treatments, remediates impairments and promotes mobility, function, and quality of life through examination, diagnosis, prognosis, and physical intervention. It is performed by physical therapists (known as physiotherapists in many countries).

In addition to clinical practice, other activities encompassed in the physical therapy profession include research, education, consultation, and administration. Physical therapy services may be provided as primary care treatment or alongside, or in conjunction with, other medical services.

1.3. IMPORTANCE OF PHYSIOTHERAPY

The Chartered Society of Physiotherapy (CSP) defines it rather elegantly as “helping to restore movement and function when someone is affected by injury, illness or disability.” Physiotherapists achieve this through a variety of methods, including movement and exercise, manual therapy, education and advice.

1.4. REHABILITATION

It is a team approach of restoration of the injured person to normalcy. The physiotherapist aims at recovering from injury and puts all his effort into the regaining
of muscle strength and mobility. The physiotherapist in sports should regain the functionality of the athletes as quickly as possible, accelerating the biological processes of recovery from injury, limiting his training as little as possible and ensuring that they are reinstalled to in the team, with the greatest prospects for success.

1.5. IMPORTANCE OF REHABILITATION

After an injury (or) surgery exercise conditioning programme will help one return to daily activities and enjoy a more active, healthy life style. Following well structured conditioning programme will also help one return to sports and other recreations activities. This is a general conditioning program that provides a wide range of exercises. To ensures that the programme is safe and effective for only. It should be performed under physician’s advice (or) physiotherapists who decide which exercise will be help one meet one’s rehabilitation goals.

1.6. PHYSIOTHERAPY TREATMENT FOR SPORTS INJURIES

There are many sports injuries commonly treated by physiotherapists, such as muscle strains, ligament sprains, dislocations and fracture. The type of physiotherapy treatments that one will receive for their specific sports injury will vary.

Physical Therapy Treatments for Sports Injuries

The following are some of the general treatments that the physiotherapist may include in one’s rehabilitation programme.

Ice pack application

Ice application is often prescribed for acute sports injuries. Icing can help minimize pain and swelling that results from the injury. Physiotherapist will wrap an ice pack with towel and apply it to the injured part for about 20 minutes.
Hot pack application

Physiotherapist may decide to use a hot pack wrapped in towel if there is no swelling. The pack will be applied for about 20 minutes. Hot pack application can help relieve pain and muscle or joint stiffness. In addition, this may help hasten healing by increasing blood flow to the injured body part.

TENS

TENS, or transcutaneous electrical nerve stimulator, is a small battery-operated device that directs small amounts of current to the skin over injury. One will feel a tingling sensation when the device is turned on. TENS can help temporarily relieve pain.

Ultrasound

An ultrasound is a machine that drives sound vibrations into tissues. It is a deep heating apparatus or modality. This means that this physiotherapy apparatus can heat up deeper tissues or bulky body areas. An ultrasound may be used by physiotherapist to soften deeper tissues or to aid in healing process.

Massage

Massage, or sometimes called soft tissue mobilization, is a hands-on therapy that physiotherapist may use. Massage may be employed to relax tight muscles, decrease swelling, reduce tissue adhesions, or pain relief.

Stretching

Muscles can become tight during periods of inactivity following an injury. Stretching can help loosen these tight muscles, thus, improving range of motion (ROM). Stretching may be done manually by physiotherapist or he or she will teach self-stretching exercises that can do even at the comfort of home.
Range of Motion Exercises

Range of motion (ROM) exercises can help improve or maintain joint range of motion. By performing ROM exercise whenever possible, one can prevent their joints and muscle from becoming stiff. Range of motion exercises may also be combined with strengthening exercises once the strength is improved.

Strengthening Exercises

Being inactive for a long time can make muscles weak. Strengthening them is important to achieve independence in movement. Strengthening exercises can help maintain the strength of uninjured muscles and improve strength of weakened muscles.

1.7. PHYSIOTHERAPY TREATMENT FOR HAMSTRING STRAIN

The primary goal of a hamstring sports injury rehabilitation is the restoration of sports person to normal and able to participate in next game without any injury as before. Achieving this objective requires consideration of musculoskeletal deficits directly resulting from pain, loss of range, as well as other risk factors that may have been present prior to injury of hamstring strain. So the goal to achieve the lacks clarity of the regimen for this strain in future references to all faculties of physical education and health sciences.

There is a lack of clinical research on the effectiveness of rehabilitation programmes for hamstring strains. Although the initial treatment of rest, ice, compression, and elevation is accepted for muscle strains, no consensus exists for their rehabilitation. Most rehabilitation programmes are based on the tissue’s theoretical healing response.
Returning the athlete to sport at the previous level of athlete’s participation without any recurrences of injuries is the primary objective of a rehabilitation program. The high recurrence rate of hamstring injuries has led to speculation regarding the appropriateness of commonly employed rehabilitation strategies. It has been stated that there are complex of factors which implicate more number of re-injuries (1) permanent weakness in muscle injury (2) decreased flexibility of musculotendinous junction due to formation of scar tissue and (3) bio mechanical mal-alignment and functional patterns of athletic movements follow the original one.

Many sports physiotherapists rehabilitate hamstring injuries on a daily basis. This is not hard to fathom when one recognizes in some sports, such as Australian Football, hamstrings injuries are the most common of any injury (Warren et al., 2010). Unfortunately, when they do occur they can be very tricky to fully and definitively rehabilitate fully and reported re-injury rates are as high as 50%.

For this investigation the following physiotherapy/rehabilitation method was used by the investigator:

- Progressive Agility Trunk Stabilization (PATS) Exercises
- Manual Intervention Therapy

1.8. CONCEPTS OF SPORTS INJURIES

Sports injury developed a conceptual basis foundation recording of health problems associated with participation in sports based on the notion of improvement concepts by world Health Organization. The participants in sports and physical exercise themselves and sports institutions, sustained in isolated events. ‘Sports injuries’ denotes the loss of bodily function (or) structure that is the object of observations in clinical examination. Sports trauma is defined as an immediate sensation of pain, discomfort
(or) loss of functioning that is the object of athlete, self-evaluations and sports incapacity is the sidelining of an athlete, because of health of an athlete, because of health evaluation. We propose a concerned development effort in this area and involve the international sporting community in building terminology system having broad relevance.

1.9. SPORTS INJURIES

Sports injuries or event which is one player who missed the game or practice due to sudden unpredictable soft issue injury or bony damaged. Sports injuries sub classified in to three types as per etiological factors, they are 1) Direct Injury or Acute Injury 2) Indirect Injury or Moderate Injury 3) Over use or Chronic Injury.

1.10. CLASSIFICATION ACCORDING TO CAUSE

a) Direct Injury or Acute Injury

It is an Injury occurred due to external blow or force. Acute Injuries mainly caused by 1) A Collision with opponent person for example Attack forward in football 2) Directly hidden by an object example Cricket ball or Hockey Stick. It may ends up in contusion, bruised, ligament damages or bony displacement.

b) Indirect Injury or Moderate Injury

This moderate or Indirect Violence occurs in two ways. The Original Injury can cause distance from the impact site. For e.g. Fall on outstretched hand can result in shoulder subluxations. The injury moderately occurs internal force by the action of sports person and this may occurs for e.g. a) Hamstring Strain b) Internal derangement knee.
c) **Overuse Injury or Chronic Injury**

Injuries happen when more number of forces activating on the bones other tissues of human body. Earlier no pain symptoms present or very mildly present in initial stage so the players continue to given unknown compression on the injured site.

This controls the injury place need necessary time to resolve healing. Injury causes severe damage the place where damaged get severe inflammation and painful. The clinical symptoms on the injury sites occurs with pain, Tenderness, Swelling and Movement restriction. So that needs the change in practice session for a players because due to continuous paining and stress. The body unaccustomed to managed the pressure. Due to more occurrence of Chronic Injury or Overuse Injury due to Improper training schedule. Player need sufficient time to recover and reparticipate other etiological factors of chronic (or) overuse injury due to improper technique and instrument. In this situation player need extra pressure on their body. For example. In Tennis elbow heavy weight racquet with back hand technique and ankle (or) knee Problem occurs due to Inappropriate use of footwear during running and sprinting. Excessive repetitive compression forces causes stress fracture and Tendinitis Tendon Inflammation.

1.11. **CLASSIFICATION OF INJURIES ACCORDING TO TISSUE TYPE**

I) **SOFT-TISSUE INJURY**

It is a common occurrence of injuries resulting in players participation.

They consists of following:

**Skin Injury Type:**

Abrasions, laceration and blister
**Muscle Injury Type:**

Ruptures (or) Stress on muscle fibers and Hematomas.

**Tendon Injuries Type:**

Ruptures (or) Stress on Tendon fibers and extreme inflammation (Tendonitis)

**Ligament Injuries Type:**

Stress and Ruptures of Ligament Fibers.

Soft Tissue Injury type may result in Internal hematoma needs proper attention and effective treatment of this hematoma aids proper recovery.

**Soft Tissue Injuries Type:**

3 Most Common Injuries are tears (or) ruptures, Sprain (or) Strain and Contusion (or) hematoma.

Tear (or) Rupture is a discontinuation of fibers of a muscle (or) tendon. This can be a small and simplest often called Stress (or) Strain.

A Tear (or) Rupture can be more extreme involve more number of fibers of both muscles and tendons. It can be occurred when muscle tendon is over lengthened when muscle shrinks (or) Isotonic contracts too fast. The extreme severe of the tear (or) Rupture can ranges from microscopic small tiny number of fibers to large number of muscle fibers Macroscopic in nature.

When a Joint over stretched beyond the anatomical limitation the normal is called sprain in ligaments. A sprain can occurs with in tiny number of fibers through severe extreme rupture. In severity situations, fibers in ligament muscle tendon remains intact and there may be break (or) crack in the bone. A hematoma (or) bruise is accumulation of blood in the soft tissues. It occurred by direct Injury by opponent person (or) struck by an object. The bleeding occurs in soft tissue of the body.
Skin Type Injuries

Abrasion, Laceration and blisters Injuries occurs in skin is very common in games and sports. They consists of smaller wounds, such as abrasions blisters and tiny lacerations. They also consists of bony fractures and more serious type skin injury need suturing (stitches). Tiny skin abrasions lacerations not need any sutures and blisters are treatable conditions and mostly we may needs Medical consultation.

Skin type injury occur even the external layer of skin is opened as a result of Scrapping. The wound opens contains dirt (or) gravel which has to be removed. More severe and deep injuries needs doctors consultation. When the skin type cut injury (lacerated) and deep with exact site. Will needs whether suturing is sufficient.

II) HARD-TISSUE INJURY

Hard-tissue injuries are those involving damage to the bones of the skeleton. They range from severe fractures and joint dislocations to bruising of the bone. A direct force can bruise a bone and cause bleeding between the outer layer of the bone and the underlying compact bone. This is common in a bone such as the tibia (shin) where there is little muscle tissue over the bone to absorb the force.

Bones have a blood supply and internal bleeding can result from a fracture. In major injuries, this internal bleeding in the bone, together with bleeding from surrounding damaged tissue, can lead to shock and serious circulatory complications.
Types of Hard-Tissue Injuries

Hard-tissue injuries include fractures and dislocations.

a) Fractures

A fracture is a break in a bone. This can result from a direct force, an indirect force or repetitive smaller impacts (as occurs in a stress fracture).

If the skin over a fractured bone is intact, the fracture is described as ‘simple’ or ‘closed’. If the skin over a fracture is broken, the fracture is described as ‘open’ or ‘compound’. The skin might be broken either by the force of the injury that caused the fracture or by a piece of broken bone protruding through the skin. A fracture is described as ‘complicated’ if nearby tissues and/or organs are damaged.

In some cases, a simple fracture can be difficult to detect. The signs and symptoms of a fracture include:

- Pain at the site of the injury
- Inability to move the injured part
- Unnatural movement of the injured part
- Deformity of the injured part
- Swelling and discoloration
- Grating of bones.

b) Dislocations

Dislocations are injuries to joints where one bone is displaced from another. A dislocation is often accompanied by considerable damage to the surrounding connective tissue. Dislocations occur as a result of the joint being pushed past its normal range of movement. Common sites of the body where dislocations occur are the finger, shoulder and patella.
Signs and Symptoms of Dislocation Include:

- Loss of movement at the joint
- Obvious deformity
- Swelling and tenderness
- Pain at the injured site.

Among various types of sports injuries only Hamstring strain injuries are taken for this investigation.

1.12. HAMSTRING STRAIN INJURIES

Hamstring strain injuries are common in sports that involve mainly in sprinting, jumping and fording activities during Football, Basketball and Cricket games. Most epidemiological studies of hamstring strain have focused on injury prevalence in all games (K. Jospt et al., 2010).

Hamstring strain injuries (HISIs) are common in a number of sports and incidence rates have not declined in recent times. Additionally, the high rate of recurrent injuries suggests that our current understanding of Hamstring strain injuries and reinjuries risk is incomplete. Whilst the multi factorial nature of Hamstring strain injuries is agreed upon by many, often individual risk factors and/or causes of injury are examined in isolation (A. Opar et al., 2012).

Hamstring strain injuries are common in the athletic population and have a high rate of recurrence. Considering the multifaceted nature of hamstring injuries, the strength in local and adjacent muscles, as well as range of motion at the hip and knee, should be evaluated during the physical examination.
Hamstring injuries are usually strains that most commonly occur proximally near the muscle tendon junction and laterally injure the biceps femoris (Garrett, 1996).

Hamstring strain, also known as a hamstring pull, is a relatively common injury that can occur in almost any sport: running, Cross Fit, ice skating, and weightlifting. The injury typically happens when one of the hamstring muscles (which are located in the posterior or back of the thigh) becomes overloaded. This causes a strain or small tear of the muscle and a complete tear in severe cases. The pain is typically located in the back of the thigh near the site of injury. This area can range from the back of the knee to the buttock area (specifically near the bones of the pelvis you sit on called the ischium). The strain most commonly occurs during running or jumping (in particular during sudden movements or when quickly starting and stopping).

It is frustrating injury because the symptoms are persistent, healing time is very slow and rate of re-injury is high. Hamstring muscle group comprises three separate muscles semi tendinosus, semi membranos and Biceps femoris.

Recent evidences have suggested that the hamstring muscles are most vulnerable to injury in the late swing phase of running where there is a rapid change of eccentric to concentric function where the leg is decelerating to strike the ground.

1.13. CAUSES OF HAMSTRING INJURIES

The causes of hamstring injuries are complicated and multi factorial.

A distinguished in risk factors is often made between.

- Intrinsic (person-related) factors eg: hamstring muscle weakness, strength imbalances, fatigue, inadequate flexibility, body mechanics and distribute postures, poor running technique and psycho social factors.
• Extrinsic (environment related) factors eg: unsatisfactory warm up and training procedures fatigue related to enforced excessive activity, poor playing surfaces and unsuitable training and sports specific activities.

Other Causes of Hamstring Strain Injuries

Hamstring pulls (or) strains often occur during a contraction of the hamstring muscle group as an athlete in running. Just before the foot hits the ground the hamstring will contract to slow the forward motion of lower leg (fibula and foot). Less commonly Hamstring injury is the result of a direct blow to the muscle from another play or being hit with a ball Hamstring strains are common and the causes are numerous. Because the hamstring crosses two joints. This produces forces and therefore stresses on the hamstrings dependent on the hip and knee position.

• Sudden contraction in explosive bursts rapid acceleration.

• Hamstring/quadriceps ratio – slight imbalance with quadriceps muscles are having 70% of quadriceps muscle strength.

• Muscle fatigue

• Decreased Full range of muscle work hamstrings.

• Muscle like Semi tendinosis, Semi membranosis and long head of biceps femoris innervated by tibia branch sciatic nerve.

Whereas the short head had a complete separate muscle innervated by peroneal branch of sciatic nerve above factors are implicated as etiology of hamstring muscle strain.

1.14. TYPES OF HAMSTRING STRAIN

Depending on the severity of the sprain, one may have to discontinue their sport. A minor strain is classified as follows:
Grade-I Injuries

Grade I injuries tend to be mild. With proper care and rehabilitation, the healing time can be shortened.

Grade-II Injuries

Grade II tears are partial ruptures. Grade II tears can often be rehabilitated, but the time frame for healing is longer.

Grade-III Injuries

A complete rupture is classified as a Grade III tear. Grade III tears may require surgical intervention. Severe Grade II and Grade III tears cause impaired muscle function and usually have associated bruising that occurs near the site of injury.

1.15. COMMON RISK FACTORS OF HAMSTRING STRAIN

Lack of Warm-up

Appropriate warming up of the muscle may prevent muscle strain. Lack of proper warm-up properly may add to the risk factor. Cold un-stretched muscle that is required to contract at maximum intensity is at highest risk. Inadequate warm-up, fatigue and sudden need for speed may risk in muscle strain. Running in cold weather could make it even worse (Jim Brown et al., 2009).

Training Procedure

Hamstrings are primarily fast twitch Type-II fibers that fatigue quickly. High speed work should be early in work out, as close to warm up as possible to avoid fatigue. Poor timing inter muscular co-ordination and eccentric strength in the
hamstring muscle during the switch between late leg recovery and initial leg approach in the swing phase of sprinting (*S. Wood et al., 2004*).

**Poor Playing Surfaces**

A wet slippery surface will put more strain on the hamstring due to slipping (*Miller et al., 2016*), due to fear of falling down or losing one’s balance. It will lead to hamstring injury playing surfaces (*M. Disaharfield et al., 2013*) in a study to evaluate how each effects athletic performance and injury potential.

**Sports Specific Activities**

Sports training programme consists of an athlete assessment to determine an athlete’s strengths and opportunities for improvement, taking into consideration weekly workout volume, competitive goals and injury prevention. It is a specific training in its current concept means of simulating a movement or exercise in the weight run with intensities of training to playing field (*S. Fornicola et al., 2008*).

**Inadequate Flexibility**

Flexibility is imperative for a healthy musculo skeletal system. Muscle length (Flexibility) has a major effect on your body throughout the day. Along with connective tissue expansibility muscle length helps our movements and posture; lack of flexibility can lead to compensations, poor posture and inefficient movement. Inadequate flexibility leads to injuries (*M. Mc Hugh et al., 2010*).

**Poor Running Techniques**

Work on landing without foot under the center of gravity, lean forward from the ankles, and use the hip flexors (Not exactly Quadriceps) to lift the knee slightly. In corporate drills such as high knees and butt kicks and do a few 10 second strides before every run to quickness leg speed. So warm up drills such as high knees, high slips, butt
kicks, knee lift and activate the gluteus and hamstrings to correct poor running technique (A. Scoot et al., 2008). Poor running technique can also contribute to an over lead of the muscle and a strain.

**Psycho Social Factor**

It is a variable encompassing two categories of variables. The first consists of psychological attributes like hostility, depression, hopelessness etc, which exist at the individual’s level and are likely to be results at the process of socialization. Psycho social factors influence sports injury and performance (M.Ahem et al., 1997).

1.16. **SPORTS MEDICINE**

Sports medicine is a branch of medicine that deals with Physical Fitness, treatment and prevention of injuries related to sports and exercise.

Sports medicine represents the efforts of medical science and arts theoretically and practically to analyze the influence of the movement, training and sports as well as hyper or hypokinesia i.e., on healthy, sick and handicapped human beings of all age groups.

Sports medicine has acquired the state of independent specialty of medical sciences. Its basic aim is to prepare and educate an athlete to achieve the optimal physical efficiency with safety rapid increase in the speed and the competitive nature of sports has resulted in an increase in the incidence of sports injuries.

Sports medicine deals with injuries or illnesses resulting from participation in sports and athletic activities. It is concerned with proper functioning of the human body and with the prevention and treatment of athletic injuries. This field continues to evolve for many reasons. Growing numbers of people seek to improve or maintain their fitness
level by engaging in a wider variety of sports activities than ever before. Parallel to the
greater number of sporting participants, there is an increase in the number of high-risk
types of sports. As a result, more people (who generally are less trained) participate in
more dangerous athletic activities (L.Minigh, 2007).

Majority of sports injuries are orthopedic and need physiotherapy and respond
favorably to adequate simple measures. A physiotherapist must be aware of the injuries
commonly met with in sports (D.Williams et al., 1979).

1.17. DIAGNOSIS OF HAMSTRING STRAIN

A thorough assessment is important to properly diagnose a hamstring strain.
There is some simple assessment so the physiotherapist uses it diagnose hamstring
strain. General assessment includes health, previous injuries and current injury. Mainly
Questionnaire is internationally accepted one to find out which a specific cause to
reproduces pain and which treatment is appropriate.

The therapist will then perfectly do the clinical examination as described below.

Straight Leg Raise

The therapist raises the leg straightly as a as comfortable with the patient
keeping knee straight. This stretches the hamstring muscles and may reproduce the
pain, the therapist can lift the leg with supported normal range of motion is 80-90°
degrees, especially less than on the other side indicates the hamstring muscles are tight
in resisted knee flexion. Physiotherapist provides resistance as the patient bends their
knee, This makes hamstring muscle contract and painful in most hamstring strains. The
strength of the movement should also be compared with normal side; it suggests the
weakened muscle provokes pain in 15° – 16° and not able to contract resistance in acute hamstring strain.

**Slump Test**

Slump test can be used to determine if there is neural involvement. Patient bends the head down, straightens one leg and points the toes up to the ceiling. The therapist then pushes, the patient forwards to increase the stretch. Pain shooting down the leg (or) reproduction of any other symptoms is a positive result.

**Palpation**

The therapist will palpate the muscles observing areas of pain in tendons of any one, especially Biceps femoris. Pain in the hamstring area can indicate a strain to one (or) more component of the muscles. Diagnosis of typical hamstring muscle injury mechanism and clinical findings of local pain and loss of function are called for. Diagnosis of avulsion in the ischial tuberosity with the need for longer immobilization and complete rupture of the hamstring origin, so this injury needs immediate operative treatment which is necessary and quite challenging for the treating physician. X-rays, Ultrasonography (or) MRI are used in diagnosis.

**Differential Diagnosis**

Correct diagnosis is the basis of adequate treatment. The different diagnoses of hamstring muscle injury included several clinical entities. These complaints include pain in the ischial tuberosity such as apophysitis painful unfused apophysis acute and old bony avulsions, Piriformis syndrome gluteus medius muscle strain posterior trochantric (or) ischial gluteal bursitis tight iliotibial tract pain radiating from lower back sacroillitis, ectopic muscle calcification and stress fracture in the pelvis. The important differential diagnosis is related to low back pain mimics sciatica, nerve
impingement. Previous history of injured players may indicate more vague symptoms and gradual insidious set so on diagnosis accuracy is very essential. Referred pain from the low back (or) saro-iliac joint (or) Neuromenigeal factors has to be rolled out properly which is closely related to acute hamstring strain. Ischial tuberosity apophysis / Piriformis syndromes, trochantric bursitis may be isolated and excluded by clear clinical assessment. To some extent MRI, Ultra sonogram are needed to find muscular pathology (or) differential etiological factors.

Referred pain from neuron meningeal structures is very important to differentiate for effective management mainly high sitting / neck flexion and active knee extension (Slump test). Among that posterior thigh pains relieved with release of cervical component of test highly likely from neuromeningeal structure and not hamstring muscle strain.

1.18. PROGRESSIVE AGILITY TRUNK STABILIZATION (PATS) EXERCISES

Progressive agility Trunk Stabilization exercises are used to provide a Neuro muscular control on eccentric pattern of exercises which can be done on sagittal plane, Pivot plane, weight bearing exercises, to improve eccentric hamstring strength which has to be randomized and research proved slight evidences on very remote (M.A. Sherry et al., 2010).

Although many people associate agility with athleticism, the need for it shows up when one does things like cross the street as the light changes, step over cracks in the sidewalk or walk on the moving platform at the airport. The level of agility one displays during sports performance or functional activities of daily living depends on
the ability of one’s deep core muscles to stabilize your trunk. A core- and agility-training programme will improve one’s overall movement efficiency.

**Agility-Stability Connection**

The agile athlete wows us with the ability to explosively initiate a movement, accelerate, decelerate or slow down when needed. That athlete will also be able to accelerate again and swiftly respond to external forces and stimuli without slowing down, losing balance or distorting postural alignment. The active core muscles will stabilize this alignment, and help the body remain centered and dynamically balanced under all circumstances. This sense of postural stability facilitates efficient and powerful movement patterns.

**Proprioception**

If one covets improved agility, include proprioception or body position should be included awareness training in one’s trunk-stability exercise programme. One-legged balances, performed with eyes closed, promote ankle proprioception, which in turn will improve one’s ability to maintain balance and quickly change direction on different types of terrain. Lifting one’s knee and the opposite arm overhead poses additional challenge for one’s trunk-stabilizing muscles. One should master these exercises on stable ground, first with eyes open, then advance to doing them with your eyes closed. Once one is able to perform them without wobbling one’s upper torso, one should try the same movements while standing on a balance board or disc.

**Agility**

Agility exercises should evolve from one’s trunk-stabilization programme. When one masters the one-legged balance, one should have a friend to toss one a medicine ball, and play a game of catch. Increasing the weight of the medicine ball
intensifies the trunk-stabilization challenge. One should kick it up a notch by performing the exercise on a balance device. One start with a two-legged balance, and then gradually progress to one-legged drills. Jumping rope — impossible to do without trunk stabilization -- also improves agility. The National Strength and Conditioning Association recommends cone drills. One can set up some traffic cones and practice running around them and include backpedaling and changes of direction.

1.19. MANUAL INTERVENTION THERAPY (MIT)

The key to full recovery from acute hamstring strain is mainly depends upon the severity. Manual Intervention Therapy is a major role of treatment in acute hamstring strain. There are few evidence based articles available in this rehabilitation programme. Manual Therapy is a passive physiological movement done with sustained gliding technique and passive accessory movements. This was designed by “Brain Mulligan”

(Opar et al., 2012).

The manual concept consists of:

- Mobilization with movement(MWM)
- Spinal Manipulation Therapy
- Electro Physical Agents

(a) Mobilization with Movement (MWM)

Mobilization with movement was designed by Brian Mulligan’s to correct the sacro iliac joint anatomical anterior pelvic tilt closely related to hamstring strain.

(b) Spinal Manipulation therapy:

It is a passively skilled technique which can be done with slow amplitude and high velocity thrust used to correct lumbar pelvic dysfunction.
Electro Physical agents:

(1) Transcutaneous Electric Nerve Stimulation (TENS)

Transcutaneous Electric Nerve Stimulation working in the frequency of 90 to 130 HZ pain gate theory mechanism. It is a pain gate pathway Ascending / Descending pain mechanism.

(2) Icing:

Cold Therapy – Cryopacks is exclusively used in acute hamstring strain to reduce inflammation, promotes quick healing and resolution of injured tissue. It is used to heal the tissues and for the reduction of pain and spasm.

(3) Therapeutic Ultrasound:

It is a high frequency deep heat modality working in the frequency of /1 MHZ (or) 3 MHZ pulsed method acute. 1:7 and 1:1 preferably used for strained muscles to quick healing and pain relief.

1.20. PHYSICAL FITNESS

The term physical fitness in view of a coach or a sports trainer is something different. In their view the term physical fitness denotes the physical capacity to tackle the external load that is placed by various exercises and excel in physical performances of the various sports and games situations. These people describe the physical fitness in terms of the capacity to do work.

The fitness refers to the dynamic quality that allows a person to satisfy his/her own needs, including but not limited to mental and emotional stability and organic health consistent with functional capacity. There are numerous fitness concepts such as
nutritional fitness, which refers to the selection of foods according to their caloric and nutritive valves, also proper eating habits.

Physical fitness refers to one's ability to carry out daily tasks without being overly tired. People who are fit have energy not only to complete everyday work but also to participate in planned and unplanned activities outside the home or other workplace.

1.21. IMPORTANCE OF PHYSICAL FITNESS

The human body is created for movements: to walk, dance, jump and play. "Inactivity may cause blood to clot in the heart more easily. It also increases the chance of developing other risk factors, including undesirable cholesterol levels, obesity, diabetes and hypertension. "With no physical stimulants, the sensory receptors become starved, subsequently causing the body aches and pains. With proper fitness, one can relieve much of these unnecessary pains and unpleasant complications. It is almost impossible to go through an entire day without being exposed to something that involves physical fitness. This national preoccupation with fitness has affected every segment of our society.

The quality of one's life depends upon the quality of work he or she does. Physical fitness is thus, essential for all but the degree of physical fitness is very individualized and will vary according to the demands and requirements of a specific task. The school athlete must constantly work to improve his or her strength, endurance, flexibility, speed and cardio-respiratory efficiency- whereas the -student who cycles to school will require less effort to maintain his or her level of physical fitness. The test cricketer needs a different level of physical fitness. A 40 year old mother requires a different physical fitness level unlike her daughter. So, physical
fitness varies according to the circumstances of a person at different times in his or her life. In essence, Physical fitness is a must for all.

1.22. PURPOSE OF THE STUDY

To investigate the relationship between effectiveness of PATS exercises and Manual Intervention therapy (MIT).

Hamstring muscle strain is common in sports and often results in chronic pain, recurrent hamstring strains and reduced sports performance. Current rehabilitation programme are primarily developed.

To propose a unique rehabilitation strategy addressing these factors in order to decrease the rate of re injury.

1.23. STATEMENT OF PROBLEM

The statement of problem is to find out Effects of Progressive Agility Trunk Stabilization (PATS) Exercises and Manual intervention Therapy on Rehabilitation of Acute Hamstring Strain in Male Athletes’.

1.24. NEEDS FOR THE STUDY

There is a lack of clinical research to find out more effectiveness on various rehabilitation protocols for acute hamstring strain in all games / contact sports. The main objective of this study is to find out the effectiveness of different rehabilitation protocols to return the player to prior level and avoid recurrence. The main concept emphasizes in this research study to reveal the Bio mechanical sacroiliac dysfunction by anterior pelvic tilt corrected by manual therapy. No other study has yet provided a mounting evidence and long term of recurrences in this strain for all players males. This main hypothetical idea has to be compared by the effectiveness of another clinical
commentary of (PATS). Neuro motor control in acute hamstring strain. This study signifies a great contribution that may explore the role of manual therapy, Strengthening and stretching group and progressive agility trunk stabilization rehabilitation program in male players.

This scientific study provides an effectiveness between 2 Rehabilitation groups helpful to compare sports specific skills, Functional performances and mainly time needed to return to sports and Re-injury rates of acute hamstring strain. This study which gives valuable importance and guidelines to physiotherapist, Athletic trainers, coaches, physical educators, sports medicine physicians and orthopedic surgeons. This effectiveness of 2 rehabilitation protocols may be helpful for fibre researchers to female players in acute hamstring strain (or) various other problems.

1.25. OBJECTIVES OF THE STUDY

Mainly to compare the effectiveness of two rehabilitation protocols after acute hamstring strain in all games, evaluating time needed to return to full participation and availability in full match session without re-injury status. Effectiveness of two rehabilitation protocols for acute hamstring strain by varying emphasize of pelvic biomechanical tilt and muscle-tendon lengths. Mainly evaluating the specific time needed to return to full participation in match selection in next games. Mainly to analyze to correlation between injury grade mild, moderate (or) severe, size of injury size, localized area, palpation of pain and how much time needed to come back to pre-injury status.
1.26. HYPOTHESES

It was hypothesized that:

1) There may be significant decrease in Hamstring strain and selected physical fitness variable speed due to the effect of Progressive Agility Trunk (PATS) exercise than Manual Intervention (MIT) group and control groups.

2) There may be significant difference in selected physical fitness variables like Strength, Flexibility, Endurance due to the effect of Manual Intervention Therapy (MIT) may exhibit greater change than PATS exs group and control group.

3) There may be significant increase on selected physical fitness variables Agility, Leg explosive power due to the effect of Manual Intervention therapy (MIT) may exhibit greater changes than PATS exercise and control group.

1.27. DELIMITATIONS

1) The study was delimited to forty five (N=45) males hamstring strain Grade-I injured athletes in Trichy, Pudukottai Districts, Tamil Nadu. Being selected as subjects during the year 2015-2016.

2) Selected subject Age Ranged from 17 to 21 years.

3) Selected subjects were sub divided into 3 groups n = 15 in each group totally 45 subjects Group-I undertaking Progressive Agility Trunk Stabilization (PATS) exercises, Group-II undertaking Manual Intervention Therapy (MIT) and Group-III as a Control groups.

4) The Training period was delimited for 12 weeks. The data were collected prior and immediately after 12 weeks of Training Programme.
1.28. LIMITATIONS

The Limitations were considered which it reveals the end results of this experimental study as follows:-

1) The knowledge of the subjects in Exercise Sciences and their previous experience in doing physical activities were not taken into consideration.

2) The previous experience of the subjects in the field of sports and games, which might influence the rehabilitation and it, was not considered.

3) The Psychological stress and other factors which affect the metabolic function were not taken into consideration.

4) The heredity of the subjects and its influence on the selected dependent variables were not taken into consideration.

5) The climatic condition such as external temperature, Food Habits, Life Style, Humidification and few materiological factors during assessment and training programme was not taken into consideration.

6) Since the subjects were motivated verbally during testing and training periods no attempt was put to differentiate their level of motivation.

1.29 SIGNIFICANCE OF THE STUDY

1. This study may explore the role of Manual therapy rehabilitation programme acute hamstring strain in male athletes.

2. In actue hamstring strain the selected variable is very useful to the end results of the study.

3. The knowledge on hamstring strain was acquired as a result of the study.

4. This concerned study is a useful guidance for all professions like sports physicians, physiotherapist, fitness instructors and physical educators by
accurately framed rehabilitation training for acute hamstring strain in
selected variables for analyzing.

5. This scientific study may be a new type of sports injury (or) new type of
problem to this topic.

6. This study acute hamstring strain rehabilitation programme create a
great awareness to physical educators, public and health professionals.

1.30. DEFINITION OF OPERATIONAL TERMS

1.30.1. Muscle Strain

A strain is a stretching (or) tearing of muscle (or) tendon. A tendon is a fibrous
cord of tissue that connects muscle or bones (K. Marx et al., 2014).

1.30.2. Hamstring Muscles

In human anatomy, the hamstring refers to one of the three posterior thigh
muscles, or to the tendons that make up the borders of the space behind the knee. In
modern anatomical contexts, however, they usually refer to the posterior thigh muscles,
or the tendons of the semi tendinosus, the semi membranosus and the biceps femoris.
(S. Magnusson et al., 1995).

1.30.3. Hamstring Injury

Hamstring injury is defined by the anatomical site within muscles that is
affected and injury must be present in one or more of the compote muscles (Marc
Sherry et al., 2004).

1.30.4. Progressive Agility Trunk Stabilization (PATS) Exercises

It is defined as a rehabilitation protocol for lumbar and pelvic stabilization
which is closely related to acute hamstring strain injury. This trunk stabilization
exercises can be given as three phase’s protocol.
1.30.5. Manual Therapy

Manual therapy is defined as the skilled passive movement of Joints(joint mobilization/manipulation and soft tissue mobilization) (M.Jeff et al., 2012).

1.30.6. Intervention

The health outcome may be modified by designing the programmes. (Webster, 2007).

1.30.7. Speed

Speed is defined as the capacity for moving a limb or part of the body’s lower system or the whole body with the greatest possible velocity (F.Dick, 1980).

1.30.8. Strength

The ability of muscles to overcome against resistance is known as strength (H.Singh, 1991).

1.30.9. Agility

Agility refers to performing a particular activity or changing the direction in quickly (B.Fresh, 1971).

1.30.10. Flexibility

Flexibility can be defined as the ability to perform movement with greater range of motion or large amplitude (A.K. Uppal, 1992).

1.30.11. Endurance

The Muscle (or) group of them moves repeated against sub maximal level of resistance is known as Endurance (J. Hoffman, 2006).

1.30.12. Explosive Power

Explosive power is the capacity of the leg to release maximum muscular force in the shortest time as in executing a vertical jump.