A COMPARATIVE STUDY BETWEEN EFFECTIVENESS OF KINESIO TAPING VERSUS IASTM IN PATELLOFEMORAL PAIN IN LONG DISTANCE CYCLER

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INTRODUCTION

Patellofemoral pain syndrome (PFPS) is a syndrome characterized by the pain in the anterior knee.1, 2 it is the most frequent disease of the knee in early childhood.Patellofemoral pain syndrome (PFPS) is a broad term used to describe pain in the front of the knee and around the patella, or kneecap. It is sometimes called "runner's knee" or "jumper's knee" because it is common in people who participate in sports—particularly females and young adults—but PFPS can occur in nonathletes, as well. The pain and stiffness caused by PFPS can make it difficult to climb stairs, kneel down, and perform other everyday activities12

Patellofemoral pain syndrome occurs when nerves sense pain in the soft tissues and bone around the kneecap. These soft tissues include the tendons, the fat pad beneath the patella, and the synovial tissue that lines the knee joint.12Patellofemoral pain syndrome (PFPS) is a condition characterized by aching pain in the peripatellar area that is exacerbated by physical activities such as climbing stairs, squatting, jumping, and running and/or by sitting with the knees flexed for prolonged periods of time14

In some cases of patellofemoral pain, a condition called chondromalacia patella is present. Chondromalacia patella is the softening and breakdown of the articular cartilage on the underside of the kneecap. There are no nerves in articular cartilage—so damage to the cartilage itself cannot directly cause pain. It can, however, lead to inflammation of the synovium and pain in the underlying bone12

There are many etiological factors and there is no a certain algorithm in the treatment.1, 3, 4 Disorders in the extensor mechanism of the knee are considered as the most important factors for the PFAS.1,3,4 Musculus vastus medialis obliquus (VMO) and vastus lateralis are the most important dynamic forces having an effect on patella at the last 30 degrees of the knee extension. During the extensional motion of the knee, VMO is contracted before musculus vastus lateralis which pre-activates the medial force vectors, thus, preventing the lateral patellar dislocation.4,6 Delay in the VMO activity and decrease in the muscle strength cause a decrease in the medial patellar stability, a balance disorder in the force vector affecting the patella and lateral movement of the patella, and also an increase in the joint pressure on the lateral facet. Therefore, this causes PFPS by changing the patellofemoral contact area and contact pressure.1,4,7

The patellofemoral joint is a unique and complex structure consisting of static elements (bones and ligaments) and dynamic elements (neuromuscular system).9 The patella has a configuration of a triangle with its apex directed inferiorly. Superiorly, it articulates with the trochlea, the distal articulating surface of the femur, which are the main articulating surfaces of the patellofemoral joint.10

The patella is a triangular shaped sesamoid bone, the posterior surface of the patella is covered with articular cartilage.11

The articular cartilage of the patella is similar to that of other joints in that it contains a solid phase and a fluid phase that is mostly composed of collagen and glycosaminoglycans. The solid phase is somewhat permeable and when the articular surface is under load, the fluid gradually redistributes itself within the solid matrix. Therefore, the pressure within the fluid is strongly associated with the cushioning effect of the articular cartilage and the low friction coefficient of articular surfaces. Any damage to the articular surfaces causes a loss of pressure within the fluid phase, which subsequently results in higher stresses on the collagen fibers and more vulnerability leading to possible breakdown.9

The patella or kneecap is a sesamoid bone, a bone that is located within the tendon of a muscle. It makes a joint with the large condyles of the femur at the knee joint. The patella runs in a track in the groove between the condyles. The patella acts as a fulcrum to increase the contraction force of the quadriceps muscle up to 50%.8

The muscles and fibrous tissue structures on each side of the bone maintain normal tracking of the patella. Disruption of this balance may be one of the causes of patella femoral pain.8

Patellofemoral pain syndrome (PFPS) or chondromalacia patella is a degeneration of the patellar cartilage existing between both bone surfaces of the femur and the patella. Its most important clinical symptom is characterized by anterior knee pain that is magnified when movements from flexion to extension are performed by the knee while the patella does not move smoothly within the trochlear groove8 . There are several reasons that can cause this syndrome: a disalignment femoro-tibial, muscle weakness, patellar prior traumatic injury (fracture, dislocation), overuse of the joint, arthritis. The main objectives to rehabilitate this pathology will be to reduce the pain and improve the neuropropioceptive information 9

Different rehabilitation strategies like electrotherapy, exercise, cryotherapy, etc. can be used to achieve both objectives. However the present review will focus on the effectiveness of a specific treatment: the use of kinesio taping (KT). KT is a cotton tape with a layer of hypoallergenic adhesive which can elongate up to 140% of its original length. Its characteristics are similar to human skin and have several mechanisms of action such as: biomechanics, exteroceptive, circulatory, analgesic.6 . Patellar taping is widely practiced among clinicians to treat patients with PFPS. This intervention involves pushing the patella medially and securing it in this position with tape on the skin. Originally, the McConnell taping technique was developed to correct altered patellofemoral kinematics and permit participation in normal daily activity.13

Instrument-Assisted Soft-Tissue Mobilization (IASTM) is a form of manual therapy involving rigid instruments of various shapes and materials to locate and treat soft tissue disorders.15-20 Although forms of IASTM have been used since ancient times using different materials, there has been a resurgence in its popularity, now using stainless steel instruments beginning with Graston Technique. This has expanded to instruments made by other manufacturers in the past few years.18-19 .The term IASTM does not differentiate between these various brands or techniques. IASTM is a non-invasive therapeutic technique which is usually applied by stroking the beveled edge of an instrument on the surface of the skin, often aided by lubricant, with the intent of influencing the underlying connective tissues, muscles and nerves.17-20

The IASTM method of intervention shown to improve pain and function in various conditions. Instrument-assisted soft tissue mobilization (IASTM) is an approach to soft tissue manipulation that uses concave and convex stainless steel instruments to release scar tissue, break soft tissue adhesions, and remove fascial restrictions. The variation in curvatures of the tools allows clinicians to individualize treatments to address specific tissues and anatomical regions. The goal of IASTM is to enhance the healing process by breaking down collagen cross-linkages, increasing blood flow, and increasing cellular regeneration. IASTM has been proposed as a treatment option for a wide variety of soft tissue injuries, ranging from medial and lateral epicondylalgia and rotator cuff tendonopathy to iliotibial band syndrome and plantar fasciitis. However, not all soft tissue pathologies can benefit from the use of IASTM18. Subjects with patellofemoral pain syndrome clinically complain of pain, a decreased range of motion, and joint instability, all of which lead to decrease function. With pain and decreased willingness to move, contractures eventually develop in portions of the musculotendon and overlying muscle, so as the disease progresses motion becomes more limited. The ageing process is accompanied by a decline in the function of the systems that are responsible for the control of balance 17. Patellofemoral pain syndrome causes changes not only in the tissues within the articular cavity, but also the ligaments, tendons, and periarticular tissues including the muscles. It is already widely known that patients with PFPS have a disability.

Research has included limited experimental randomized control trials and many case studies suggesting IASTM can improve soft tissue physiology, increase balance, decrease pain, and increase ROM.21-23, Animal studies on rats have shown increased circulation, increased fibroblast response, and accelerated knee ligament healing through controlled microtrauma. 24-27 IASTM has also resulted in improvements in pain within patients experiencing patellofemoral arthritis.25 One study showed a reduction in trigger point sensitivity, as well as an increase in pain pressure threshold (PPT).27

The number of cyclists in the United States has grown substantially over the past 10 years, according to the League of American Bicyclists38. The health benefits of cycling have been clearly established by research, with studies showing consistent positive dose-response relationships between the amount of cycling and improved fitness, decreased risk of all-cause mortality, cardiovascular disease, colon cancer morbidity, and obesity 39. Societal benefits of a modal shift from car travel to cycling also have been shown, including a reduction in air pollution and traffic accidents 40. In addition to its health benefits, however, cycling also is associated with a variety of injuries 41,42 . Nontraumatic (overuse and degenerative) injuries predominate within recreational cyclists 43 , though those who travel at high speeds, in large groups, over technical terrain, or in traffic may be at risk for traumatic injury. In a study of elite cyclists during a multiday road race, half of the injuries documented were traumatic, most involving skin and soft tissue 44 . A recent survey of elite British cyclists found that training injuries were more prevalent, but competition injuries were more severe 45 .

Overview of Cycling Cyclists take to the roads and trails for recreation, transportation, and competition, and the demands of each type of cycling dictate the necessary equipment, as well as potential for injury. Competitive cycling includes the disciplines of road racing, time trial, cyclocross, mountain biking, track, BMX, and triathlon. Road bicycles are generally light, stiff, and aerodynamic, to allow the rider to transfer power efficiently but also to maintain comfort throughout several hours of riding at a time. Cyclocross, a discipline where handling is emphasized as much as power, andwhere courses venture offroad, requires a machine that will handle a variety of terrain. Similar to a mountain bike, these bicycles use wider tires and braking systems less likely to get clogged with mud, but with a geometry that allows the rider maximum control while sacrificing only the minimum of speed. In solo events such as time trial and triathlon, where riders are prohibited from drafting or riding in groups, a unique bicycle frame geometry and triathlon-specific ‘‘aero’’ handlebars with forearm rests allow a more aerodynamic position. This decrease in wind resistance can make a major difference in speed for a given fitness level 45,46 . The lowimpact nature of cycling makes it an appropriate component of rehabilitation, as well as a fitness activity for adults with degenerative joints47. Bicycling on level surfaces is nearly universally recommended by orthopaedic surgeons after total hip and knee arthroplasty48 . A wonderfully unique quality of the bicycle is its ability to accommodate a wide variety of injuries and disabilities. For adaptive athletes, cycling offers options including handcycling for athletes with reduced lower extremity mobility, tandem cycling for athletes with visual impairment, and recumbent and/or threewheel cycling for athletes with impaired balance. Riding volume and training plans vary widely based on an individual's goals. Bicycle commuters can essentially get extra workouts on their way to work, and year-round commuters with appropriate winter gear may log yearly mileages that rival their racing counterparts. Weather and daylight factor into training, with many riders training indoors or avoiding longer rides during the colder months and shorter days. It is important to note that there are physiologic differences between indoor and outdoor cycling49,50, with research showing higher power output during outdoor riding despite the same RPE51. With the development of new technology and devices, cyclists can record location, distance, elevation, HR, and power output for both personal use and the review of coaches or medical professionals

Cristina B. Seffri, current literature provides support for IASTM in improving ROM in uninjured individuals as well as pain and patient-reported function (or both) in injured patients. More high-quality research involving a larger variety of patients and products is needed to further substantiate and allow for generalization of these findings37 No literature has found to compare the effectiveness of Kinesio Taping versus IASTM in Patello-femoral pain in long distance cycler So this study is designed

METHODOLOGY STUDY DESIGN: it is comparative study which have 40 patients diagnosed with patella femoral pain. 40 patients with patella femoral pain will be randomly selected according to inclusion and exclusion criteria and will be divide into two groups – Group A: Kinesio taping and Group B: IASTM.

STUDY will be performed in the PACIFIC INSTITUTE OF MEDICAL SCIENCES (PIMS)

Study duration is 12 Weeks (30 minutes per day, 3days in a week.)

Outcome Measures 1. Visual Analog Scale (VAS) The visual analog scale (VAS) is a validated, subjective measure for acute and chronic pain. Scores are recorded by making a handwritten mark on a 10-cm line that represents a continuum between “no pain” and “worst pain.”

2. Kujala Patellofemoral Scale (KPS) The Kujala Patellofemoral Scale (KPS) is a questionnaire used to evaluate the severity of patellofemoral pain syndrome (PFPS), also known as runner's knee. The KPS consists of 13 items that assess various aspects of knee function, including pain, swelling, stiffness, and ability to perform activities of daily living. Each item is scored on a scale of 0 to 10, with higher scores indicating better knee function. The total score is calculated by summing the scores of all items, with a maximum score of 100. The KPS is a widely used tool for assessing the severity of PFPS and tracking changes in knee function over time. It is commonly used in clinical research studies and in clinical practice to evaluate the effectiveness of various interventions for PFPS.

Inclusion criteria: 1. Long distance cyclists (define what is considered "long distance" in your study) who have experienced patellofemoral pain for at least 4 weeks 2. Age between 20 to 40 3. Both male and female patients 4. Willingness to participate in the study and comply with the treatment protocol 5. Ability to understand and sign the informed consent form

Exclusion criteria: 1. Any other underlying knee pathology or injury (such as ACL tear or meniscal tear) 2. Previous knee surgery 3. Contraindications to kinesio taping or IASTM, such as open wounds or skin conditions 4. Use of corticosteroids or other pain medications within 2 weeks prior to enrollment in the study 5. Participation in another study that involves knee pain treatment

PROCEDURE

After collecting the written consent form from the patients, they would be divided into two group- group A and group B. Group A will be treated with kinesio taping (Taping was applied twice a week, 12 times in total during treatment period of 12th weeks) Group B will be treated with IASTM Group A & B patients Following Exercise prescribe for home exercises ¬ isometric quadriceps ¬ isokinetic knee extension exercises ¬ Quadriceps ¬ hip adductor ¬ Gluteal ¬ Lower extremity muscle and iliotibial band stretching The outcome Measures Are: 1. VAS : Reliability of the VAS for acute pain measurement as assessed by the ICC appears to be high. Ninety percent of the pain ratings were reproducible within 9 mm. These data suggest that the VAS is sufficiently reliable to be used to assess acute pain. 2. KUJALA SCORING QUESTIONNAIRE

DATA ANALYSIS Mean, Standard deviation, paired‘t’ test and unpaired‘t’ test will be performed for analysis of pre and post data evaluation within and between groups.

RESULTS

Results of the study will revealed after getting the analyzed data.

DISCUSSIONS

Pain is the main symptom in PFPS. A histological study has demonstrated that patellar retinaculum, patellar, and quadriceps tendons, synovium, fat pad, and subchondral bone contain nerve fibers which may cause pain in PFPS.[4] It has been shown in many studies that conservative treatment methods used for PFPS treatment are effective in reducing pain.[8,26,27]

Kinesiotaping is also a frequently used method for PFPS treatment in recent years. Studies carried out by Campolo et al.,[28] Lan et al.,[29] and Akbaş et al.[18] showed that kinesiotaping for PFPS reduced pain. Freedman et al.[30] also reported that kinesiotaping on the patients having PFPS reduced pain and increased the jumping distance on one foot. Kuru et al.[21] studied the effectiveness of the electrical stimulation and kinesiotaping onto the VMO for PFPS. The authors observed decrease in the pain and improvement in the KPS for both the kinesiotaping group and the electrical stimulation group after a six weeks long treatment. In another study, it was reported that kinesiotaping by pain control was able to allow the patients to do quadriceps exercises without any pain.[27] In our study, pain was statistically significantly reduced in all three groups and this improvement also sustained at week 12

The IASTM treatment is thought to stimulate connective tissue remodeling through resorption of excessive fibrosis, along with inducing repair and regeneration of collagen secondary to fibroblast recruitment. In turn, this will result in the release and breakdown of scar tissue, adhesions, and fascial restrictions (Strunk RG et al, 2014; Papa JA 2012; Davidson CJ et al,1997).In laboratory studies using a rat model, the use of instruments resulted in increased fibroblast proliferation and collagen repair (e.g., synthesis, alignment, and maturation) in cases of enzyme-induced tendinitis (Gehlsen GM et al,1999; Loghmani MT et al,2009).Many of these benefits were also found in a laboratory study on ligament healing using the rat model which further provided supporting evidence that instrument massage produces a significant short-term increase in ligament strength and stiffness compared to the contralateral control limb(Fowler S et al,2000)

Mahida Payal Dharmendrasinh etal study shows the improvement in pain and functional disability could be because of “instrument assisted soft tissue mobilization (IASTM)” followed by initiating exercise ,active warm up-cycling on stationary bicycle for 5-10minutes with minimal resistance and stretching should done before and after the exercise routine for hip flexor, quadriceps, hamstring, gastronemius and soleus tightness. Evidence regarding the use of IASTM is limited and often mixed with regard to benefits. Although the technique has been found to accelerate ligament healing using an animal model and increase shoulder range of motion in athletes, several studies have demonstrated no therapeutic benefits beyond those of more traditional treatments. This clinical roundtable discussion investigates the benefits and limitations of IASTM (Elias JJ et al, 2004).

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