EFFECT OF KINESIO TAPE VERSUS KNEE STRAP ON OSGOOD SCHLATTER DISEASE IN ATHHELETIC CHILDERN

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INTRODUCTION

Osgood Schlatter disease is a traction apophysitis of the tibial tuberosity caused by the repetitive pull of the patellar tendon on the tibia. This condition was described separately and simultaneously by Robert Osgood and Carl Schlatter in 1903, as a lesion where the tibial tubercle separates due to repetitive strain by the patellar tendon and becomes tender. Kicking, jumping, sprinting sports, history of previous Sever's disease and lower limbs muscle tightness are among the risk factors that have been associated with Osgood Schlatter's disease, it is one of the leading causes of anterior knee pain in children and adolescents. Usually, patient history and physical examination are enough for diagnosis. It can be easily recognized when you find local pain, swelling, and tenderness on the tuberosity, in one or both knees.(1)

Osgood Schlatter disease (OSD) is a common paediatric disorder. It is a growth- and sports-associated knee injury with pain around the tibial tuberosity and morphology alterations around the apophysis during adolescent growth. It often results from acute or chronic overload during sports activity, causing inflammation of the patellar tendon insertion on the tibial tuberosity. It was first described in 1903 independently by Osgood in the US and by Schlatter in Switzerland. Classically, the clinical presentation is associated with insidious onset (usually atraumatic) of anterior functional knee pain over the tibial tuberosity along with a bony prominence, as well as tenderness at the patellar tendon insertion site.(2)

Osgood-Schlatter disease occurs during the apophyseal phase between ages 12 and 15 in boys and 8 and 12 in girls. During the maturation phase, the cartilage

cells of the proximal part of the tuberosity migrate distally, replacing the fibro cartilage in the middle part. This makes the tuberosity unable to withstand the force exerted by the quadriceps, resulting in micro-avulsions, with secondary ossification. These bone fragments are incorporated secondarily into the remainder of the tibial tuberosity, which can result it sequelae of an enlarged tuberosity, in rare cases, the fragments are not incorporated and intra tendinous bone fragments can remain after growth stops, which must then be surgically removed. The pain usually occurs during and after physical activity and might be associated with local swelling. Many patients are completely asymptomatic, with less than 25% of patients reporting pain at the tibial tuberosity apophysis. The age of onset is between 8 and 15 years. Boys have it more often than girls, with a male-to-female ratio of 3:1. The prevalence of OD is 9.8%, and it can be bilateral in 20–30% of patients. Many risk factors and activities have been associated with the increase of incidence of the pathology.(3)

Treatment is generally conservative with rest, ice, and specific exercises being recommended. Involves limiting activity until inflammation resolves and exercises that strengthen the surrounding musculature to reduce stress across the tibial tuberosity., treatment with PRICE protocol (Protection, Rest, Ice, Compression, Elevation) physical therapy and strict activity modification was initiated. Surgical removal of the ossicles was considered.(1,2)

Knee strap can immobilize and protect joints, reduce pain, decrease swelling, and facilitate healing of acute injuries. They are also used for injury prevention and chronic pain reduction. Infrapatellar strapping is a treatment technique used in various knee pathologies; however, its effect on pain and functional performance among young athletes has not been studied.

Kinesio Taping is effective in improving for pain and joint function in patients with knee osteoarthritis.

Kinesiology Tape is used in treatment of muscle, fascia, and tendon symptoms and for performance enhancement by way of continuous receptor stimulation. Natural healing process is therefore instantly enhanced due to improved circulation in the taped area. When a muscle is inflamed, swollen, or stiff, the space between the skin and the muscle is compressed, resulting in constriction and congestion to the flow of lymphatic fluid and blood circulation. This compression applies pressure to the pain receptors located in the space between the skin and the muscle, which in turn relays discomfort signals to the brain resulting in the sense of ‘pain’ of affected area. If you stretch the skin of the affected area before the application of Kinesiology Tape the taped area will form wrinkles when the applied area is back to its normal or neutral position. The wrinkling effect formed by Kinesiology Tape is essential since this lifting of the skin creates more space for lymph and blood flow. Therefore, the lymph drainage as well as blood circulation in the affected area can be improved effectively through taping application. Eventually, the friction between the tissues beneath the skin is decreased due to the promoted movement of lymphatic fluid and blood circulation. Pain is reduced because the pressure on the pain receptors is lessened. The end results are believed to be reduced muscle fatigue, increase in range of motion (ROM), and better quality of muscle contraction.

Statement of the problem

Are there any significant differences between the effects of using Kinesio tape and knee strap on pain management, range of motion and quadriceps muscle power.

Purpose of the study

This study will be conducted to evaluate the effect of using Kinesio tape versus strapping the knee on pain management, range of motion and quadriceps muscle power.

Significance of the study

The prevalence of Osgood Schlatter disease ranges from 6.8% to 33%, affecting 1 in 10 athletic adolescents, and depends on factors such as the degree of development, the sport discipline or the presence of preventive programs, the hours of sports practice, Symptoms can persist until adulthood in 10% of cases Additionally, between 20% and 30% of all cases are bilateral.(4)

Osgood-Schlatter disease occurs during the apophyseal phase, During the maturation (apophyseal) phase, the cartilage cells of the proximal part of the tuberosity migrate distally, replacing the fibro cartilage in the middle part. This makes the tuberosity unable to withstand the force exerted by the quadriceps, resulting in micro-avulsions, with secondary ossification. These bone fragments are incorporated secondarily into the remainder of the tibial tuberosity, which can result it sequelae of an enlarged tuberosity resulting in micro-avulsions, with secondary ossification. These bone fragments are incorporated secondarily into the

remainder of the tibial tuberosity, which can result it sequelae of an enlarged tuberosity.(5)

Physical therapy has very important role in pain management and prevent limitation of range of motion and keep muscle strength using physical therapy modalities such as ultrasound, exercise, cold application, heat application, taping and strapping. Pain limited activities, patient education, Iontophoresis, anti-inflammatory medication, local anaesthetic, heating with hot packs (anterior and posterior thigh) followed by quadriceps and or hamstring stretching, strengthening of the quadriceps, ice massage. (Mild pain): ice, limitation of activities, NSAIDs, protective knee padding, physical therapy to strengthen and improve flexibility (quadriceps, hamstring, iliotibial band, gastrocnemius). Not recommended initially: high-intensity, quadriceps-strengthening exercise. (Moderate to severe pain): activity modification, rest, NSAIDs, Immobilisation, Rest, ice, compression, elevation (RICE), warming up before activity, icing after activity, rest, activity modification, infrapatellar strap, anti-inflammatory medication, physiotherapy, stretching (hamstring, calf, hip), immobilisation (cast). Pain relief, doing virtually nothing to numerous surgical manoeuvres; rest, strapping, immobilisation (cast), rarely: surgical treatment.(1,3)

Other Therapy management is based on the clinical classification. Grade 1 and 2 (pain symptoms are completely reduced after the end of sports activities) parent education, modification of sports activities, NSAIDs, ice, hamstring stretching, shock absorbing insoles. Grade 3 (pain does not disappear between sports activities): rest, immobilisation in a cast, specific rehabilitation program. Surgery only in rare cases (excision of ossicles). Not recommended: local injection of corticosteroids.(2,3)

Kinesio Taping is frequently used in the field of rehabilitation as a means of treatment for knee injuries however much of the evidence is contradictory. Taping is one of the adjunct treatments that we as physiotherapists might use with patients in combination with well supported techniques such as patient education and exercise therapy. There is good reason to use taping for sporting injuries of the knee.(6)

Patellar tendon strap is prescribed for patient who experience pain in front of knee caused by injury of the patellar tendon. The strap keeps the knee in proper alignment to reduce pain, as the strap redistribute tension inside the tendon The use of the infrapatellar strap was effective in reducing local pain among young male athletes without altering jumping parameters. Although no immediate effects were observed on jumping parameters, it can be assumed that the reduction in pain will cause better performance of the athlete during practice or match. Given its low cost, ease of use, and the fact that it is an appropriate intervention for young athletes, the infrapatellar strap can be recommended to use during physical activity in addition to other physical therapy modalities (e.g. appropriate exercise and manual therapy) for patellar tendinopathy.(7)

Hypotheses

This study will test the following hypothesis:

There will be no significant differences between the effects Kinesio tape and knee strap on pain management in Osgood Schlatter disease.

Basic assumptions

It is assumed that: All the children in will cooperate during the evaluation and treatment. All children will recognize and follow verbal orders and commands included in both testing and training techniques.

Delimitations

This study will be delimited to:

1. Thirty-eight young athletes with age range from 9 to 15 years with Osgood Schlatter disease.
2. Children will be randomly allocated into two equal groups; Group A will receive knee strap, while Group (B) will receive Kinesio tape.
3. In addition to the traditional exercise program given to both groups.
4. All children will receive three sessions per week for twelve weeks.

LITERATURE REVIEW

This study will compare the use of Kinesio tape versus knee strap on pain management and quadriceps muscle power on Osgood Schlatter disease.

Osgood Schlatter disease

Osgood Schlatter disease is defined as a separation of the tibial tubercle apophysis from the proximal end of the tibia. This lesion may have a history of trauma or may present without a significant recognizable injury. KatzI4 classifies this entity as a no articular osteochondrosis involving the quadriceps muscle/tendon insertion secondary to excessive muscle pull. Citing the same mechanism of increased quadriceps pull on the adolescent tubercle, Smillie28 describes Osgood Schlatter disease as a traction apophysitis. Dorland's Medical Dictionary gives as a synonym "apophysitis tibialis adolescent," while Christie4 states that the radiographically evident bone changes make it a disease entity. He adds that poor epiphyseal nourishment during a time of rapid growth can lead to the onset. However, histological studies of nine specimens indicate no evidence of primary aseptic necrosis in any of the tubercles examined. Increased stress on the weak link of the adolescent knee extensor mechanism accounts for the symptoms experienced by those patients with this lesion.(8)

Osgood-Schlatter disease (OSD), also known as Lannelongue disease is a type of osteochondrosis first described by Osgood and Schlatter in 1903. In most cases, Osgood-Schlatter disease is a clinical diagnosis with locally painful alterations around the tibial tuberosity apophysis. It results in knee pain, often severe enough to cause limping, sometimes accompanied by swelling or deformity, and frequently resulting in long-term symptoms with functional impairment. Patients experience

pain on descending stairs, after prolonged periods of sitting with the knee immobile, while kneeling, and during sports activities. Its manifestation coincides with the development of the secondary ossification centre of the anterior tibial tuberosity (apophyseal phase), which usually occurs at around age 9 in girls and 11 in boys. However, symptoms usually first appear between ages 8 and 12 among the former, and between 12 and 15 among the latter. Despite this, cases in adults have been reported. Osgood Schlatter disease has been associated with other pathologies and alterations, such as compartment syndrome, meniscal and patellar tendon injuries or hyperactivity and attention deficit. In addition, nearly 40% of patients reported pain after long-term follow up, which may lead to consequences such as the chronification of knee pain and the appearance of tendinosis, which, in turn, will end up conditioning the application of surgical techniques. The development of Osgood-Schlatter disease is thought to be the result of repetitive high forces being transferred from the quadriceps muscle to the insertion of the patellar tendon on the weak apophyseal cartilage of the tibial tuberosity. This can result in pain during contractions of the quadriceps during activities that load the knee such as jumping and running.(9)

Physical examination, ultrasound, and a lateral X-ray (figure 1) showing the fragmentation and separation of the tibial tuberosity apophysis, were performed in a standardized clinically common manner by author one, an experienced paediatric and sport orthopaedist alone. Body height (cm) and weight (kg) were measured to calculate the body-mass-index (BMI). Rectus femoris muscle shortening was measured in the prone position (heel-buttock) and classified according to patients' height into normal (10%).(3)

(Figure. 1) knee X-ray (3)

Symptoms can persist for 12 to 18 months and commonly resolve with skeletal maturity Conservative treatments include controlled immobilization, stretching, and reduction of activity, which are the preferred methods of treatment. Anti-inflammatory drugs can also be used for acute symptom relief. There have been several studies on injection of dextrose, lidocaine, or autologous conditioned plasma into the patellar tendon to provide symptomatic relief as well. Although conservative therapy is the mainstay treatment of Osgood-Schlatter disease, surgical intervention may be necessary for patients whose symptoms do not resolve with skeletal maturity. A small percentage of patients develop an ossicle and painful bump despite closure of the growth plates and are indicated for surgery. At our institution, 6 patients presented with persistent symptoms past skeletal maturity and were indicated for surgery. Osgood Schlatter is a common condition in sports medicine, and there is a lack of management strategies that have been evaluated in research. (Figure 2) lateral view of Osgood Schlatter patient. Irregular ossification

and fragmentation of the tibial tubercle and calcification and thickening of the patellar tendon.(8,9)

(figure 2) Osgood Schlatter disease, lateral view(8).

HISTOLOGY

Microscopic examination of bony ossicles removed at surgery indicates that the separation is due to increased tension over a small area of tendon insertion. All nine cases studied by LaZerte and RappI demonstrated an anterior cortical bone defect of the tubercle, in addition to increased vascularization of the infrapatellar tendon surrounding the ossicles.(10)

Causes

Factors of Osgood Schlatter disease and its progression include growth spurt, the specificity of the sport practiced, early sports specialization, sports training conducted in inappropriate conditions, with high volume and intensity, and poor general motor preparation with a lack of training focused on muscle strength development.(3,5)

Classification of Osgood Schlatter disease

Type 1: cartilage swelling alone Hypoechoic zone superficial to the apophysis of the anterior tibial tubercle representing pretibial cartilaginous swelling with forward displacement of the subcutaneous tissues and elevation of the patellar tendon from the tibial outline on the longitudinal view.(1,4)

Type 2: cartilage swelling and bony changes A fragmented and hypoechoic ossification center in addition to the abovementioned findings. (1,4)

Type 3: associated tendinitis Diffuse thickening of the insertion of the patellar tendon with or without vacuolation. (1,4)

Type 4: associated bursitis Fluid collection in the retrotendineal soft tissue representing infrapatellar bursitis.(1,4)

Differential diagnoses of OSD include.

there are some diseases affecting the knee joint and have some of the Osgood Schlatter manifestations such as Sinding-Larsen Johansson (SJS) disease, Hoffa’s

fat pad impingement syndrome, fracture of the tibial tuberosity, infrapatellar bursitis, patellar tendonitis.

(a) Sinding-Larsen Johansson (SJS) disease. which is an overuse disorder seen in skeletally immature adolescents, on the same spectrum as Osgood-Schlatter disease (OSD). SLJ is caused by weakness at the tibial tubercle apophysis, leading to stress at the patellar apophysis. Like other overuse disorders, the mechanism behind this is thought to be quadriceps tightness.

(b) Hoffa's fat pad impingement syndrome. Which has been defined as impingement of Hoffa's fat pad, leading to oedema and fibrosis. The primary aim of this systematic review was to identify morphological differences in Hoffa's fat pad between patients with and without Hoffa's fat pad syndrome, evaluating them as risk factors predisposing to its development. The secondary aim was to summarize and evaluate current evidence pertaining to the management of Hoffa's fat pad syndrome.

(c) fracture of the tibial tuberosity. Traumatic Tibial tuberosity fracture (TTF) is an uncommon injury occurring mostly in adolescents.

(d) infrapatellar bursitis. The common causes of bursitis are overuse, direct trauma or repetitive microtrauma, crystal disease, haemorrhage, infection, and systemic inflammation.

(e) patellar tendonitis. Patellar tendinopathy is an overuse injury of the patellar tendon frequently affecting athletes involved in jumping sports. The tendinopathy may progress to partial patellar tendon tears. Current classifications of patellar tendinopathy are based on symptoms and do not provide satisfactory evidence-based treatment guidelines.(10)

Treatment of Osgood Schlatter disease

Treatment is generally conservative with rest, ice, and specific exercises being recommended. Involves limiting activity until inflammation resolves and exercises that strengthen the surrounding musculature to reduce stress across the tibial tuberosity. With our patient, treatment with PRICE protocol (Protection, Rest, Ice, Compression, Elevation) physical therapy and strict activity modify cation was initiated. Surgical removal of the ossicles was considered. continues to have persistent pain with kneeling and occasional flares of acute pain over the tibial tuberosity with squatting and on long distance walking. Surgical treatment of unresolved Osgood-Schlatter disease. For symptomatic patients after closure of the growth plate, removal of the ossicle and adjacent bursae, smoothing down the bump with a burr, and repairing the reflected patella tendon to bone using suture anchors. The outcomes were excellent in all patients with no complications.(1,5)

Braces and splints can immobilize and protect joints, reduce pain, decrease swelling, and facilitate healing of acute injuries. They are also used for injury prevention and chronic pain reduction, and to alter the function of a joint. The medial unloading (valgus) knee brace is an option for patients with medial knee osteoarthritis, but evidence of long-term benefit is limited. The patellar stabilizing brace helps maintain proper patellar alignment but has mixed results in treating patellofemoral pain syndrome. The patellar tendon strap is effective in treating pain from patellar tendinopathy. The knee immobilizing splint is used after surgery to prevent reinjury and for acute or presurgical management of quadriceps rupture, patellar tendon rupture, medial collateral ligament rupture, patellar fracture or dislocation, and other acute traumatic knee injuries.(8,10)

Knee strap

Strap like band surround the tibial tuberosity, (figure 3) apply support pressure, reduce pain, decrease swelling, and facilitate healing. They are also used for injury prevention and chronic pain reduction, Patellar bracing/strapping is commonly used for pain reduction in patients suffering from patello-femoral pain. This concept has been supported by several studies. however, its effect on pain and functional improvement in patellar tendinopathy has not been studied extensively, and a lack of evidence exists as to its effectiveness. the effect of the infrapatellar strap on pain and jumping performance among young athletes diagnosed with patellar tendinopathy. the use of infrapatellar strap decreased pain severity reported by the participants in two out of four jumping tests. exhibiting the highest significant change in pain severity. These findings are consistent with de Vries et al.20 who studied the short-term effect of infrapatellar strap and tape on pain in individuals with patellar tendinopathy during the single leg decline squat, vertical jump test, and triple hop test. significant decrease in pain score while using the strap. In addition, studies compared the strap to other tapes, finding no differences between conditions claiming that any orthosis during sport can reduce pain in patellar tendinopathy. examining the effect of infrapatellar strap on quadriceps' muscle activity, lower extremities kinetics, and pain during jumping performance. result showed decreased pain severity while using the strap, reduced knee adductor moment, and lower activation of vastus lateralis prior to landing. studies compared individuals with patellar tendinopathy to healthy control using electromyography and motion analysis lab.(7)

(Figure 3) knee strap(7)

Kinesio tape

is an elastic therapeutic and sporting tape for Kinesiology Taping Method, which is worldwide technique being used in many sporting fields as successfully as with patients in a physiotherapeutic setting and designed to the same thickness and elasticity of the epidermis (out layer) of the skin with longitudinal stretch of 30~40% of its resting length. Kinesio tape is a popular method used to manage knee pain and improve knee stability, relief pain for knee arthritis (figure 4), improve knee range of motion and decrease pain in osteoarthritis, decrease pain in patellofemoral syndrome improve joint position sense, reduce Kinesio phobia, improve proprioception and correct mascle imbalance, movement pattern,

providing external feedback, encourage proper alignment and reduce stress on the knee joint during movement and activity.(11)

Recently there are so many studies on the effect on the Kinesio tape application on muscle performance, joint support and decrease pain but there are no studies known to our knowledge on the application on Kinesio tape on Osgood Schlatter disease. While Application of therapeutic Kinesio tape is effective in improving isokinetic quadriceps torque and reducing pain in knee osteoarthritis.(12)

(Figure 4) knee Kinesio tapping.(12)

The basic applications of Kinesio-tape are: ‘’I’’ - strong tape with the biggest effort, the tension is focused directly on the target tissue (therapeutic area), for stabilizing of joints. ‘Y’ with less effort than the ‘’I’’ application, the tension is under the bar and between the two ends of the target tissue. It is U used for the ligament and tendon techniques, corrective, myofascial, for wrapping the muscle, mechanical correction, for supporting the superficial fascia. , ‘X’ the tension is

focused on the target tissue between the two double edges. Works on a small space – rhomboids, elbow injury, fascia. With it we gather a maximum amount of tissue together. , ‘FAN CUT’ this application is with very low effort. Used for oedema, for improving blood and lymph circulation. In sport – for reducing the muscle tension and fatigue - for example riding - inlays on the quadriceps 1-2 pieces , ‘FAN CUT’ on foot and affects 15 to 20 min. It has been proven that the effect is better than the massage. ‘’WEB CUT” - is also used to reduce the oedema, but it is stronger than ‘FAN CUT’. It is U used in strains - myofascial bursitis, sports trauma, for pain reduction, etc. Tension of the “Kinesio Tech” bar: 0 – 10 % - effects on the myofascial 10 – 15 % - inhibition of the myofascial 15 – 25 % - facilitates the myofascial 25 – 35 % - corrective techniques 50 – 75 % - tendon, ligament, mechanical corrections 75 – 100 % - for mechanical corrections and ligament techniques 0 % - on the edges of the application, which should be approximately 5 cm long each. In presence of the areas with a concentration of lymph nodes, lots of sensory areas and concentration of receptors - the tension is low or the application there is to be avoided. Generally, applications affect optimally for 3 to 4 days. But when the tension is high 75% - 100%, 12 to 24 hours are enough.(11,13)

MATERIALS AND METHODS

This study will be conducted at the Outpatient clinics, Faculty of Physical Therapy Kafrelsheikh University to compare the effects of Kinesio tape and strapping on pain management in Osgood Schlatter disease.

Ethical consideration

The study's protocol will be reviewed and approved by the Research Ethical Committee, Faculty of Physical Therapy Kafrelsheikh University.

Statical analysis

Sample size.

Children will be randomly allocated into two equal groups; Group A will receive Kinesio tape, while Group (B) will receive knee strap.

Using G-power for windows and regarding t-test study, alpha level of 0.05, the total sample size will be 38 children (19 in each group)

To avoid selection bias, the children will be randomly allocated by simple random method via choosing one of two wrapped cards representing the two treatment groups, which are:

Group (A): will receive Kinesio tape in addition to the traditional program.

Group (B): will receive knee strap in addition to the traditional program.

To detect sample size (n) using the equation

$$n = \frac{z_c^2 \, p \, (1 - p)}{d^2}$$

where $\alpha = 0.05$, $p = 0.1$, $d = 0.098$, $\sigma = 0.3$

Inclusion criteria

Children will be included in the study if they fulfil the following criteria:

1) A medical diagnosis with Osgood Schlatter disease was made by paediatricians or paediatric orthopaedist.
2) Number of the participate children will be 38 children.
3) Age ranges from 9 to 15 years.

Exclusion criteria

Children will be excluded from the study if:

1) They had a permanent deformity (bony or soft tissue contractures).
2) Children have visual or auditory defects.
3) Children with intelligence quotient less than 70.
4) Children who had undergone a previous surgical intervention to knee joint.
5) A history of epileptic seizure and any diagnosed cardiac or orthopaedic disability that may prevent the use of assessment methods.
6) Children who are absent in two sessions.

Assessment

Pain, range of motion, muscle strength and functional test. Pre and post treatment for both groups

1. Pain assessment using visual analogue scale. it is widely used to assess pain using straight horizontal line with a fixed length usually 100mm, the two

ends of the line represent the extreme limits of the parameter being measured, the left end represent the worst condition while the right end represent the best condition. (14)

2. Range of motion using electrical goniometer. Universal goniometer in clinical evaluations of patients (as they are easy to be employed) and electro goniometer in laboratory studies (as they are more accurate) are reliable to test the knee range of motion.(15)

3. Muscle strength as the quadriceps muscle may be weaker due to limitation of exercise as pain persists. Lafayette Manual Muscle Tester to test maximal isometric knee extension and flexion. For knee extension, the subject sat in a chair. straps across the chest, directly under each arm, across the pelvis, and over the thigh at a point 6 to 8 cm proximal to the superior aspect of the patella. Each strap was adjusted to ensure subject stability and to prevent extraneous movement. With the knee fully extended, the Manual Muscle tester was placed between the examiner's hand and the subject's leg, four to six cm proximal to the malleoli We applied a downward force over 1 second to allow the subject to adjust and recruit the maximum amount of muscle fibers. Additional force was applied until the muscle contraction began to break and the limb began to lower. Further force completely lowered the limb, and the test ended before the limb touched the chair, instructed the child that the test was over when the limb had been lowered. Testing lasted no longer than 3 seconds. The peak force achieved was recorded as the maximum strength effort for that motion.(16)
4. single leg triple hops Functional scale to evaluate the activity pre and post treatment for both groups.(17)

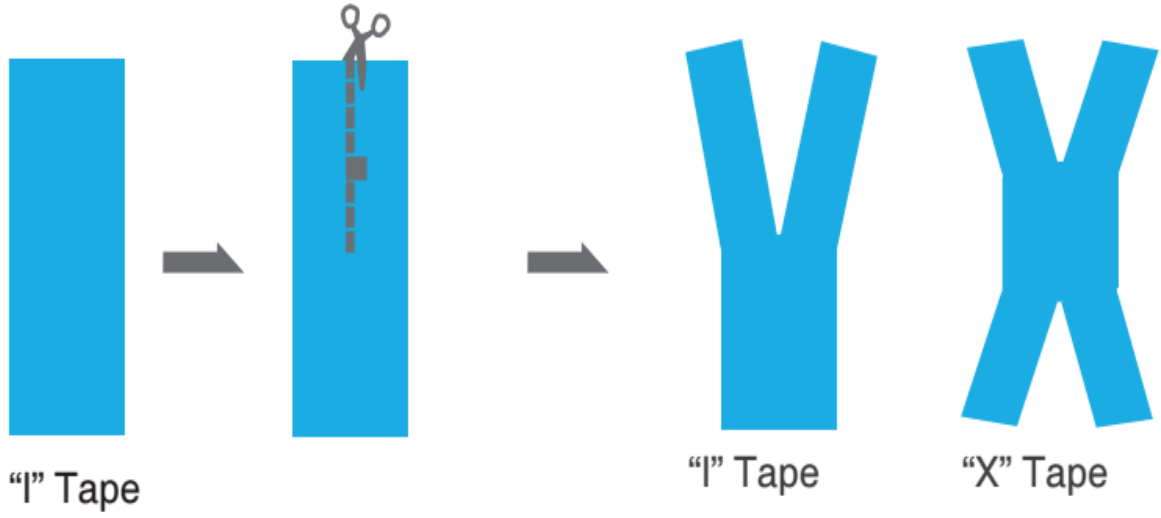
Treatment

The treatment protocol will be repeated for 12 weeks.

1) The traditional exercise program (given to both groups):

- ❖ Stretching exercise aims to maintain length and flexibility of shorten muscles.
- ❖ Strengthening exercise aims to improve the functional ability.
- ❖ Balance training program aims to improve balance.

(2) Kinesio tape. 2 days on, one day off with mixed Y and I shape application. (figure 5) (11)



(Figure 5) tapping shapping. (11)

(3) knee strap. All daytime wearing and resting at night. Strapping will add support to the patellar tendon at the site of insertion at the tibial tuberosity.

Procedures

All the patient will collected form the clinic of kafrelsheik physical therapy clinic. the number of 38 will be randomised divided to two groups each of 19 young athletes age from 9 to 15 years old. assessment will take place pre and post treatment.

Data collection and statistical analysis

A. Data collection pre and post treatment.

Data of all children in both groups will be collected and include:

1. Name, serial number, age (years), weight (kg), height.
2. Visual analogue scale for pain evaluation pre and post treatment.
3. Range of motion with Electrical goniometer to evaluate range of motion.
4. Muscle power using Lafayette Manual Muscle Tester to evaluate muscle power.

B. **Statistical analysis**

For testing the study hypotheses, the following statistical methods will be used:

Descriptive statistics (mean and standard deviation) of the demographic data of all patients in both groups. The suitable statistical tests will be used according to the nature of the collected data. Level of significance for all tests will be set at p-value $p = 0.1$. (18)

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تأثير شريط الكينيزيو مقابل تأثير رباط الركبة على مرض التهاب النتوء الاعلى لعظمه الساق لدى الاطفال الرياضيين

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