Trigger Points Release Versus Ultrasound in Treatment of Iliotibial Band Friction Syndrome

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ABSTRACT

Introduction: *Iliotibial band friction syndrome (ITBFS) was found to be a cause of lateral knee pain in active population, particularly in runners, and cyclists. This injury results from repetitive friction of the iliotibial band over the distal part of the femur. Treatment often focuses on exercise therapy, and treating local inflammation of the iliotibial band.* ***Purpose:*** *The aim of this study was to compare between the effects of trigger points release versus the effects of ultrasound in treatment of iliotibial band friction syndrome.* ***Subjects and Methods:*** *Thirty patients with a mean age 29.47 (±6.22) with chronic iliotibial band friction syndrome participated in the study. They were randomly classified into two equal groups. Each group received nine sessions over a period of 3 weeks. The first group received trigger points release followed by exercises therapy. The second group received ultrasound followed by the same exercises. Lateral knee pain intensity, range of motion of active hip adduction and lower extremity functional ability were the dependant variables measured before and after the treatment.* ***Results:*** *It was found that each of the lateral knee pain intensity, and the lower extremity functional ability were more significantly improved in the group of trigger points release compared to the other group receiving ultrasound. The range of motion of hip adduction was significantly improved in both groups, with no significant difference between groups.* ***Conclusion:*** *Trigger points release was more effective than ultrasound for reduction of pain intensity, and increasing the lower extremity functional ability in cases of iliotibial band friction syndrome. However there was no significant difference between treatments on increasing hip adduction motion.*

Key Words: *Trigger points release, ultrasound, iliotibial band friction syndrome.*

INTRODUCTION

Iliotibial band friction syndrome is a common knee injury caused by inflammation of the distal portion of the iliotibial band[1,2]. The iliotibial band is a thickened fascia that originates at the tubercle of iliac crest, runs distally down the lateral side of the thigh, and inserts on the lateral patellar retinaculum, tubercle of the tibia, and the fibular head. Along its length, the iliotibial band provides attachments for the tensor fascia lata, gluteal muscles and the vastus lateralis[3]. Iliotibial band friction syndrome is an overuse injury caused by repetitive friction of the iliotibial band across the lateral femoral epicondyle[4,5]. Repetitive flexion and extension of the knee causes the distal portion of the iliotibial band to become irritated and inflamed resulting in diffuse lateral knee pain[6,7].

Although recognizing the burning lateral knee pain of iliotibial band syndrome is not difficult, treating the condition can be a challenge, because there are underlying myofascial restrictions which can significantly contribute to the patient's pain and disability. Evaluation should include identification of the tender myofascial trigger points at the distal iliotibial band. After acute symptoms are alleviated with activity restriction, the trigger points should be managed with massage therapy or any other treatment. A stepwise stretching and strengthening program can help patients to return to their previous level of activities[8].

Myofascial trigger points contribute to increased tension in the iliotibial band[3]. They are hyperirritable spots located within a taut band. These spots are painful on compression and give rise to referred pain which arises from the distal portion of iliotibial band to the lateral aspect of the knee joint[12]. Myofascial trigger points also cause spot tenderness, muscle tightness, and fascial restriction[9,10]. The distal iliotibial band myofascial trigger points are about 0-3 cm (mostly 2 cm) proximal to the lateral femoral epicondyle[11].

Several physical therapy modalities have been utilized for treatment of iliotibial band syndrome such as; cryotherapy, ultrasound, deep transverse friction massage, stretching

and strengthening exercises[13,14,15,16]. Anti-inflammatory medications, cortisone injection, and surgery in the form of lengthening of the iliotibial band can also be advocated for treatment of iliotibial band friction syndrome [17]. Modalities that were used to treat myofascial trigger points are such as; transcutaneous electrical nerve stimulation, iontophoresis, interferential current stimulation, ultrasonic, acupuncture, and hot packs[18,19,20].

Myofascial trigger points are located within specialized soft tissue restrictions. Myofascial release focuses directly on these restricted myofascial elements, thus release the resulting tightness. If the myofascial tightness remains untreated, the normal pain-free function, and smooth muscle contraction can not be resumed[21]. Manual therapy can be used successfully, either as a sole modality or in conjunction with other physical therapy modalities; for the treatment of muscle-fascia disorders[22,23,24]. Trigger points release is the treatment of choice, if the patient has trigger points that causes myofascial restrictions such as iliotibial band syndrome. Trigger points release is a specific myofascial release technique that is used for the release of trigger points[25].Therapeutic ultrasound is used in the treatment of myofascial disorders, such as iliotibial band syndrome, because of its ability to increase extensibility of collagen tissues, and relieve pain[16].

Trigger point is effectively deactivated if the soft tissue structure in which it lies is restored to its normal resting length[26]. Stretching is intended to reduce pain, reduce muscle spasm, and increase range of motion[27,28]. Stretching has been used effectively in the treatment of iliotibial band syndrome[4,13]. The emphasis is on stretching of the iliotibial band for any myofascial restrictions[12]. Stretching exercises can be started once acute inflammation is under control. Identifying and eliminating myofascial restrictions complement the physical therapy program and should precede strengthening exercises[4].

Studies have also demonstrated that weakness or inhibition of the lateral gluteal muscles is a causative factor in this injury. When these muscles do not fire properly throughout the support phase of gait, as a result, other muscles must compensate, often leading to excessive soft tissue tightness and myofascial restrictions[4]. A significant difference in hip abductor strength was found between the injured and uninjured side[14]. Hip abductor strengthening appeared to be beneficial in the treatment of ITBFS[7,12].

To the author's knowledge, no published studies investigated the effect of trigger points release in treatment of iliotibial band friction syndrome, on the other hand there are few studies which proved the efficacy of ultrasound in treatment of this syndrome. Therefore the main purpose of this current study is to compare between these two modalities in treatment of iliotibial band friction syndrome. It is hypothysed that there will be no significant difference between the effects of trigger points release versus ultrasound in treatment of iliotibial band friction syndrome.

MATERIALS AND METHODS

Subjects

Thirty subjects (18 males & 12 females), diagnosed as chronic unilateral iliotibial band syndrome were selected for the study. Patients were excluded from the study if they had any of; distal biceps femoris tendinitis, popliteal tendinitis, lateral meniscus lesion within the past year[15]. Subjects were randomly assigned to two equal groups. The first group had a mean age of 29.47 (+ 6.22). They received trigger points release of the iliotibial band followed by stretching of the iliotibial band and strengthening of hip abductors. The other group had a mean age of 30.73(+ 6.09). They received ultrasound followed by stretching of the iliotibial band and strengthening of hip abductors.

Evaluation procedures: Evaluation was done before and after treatment which was for nine sessions, over a period of three weeks.

Pain intensity: Both groups were evaluated for lateral knee pain intensity using visual analogue scale[29]. The scale is a straight undivided line 10 cm in length, the ends of which are marked by statements indicating the extreme limits of pain sensation to be

measured, that is "No pain" at the far left end, and "extreme pain" at the far right end[30].

Range of motion: Active hip adduction was measured using myrin inclinometer[31]. The inclinometer is placed on the distal part of the lateral aspect of the thigh over the lateral epicondyle from the modified Ober test position[32].

Functional ability: The patients' functional ability had been assessed using the lower extremity functional scale (LEFS)[33], The LEFS has acceptable validity on outpatients in assessing functional ability. The LEFS is reliable to assess group and individual changes[34].

Treatment procedures

Trigger points release technique: This technique was given to the first group of patients, while the patient was in side lying position on the sound lower limb. It consisted of two steps; the first step was trigger points palpation; to identify and locate the myofascial trigger points in the distal portion of iliotibial band, which were about 0-3 cm (mostly 2 cm) proximal to the lateral femoral epicondyle[11]. Trigger points were identified and felt as firm, tender, and localized hyperirritable nodules[10]. Palpation was followed by the second step; which is the trigger points release technique[35]. This technique consisted of applying pressure by the pad of the therapist's thumb, which should not exceed eight to twelve seconds at the beginning, this duration was increased gradually for a maximum of twenty seconds for each pressure[25,36]. The total time of successive pressures was for five minutes or more (upon each trigger point) until the release was felt by the therapist's thumb[37].

Ultrasound: Ultrasonic device with a frequency of 1 MHz was used in the study[38]. The ultrasound head was applied to the muscle where digital pressure of the tender spot reproduces the patient's pain complaint[39,16]. A coupling medium (gel) was used for perfect transmission of ultrasonic waves from the treatment head to the body, and the ultrasonic head was applied perpendicular to the skin. Pulsed mode was used with an intensity of 1 W/cm2, the application as for two minutes for each point[38].

Exercises: Stretching of the iliotibial band: Stretching was begun with the subject standing upright. The leg being stretched was extended and adducted across the other leg. The subject exhaled while slowly flexing the trunk laterally to the opposite side, and the arm of the same side of the leg being stretched was stretched in the same direction over the head. This motion was continued until a stretch was felt on the side of the hip around the greater trochanter[3]. Stretching was applied for four times in each set; and two sets were performed in each treatment session[40].

Strengthening exercises: Strengthening of hip abductors: Sideway lift was applied following stretching of the iliotibial band. The exercise was performed from side lying position, with the injured lower limb upwards. Three sets of 10 repetitions were performed in each treatment session[12].

RESULTS

T-test was used to compare between groups and within groups for each of the three variables under investigation.

Differences between groups before treatment:

There was no significant difference between both groups at the pre-treatment evaluation concerning each of the pain intensity, the lower extremity functional scale (LEFS), and the range of motion of active hip adduction; indicating homogeneity between groups at the pre-treatment evaluation (Table 1).

Table (1): Differences between groups before treatment.

Variables	Group	Mean	Standard deviation	t-test value	P- value
Pain intensity	Group A	77.3	11.7	1.46	P > 0.05 (NS)
	Group B	71.4	10.34		
LEFS	Group A	22.13	3.96	1.83	P > 0.05 (NS)
	Group B	25.07	4.79		
Hip adduction	Group A	14.53	2.97	0.68	P > 0.05 (NS)
	Group B	13.87	2.33		

Differences within the trigger points release group:

There were significant differences between the pre-treatment and post-treatment mean values for each of pain intensity, lower extremity functional scale (LEFS), and hip adduction in group (A) (Table 2).

Table (2): Differences within the trigger points release group.

Variables	Pre-treatment mean values	Post-treatment mean values	t-test value	P- value
Pain intensity	77.3	16.5	23.58	P < 0.05 (Sig.)
LEFS	22.13	72.47	65.68	P < 0.05 (Sig.)
Hip adduction	14.53	24.00	11.29	P < 0.05 (Sig.)

Differences within the ultrasound group:

There were significant differences between the pre-treatment and post-treatment mean values for each of pain intensity, lower extremity functional scale (LEFS), and hip adduction in group (B) (Table 3).

Table (3): Differences within the ultrasound group.

Variables	Pre-treatment mean values	Post-treatment mean values	t-test value	P- value
Pain intensity	71.4	46.07	15.17	P < 0.05 (Sig.)
LEFS	25.07	59.00	30.798	P < 0.05 (Sig.)
Hip adduction	13.87	22.00	11.8	P < 0.05 (Sig.)

Differences between groups after treatment:

A significant difference was detected between both groups concerning each of the pain intensity, and the lower extremity functional scale (LEFS). The significant differences were in favor of group (A). However, no significant difference was found between both groups concerning the range of motion of active hip adduction (Table 4).

Table (4): Differences between groups after treatment.

Variables	Groups	Mean	Standard deviation	t-test value	P- value
Pain intensity	Group A	16.53	8.99	7.37	P < 0.05 (Sig.)
	Group B	46.07	12.67		
LEFS	Group A	72.47	4.79	6.14	P < 0.05 (Sig.)
	Group B	59.00	7.04		
Hip adduction	Group A	24.00	4.28	1.27	P > 0.05 (NS)
	Group B	22.00	1.12		

DISCUSSION

Myofascial trigger points, fascial adhesions, and hip abductor muscles weakness can all contribute to increase tension and friction of the iliotibial band at the lateral femoral epicondyle3.

Trigger points release improves the blood supply in the area of the taut band, reversing the existent ischemia. There is also localized stretching of the myofascia, till the elastic barrier is reached, and then a creep occurs. Thus trigger points release inhibits the trigger points and releases the fascial adhesions[36,41]. The application of ultrasound is an effective way of inactivating trigger points. Ultrasound is particularly valuable for treating trigger points of the deeper soft tissues, which are hard to reach by other therapeutic modalities. The mechanism by which ultrasound could effectively inactivate trigger points is that ultrasound heats the tissues, which, if is continued long enough at sufficient intensity, it terminates the local energy crisis caused by myofascial restrictions (local decrease of the blood supply at the area of the taut band), thus reducing the energy being consumed39.

Stretching reduces the overlap between actin and myosin molecules of the short

sarcomeres; in the area of the taut bands. This leads to decrease of the ischemia in the short sarcomeres. When oxygen has been adequately present at full essential length of the muscle fibers, this breaks the essential link needed to maintain the vicious cycle of the local energy crisis[39]. Strengthening exercises (used after the stretching) restore the functional capacity of the muscles, and increase mobility of the joints[42].

Unfortunately there is no available published research work on the use of trigger points release in cases of iliotibial band friction syndrome (ITBFS). However similar results to the present study were reported by other researchers, who used myofascial release in the treatment of myofascial pain dysfunction syndrome of other body muscles, such as; subscapularis muscle[40], iliopsoas muscle[43], neck and upper back muscles[44], scalenei muscles[45], shoulder girdle muscles46, masticatory muscles[47], and upper trapezius muscle[48].

Ingber (2000)[40] applied myofascial release in patients with shoulder impingement syndrome (with myofascial trigger points), in tennis players. Results of the present study are similar to the results achieved by Ingber; concerning the decrease of pain intensity and increase of range of motion. Significant improvement of pain intensity and range of motion was reported after 2-3 treatment sessions, and subjects had almost returned to painless function after 6 treatment sessions.

Kostopoulos and Lekkas (1995)[43] who used myofascial release in treatment of iliopsoas myofascial pain dysfunction syndrome, also support the results of the current study in the group of trigger points release. The treatment resulted in a decrease of the pain intensity, decrease of the muscle tightness and restoring flexibility and range of motion.

The study of Hanten et al. (2000)[44] supports our results in that a significant reduction of pain intensity was obtained by the use of myofascial release in patients with myofascial pain dysfunction syndrome of the neck and upper back muscles.

Results of Sucher (1990)[45] confirm our results because myofascial release caused decrease of pain intensity and increase of range of motion, in patients with thoracic outlet; having myofascial trigger points in the scalenei muscle.

Elpers and Griffith (1999)[46] applied nine treatment sessions of myofascial release techniques followed by therapeutic stretching exercises such as in our study. After 4 treatment sessions significant improvement occurred and resulted in an increase of the range of motion and a decrease of pain complaint; in cases of shoulder girdle myofascial pain dysfunction syndrome.

Zaky et al. (2003)[47] investigated the effect of trigger points release in chronic masticatory myofascial pain dysfunction syndrome. The results of the study confirm their findings because myofascial release and/or exercises caused decrease of pain intensity and increase of range of motion such as occurred in the group of trigger points release followed by exercises.

Zaky et al. (2008)[48] compared the efficacy of myofascial trigger points pressure release versus an exercises program in cases of chronic cervical myofascial pain dysfunction syndrome. Results indicated that myofascial trigger points pressure release is more effective than the exercises program. This supports the results of the present study concerning the beneficial effects of trigger points release in cases of myofascial pain such as ITBFS.

Delacerdo (1982)[49] demonstrated that hot packs followed by ultrasound, are more effective for alleviating pain than muscle relaxants and analgesics in patients with myofascial pain. It supports our results concerning the beneficial effects of ultrasound in cases of iliotibial band syndrome. Esposito and Colleagues (1984)[50] support our study and recommended ultrasonic as an effective modality to decrease pain intensity in patients with myofascial pain such as ITBFS. Esenyel and Colleagues (2000)[51] found that, when combined with stretching exercises, ultrasonic therapy and trigger points injection were found to be equally effective in treatment of myofascial pain, which also supports our results about the efficacy of ultrasonic as a treatment modality for iliotibial band friction syndrome.

According to the manuscript this is the first study to describe the role of each variable (trigger points pressure release, ultrasonic) in treatment of iliotibial band friction syndrome. It is expected that the results of this study will add to the body of knowledge and clinical application in the field of physical therapy. It is recommended that these interventions should be compared to other physical therapy modalities to investigate their effects in iliotibial band friction syndrome.

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الملخص العربي

إنفراج النقاط المستهدفة مقابل الموجات فوق الصوتية في علاج متلازمة إحتكاك العصبة الحرقفية الساقية

المقدمة : لقد وجد ان متلازمة احتكاك العصبه الحرقفيه الساقيه تتسبب في الألم الجانبي للركبه في الأشخاص الأكثر نشاطا، على وجه الخصوص العدائين ، وراكبي الدراجات الهوائيه . تنتج هذه الاصابه عن احتكاك العصبه الحرقفيه الساقيه بنهاية عظمة الفخذ. يتم التركيز في علاج هذه الحالات على التمارين العلاجيه ، وعلاج الالتهاب الموضعي في العصبه الحرقفيه الساقيه . **هدف الدراسه :** هذه تهدف الدراسه الى مقارنة تأثير انفراج النقاط المستهدفه ، مقابل تأثير الموجات فوق الصوتيه في علاج متلازمة احتكاك العصبه الحرقفيه الساقيه. **الوسائل :** تم اشتراك ثلاثون من مرضى متلازمة احتكاك العصبه الحرقفيه الساقيه في هذه الدراسه ، وكان متوسط العمر 29.47 (±6.22) . تم توزيع المرضى عشوائياً بالتساوى على مجموعتين ، وكانت فترة العلاج لمدة تسعة جلسات . تلقت المجموعة الأولى العلاج بانفراج النقاط المستهدفه يتبعه برنامج تمارين علاجيه . تلقت المجموعة الثانيه العلاج باستخدام الموجات فوق الصوتيه يتبعه برنامج تمارين مماثله . تم تقييم كلا من شدة الألم الجانبي للركبه ، القدرة الوظيفية للطرف السفليى ، والمدى الحركي لضم مفصل الفخذ ، قبل العلاج وبعده . **النتائج :** أظهرت نتائج الدراسة وجود فروق ملحوظة في كلآ من شدة الألم الجانبي للركبه ، والقدرة الوظيفيه للطرف السفليى في المجموعتين ، مع أفضلية ملحوظة لمصلحة المجموعة الأولى . كما وجدت فروق ملحوظة فى المدى الحركي لضم مفصل الفخذ فى كلتا المجموعتين ، مع عدم وجود فرق بين المجموعتين . **الاستنتاج :** ان تأثير انفراج النقاط المستهدفه أفضل من الموجات فوق الصوتيه ، في علاج حالات متلازمة احتكاك العصبه الحرقفيه الساقيه ، بخصوص كلآ من شدة الألم الجانبي للركبه ، والقدرة الوظيفية للطرف السفليى ، مع عدم وجود أفضليه بين وسيلتي العلاج بخصوص المدى الحركي لضم مفصل الفخذ .

الكلمات الداله : انفراج النقاط المستهدفه ، الموجات فوق الصوتيه ، متلازمة احتكاك العصبه الحرقفيه الساقيه .