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CASE REPORT

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Muscle energy technique on non-specific knee pain associated with sacroiliac dysfunction

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ABSTRACT

Objective: to check the effectiveness of the increase on sacroiliac joint mobility on the painful knee among university students. Method: This was an experimental study with 13 students, from 18 to 25 years, which were subjected to an application of muscle energy technique in the sacroiliac joint. The knee functioning was assessed using the International Knee Documentation Committee Subjective Knee Form (IKDC). To classify the functioning was applied the International Classification of Functioning, Disability and Health generic core set. As for pain assessment, it was used the visual analog scale (VAS). Results: in initial evaluation, the referred pain was 6.1±1.3. After intervention was observed significant difference (p=0,0009), and reported pain of 3.3±2.7. Conclusion: a muscle energy technique applied in sacroiliac joint can be used for reduction of unspecific painful symptomatology of knee joint.

Key-words: sacroiliac joint; knee, musculoskeletal manipulations; physical therapy modalities; health evaluation.

INTRODUCTION

The knee joint is one of the most affected by damage, whether acute or chronic.(1) The high incidence of knee injuries is mainly due to the anatomical conformation very dependent dynamic stabilizers and because it is a joint which is subject to constant overloading.(2)

One of the possible etiologic factors to generate overloading on the knee joint is the unilateral sacroiliac joint dysfunction.(3) The sacroiliac joint hypomobile, due to a bad posture, muscular imbalances and abnormal neuromuscular control, it makes the joint does not have a proper arthrokinematics, turning their movement inefficient and leading to joint overload.(4)

Among the resources used to treat the sacroiliac dysfunction is muscle energy technique (MET), which is a technique which uses the principles of neurophysiology to relax overactive muscles and/or lengthen shortened muscles.(4) The technique is a method in which the individual actively uses his muscles from a controlled position in a specific direction against an opposing force, in order to restore joint mobility. It is based on, after a pre-stretching contraction of a retracted muscle, it will relax as a result of autogenic inhibition and it will be easily elongated, increasing the joint mobility.(5) MET is indicated to patients with symptoms of painful musculoskeletal system which present shortened muscle or spasm and abnormal joint activity.(6)

The MET is ranked among the active structural techniques, in which the individual participates applying its muscle strength and dosing the technique.(6) The patient is instructed to contract isometrically the agonist muscle against therapist resistance of approximately 20 to 25% of its available force(4). This contraction is maintained for 3 seconds to occur a neurophysiological inhibitory effect on the muscle spindle.(7)

In this context, the aim of the present study was to verify the effectiveness of the increased mobility of the sacroiliac joint in the painful knee symptomatology of university students.

METHOD

Study Design

An experimental study was carried out, without control group, from August 2015 to July 2016, at the Clínica-Escola de Fisioterapia da Universidade Estadual do Centro-Oeste (UNICENTRO), approved by the Research Ethics Committee of UNICENTRO (number 1,801,678).

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Sample

We adopted a non-probabilistic sample model, formed by convenience and spontaneous demand. Seventeen individuals attended the initial evaluation, but only 13 were in the pre-established criteria. Individuals between the ages of 18 and 25 with knee pain (with no clinical diagnosis) with dysfunction of the sacroiliac joint (identified by special/orthopedic/osteopathic tests) were included. Individuals with a history of trauma and/or lower limb surgery and difference in leg length were excluded. Eligible individuals (n=13) agreed to participate in the study and signed a free and informed consent form.

Evaluation

Initially, a physical evaluation was performed to identify the presence of dysfunction. In this evaluation, Mitchell and Gillett tests were performed which aim to detect biomechanical change (setting) of the sacroiliac joint, and Downing, which complements the Gillet test to evaluate dysfunction osteopathic of sacroiliac joint (anteriority and posterity).[7,8]

The Gillet test is performed with the patient standing and the examiner remains behind it, which rests his thumb on the posterior superior iliac spine (PSIS) on the side under examination. The other thumb rests on the midline of the sacrum at the level of the spinous process of S2. Next, The patient is instructed to perform a hip flexion and homolateral knee greater than 90°. The test is performed on both sides. The test will be positive on the side where PSIS does not lower.

At the second moment of the test, the thumb contact should be one finger above the PSIS and the spinal process of S1 and then solicit to the participant to flex the limb to be tested. If PSIS does not go down or lower, there is an indication of iliac posteriority. The last stage of the test consists of contact of the thumbs one finger below the PSIS and in the spinal process of S3, performing flexion of the tested limb. The result will be positive on the side where the PSIS does not go down or lower, indicating anteriority of the iliac.

The Downing test has its execution with the patient in the supine position. The lower limb of the side to be tested is passively mobilized by performing hip flexion, abduction and internal rotation, followed by extension of the limb. The expected result is that the leg is "short" (medial malleolus is proximal compared to the contralateral malleolus), indicating a posterior rotation of the iliac. Then, in the same limb, the movement performed is of flexion, adduction with external rotation of the hip, followed by extension of the limb, where the expected result is that the leg becomes "long" (medial malleolus is distal compared to the contralateral malleolus), indicating anterior rotation of the iliac.

Eligible individuals with positive tests were included and submitted to subsequent evaluations. A sociodemographic questionnaire was used to characterize the sample.

To represent the sample relative to the knee functionality, the subjective form the *International Knee Documentation Committee Subjective Knee Form* (IKDC) was applied.[9,10] The IKDC was developed in 1987, and its latest version was published in 2001, aiming to obtain a standardized international system of documentation for the various conditions of the knee.[11,10] The Brazilian version of IKDC is valuable content, with measurement properties similar to the original version[9], consisting of ten objective questions which assess three areas including symptoms (pain, stiffness, swelling and blockage), sports and daily activities, pre and post knee injury.[12,10] The total score ranges from 0 to 100, where 100 indicates that the individual has no limitation in daily life activities or sports activities as well as the absence of symptoms.[10]

To sort functionality the shortened version of the generic *core set* of CIF was applied, which comprises 7 classes of 2 CIF components, and 3 of body functions (b130 energy functions and pulses, b152 emotional functions and b280 pain sensation) and 4 activities and participation (d230 To perform daily routine, d450 to walk, d455 to move and d850 Paid work). Qualifiers 1, 2, 3 and 4 represent progressive levels of disability and were grouped under the column named "some deficiency." The qualifiers 0 and 9 indicate, respectively, no deficiency or not applicable and have been grouped under the column "non-disabled".[13]

Pain was considered as a primary outcome. The Visual Analogue Scale (EVA) was used to evaluate the intensity of the pain, which consists of a straight line of 10cm, not numbered, indicating at one side the marking "absence of pain" and the other "worse pain imaginable".[14] This scale provides conclusive information for the diagnosis of pain intensity.[15]

Experimental procedure

MET was performed with the purpose of correcting the anterior or posterior iliac (according to previous diagnostic tests for each individual), applied only once. One week after the application of the technique the patients were reevaluated by VAS.

MET was chosen from the results of the physical evaluation. For the anterior iliac the patient was placed in lateral contralateral position to the side to be treated, hip and knee of the same side in maximum flexion, therapist in front of the patient, positioning the foot of the patient on the anterior superior iliac spine of the therapist. The cephalic hand controls the knee of the patient and the caudal hand palpates the S3 segment at the sacroiliac level; the therapist searches for motor barrier, with hip flexion and an adduction component; then, the isometric contraction of hip adduction is requested, a new motor barrier is searched, isometric contraction in extension is requested. Thus, three cycles of isometric contraction of three seconds were performed.

For the posterior iliac, the patient was positioned in the ventral decubitus position and the therapist positioned in

an anterior fissure looking at the head of the patient, on the contralateral side to be treated, cephalic hand with the pisiform in contact on the PSIS, the fingers along the iliac crest and the caudal hand on the anterior face of the knee; from this contact the motor barrier in hip extension, adduction and internal rotation of the lower limb was searched; From this contact, three contractions were performed in flexion, during three seconds, and a new motor barrier was searched. We performed three rounds of three hip flexion contractions.[7]

Statistical analysis

For comparison of pre and post-intervention results the data were submitted to the Kolmogorov-Smirnov normality test. Since all data were normally distributed, we used the Student *t* test. Data were analyzed by *Graphpad Instat software,* version 3.4 and for all analyzes was considered as significance level of 5%.

RESULTS

The sample characteristics are represented in table 1.

Table 1. Sample Characteristics

Genre	
Female, n (%)	9 (69.2)
Male, n (%)	4 (30.8)
Age, mean (SD)	20.3 (2.2)
Knee injury history, n (%)	6 (46.2)
Low back pain, n (%)	7 (53.8)

Regarding the presence of sacroiliac dysfunction, based on the Mitchell, Gillet and Downing tests, the dysfunctions were observed (Table 2).

The categories frequencies of the generic set of CIF. It is possible to observed that only category b280 (pain sensation) was considered by all students. Qualifier 8 (unspecified) was not used, reflecting the good data quality (table 3).

In the IKDC analysis, the mean score was 60.2 ± 11.1. As the scale ranges from 0 to 100, it indicates that the evaluated patients presented functional levels with slight limitations to the activities of daily life and sports.

DISCUSSION

The study by Siegele et al.[3] related the bad positioning the pelvis with knee pain and based on this finding justifies the application of the technique in sacroiliac joint in this study.

The posterior iliac may be fixed by the action of posterior muscles of the thigh, rectus abdominis, psoas and gluteus maximus, tensioning the iliac muscles, sartorius, rectus of the tight, hip abductors and quadratus lumborum muscle. The posterior iliac also triggers an external rotation of the hip and may lead to a functional short leg. The anterior iliac may be fixed by the action of the lumbar, sartorius, iliac, rectus of the hip, dorsal and hip adductor muscles, tensioning the posterior thigh muscles, rectus abdominis, psoas, and gluteus maximus. The anterior iliac also triggers an internal rotation of the hip and may lead to a functional long leg.[7] Thus, both the anterior and posterior iliac may overload the knee joint, triggering pain.

The pain reported by the individuals was significantly decreased after the application of MET, which may be

Table 2. Functional evaluation, diagnosis of dysfunction and technique applied.

Voluntary	Complaint side	Mitchell		Gillet (S2)		Gillet (S1)		Gillet (S3)		Downing AB+RI		Downing AD+RE		Treated side	Technique applied
		R	L	R	L	R	L	R	L	R	L	R	L		
1	R	-	+	+	-	+	-	+	-	+	-	-	-	R	AI
2	R	-	-	+	+	+	+	+	-	+	+	-	-	R	AI
3	L	-	+	+	+	+	-	+	-	-	-	+	-	R	PI
4	R	-	+	+	-	+	-	+	-	-	+	-	-	L	AI
5	R	-	-	+	-	-	-	-	-	-	-	-	+	L	PI
6	R	-	+	-	+	-	+	-	-	-	-	-	+	L	PI
7	R	+	-	+	-	+	-	+	-	-	-	+	-	R	PI
8	R	-	+	+	-	+	-	-	-	-	-	-	+	L	PI
9	R	+	-	+	-	+	-	-	-	-	-	+	-	R	PI
10	R	-	+	+	-	+	+	-	-	-	-	-	+	L	PI
11	R	+	-	-	-	+	-	-	-	-	-	-	+	L	PI
12	R	+	-	+	-	+	-	+	-	-	-	+	-	R	PI
13	L	+	-	+	-	+	-	-	-	+	+	-	-	R	AI

R: right; L: left; AI: anterior iliac; PI: posterior iliac; +: positive for the tested side; -: negative for the tested side.

Table 3. Categories frequencies of the generic set of CIF, according to the qualifiers.

CIF Category	CIF Qualifier							
	Any disability					No disability		
	.1	.2	.3	.4	%	.0	.9	%
b130 Functions of energy and impulses	6	-	1	-	53.8	6	-	46.25
b152 Emotional functions	3	4	5	-	92.3	1	-	7.7
b280 Pain sensation	2	11	-	-	100.0	-	-	-
d230 To perform daily routine	3	6	1	-	76.9	3	-	23.1
d450 To walk	2	5	-	1	61.5	4	1	38.5
d455 To move	3	5	4	-	92.3	1	-	7.7
d850 Paid work	4	2	2	-	61.5	4	1	38.5

explained by the fact that the technique is effective in patients who have pain and severe muscular spasms[6], since there is an active isometric muscle contraction followed by muscle relaxation[16]. A single MET application does not change the biomechanics muscle, however, it increases the stretch muscle tendon, suggesting that the stretching and relaxation promote the reposition of pelvis.[17] Similar results to this study were reported by Selkow et al.[18], which used a single application of the technique in patients with lumbopelvic pain.

In 13 evaluated individuals, 9 (69.2%) were female; what explains the higher female prevalence is that women have a higher risk of developing lesions in the knee joint[19], because of the differences between genders, both structural and biomechanical.[20]

It was observed that 53.8% of the individuals reported low back pain in addition to knee pain. On this finding, it is believed that the bad position of the sacroiliac joint might explain such prevalence.[21]

The CIF proposes a model of understanding human functionality which integrates biomedical, social and personal aspects, as well as homogenize the terminology that describes incapacitating conditions related to health. Abnormalities in functions or structures are named deficiencies, which are defined as significant losses or changes in structures and/or functions. Because pain is a change of function[22], knee pain was considered in this study.

Due to the complexity of this classification, *core sets* have been developed which are sets of categories which assess the individual functionality.[22] In this study, we used the short *core set* due to increased convenience and utility.

This study was limited to a sample of students complaining of knee pain associated with sacroiliac dysfunction, which does not allow the generalization of the results. In addition, a single intervention of MET was performed, and reassessment after one week of the intervention, considering only the pain as an outcome. We suggest a follow-up study and the inclusion of functional-related outcomes.

CONCLUSIONS

The muscular energy technique applied in the sacroiliac joint may be effectively used to reduce the non-specific painful symptomatology of the knee joint when associated with sacroiliac dysfunction.

Conflict of interest: There is no conflict of interest.

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AUTHOR'S CONTRIBUTION

GA: collection and processing of data, analysis and interpretation, literature review and wording; MYO: collection and processing of data, analysis and interpretation, literature review and wording; BGM: collection and processing of data, analysis and interpretation, literature review and wording; ACB: design and development, supervision and critical review; JAR: design and development, supervision and critical review; ARF: design and development, supervision and critical review.

CONFLICTS OF INTEREST

The authors declare no have conflict of interest.

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