ORIGINAL ARTICLE

Prevalence of myofascial dysfunction in patients with low back pain

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ABSTRACT

Objective: This study aimed to examine the prevalence of myofascial dysfunction in patients with low back pain, which is the area most frequently afflicted, and to quantify the pain threshold for these evaluations using an algometer. **Method:** We evaluated 70 patients with a history of chronic low back pain in search of trigger points that would elicit the patient's pain. The muscles tested were the quadratus lumborum, iliopsoas, gluteus maximus, medius, minimus, and piriformis. The prevalence of myofascial dysfunction was determined by the percentage of patients with trigger points. The pain threshold was determined by the average of three assessments of pressure for each trigger point. **Results:** The results showed that 90% of patients had myofascial dysfunction, 76% of whom had trigger points in the quadratus lumborum, 69% in the gluteus medius, 56% in the piriformis, 40% in the gluteus minimus, 31% in the iliopsoas, and 29% in the gluteus maximus. The pressure pain threshold of the quadratus lumborum was 1.71 kg/cm^2, 2.39 kg/cm^2 for the gluteus medius, 2.34 kg/cm^2 for the piriformis, 2.58 kg/cm^2 for the gluteus minimus, 2.11 kg/cm^2 for the iliopsoas and 2.19 kg/cm^2 for the gluteus maximus. **Conclusion:** Our data demonstrate the high prevalence of this disorder and suggest that it deserves specific attention in the treatment of low back pain in patients with chronic pain.

Keywords: Myofascial Pain Syndromes, Low Back Pain, Prevalence

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INTRODUCTION

Lumbar pain can afflict approximately one in every five adults at some point in their lives; in 10% of all individuals it can be recurrent and chronic, making it one of the main causes for absenteeism at work. Among its etiologies are alterations in the facet articulations, in the intervertebral disk, and in the nerve roots - in addition, there are degeneration, neoplasia, and myofascial origins.[1-3]

The myofascial disorder occurs in trigger points in the muscle, normally with tight bands either in the skeletal muscle or in the muscle fascia, causing pain in a referred zone and susceptibility to reduced flexibility.[4] The pain and consequent functional alterations can lead to socioeconomic disabilities in individuals with low back pain, making them incapable of performing daily life activities and/or work activities.[5,6]

Studies indicate that acute trauma or repetitive microtraumas can predispose the development of trigger points. A lack of physical activity, remaining in bad postures for long periods of time, and articular dysfunction can predispose the individual to develop microtraumas and consequent myofascial dysfunction.[4]

The prevalence of trigger points occurs in various clinical conditions and they afflict more than 85% of the individuals in tertiary clinics and have received less attention, even though it is an important source of low back pain.[7]

The main muscles afflicted by trigger points that can be related to low back pain are: quadratus lumborum, iliopsoas, gluteus maximus, gluteus medius, gluteus minimus, and the piriformis. The best way to diagnose myofascial dysfunction is through a careful analysis of the pain history with a consistent physical exam as demonstrated by Bron et al.[7] where the author reports that myofascial trigger points can be detected with reliability by trained examiners.

In order to determine the presence of trigger points, the presence of a quite singular set of symptoms is necessary such as tight band, local tightness, recognition of pain by the patient, referred pain, and response to local contraction.[4]

Pressure algometry is used clinically to diagnose muscular pain syndromes and is effective in locating trigger points in the muscle. The use of this equipment can also be important for it aids in documenting tightness or sensitivity in the dysfunctional muscle.[8-10]

OBJECTIVE

The present study sought to examine the prevalence of myofascial dysfunction in individuals with low back pain and to identify which were the muscles most frequently afflicted as well as to quantify the pain threshold through the algometer.

METHOD

In this study, 70 individuals with an average age of 48 ± 11.76 years and hypothetically diagnosed with low back pain were evaluated. Individuals who reported not being able to remain in the appropriate position for the evaluation of the referred trigger points and those with cognitive alterations were excluded from this study.

The participants were recruited from the Back Rehabilitation Outpatient Clinic at the Clinics Hospital of Ribeirão Preto Medical School/University of São Paulo. All the participants were instructed on the procedures to which they would be submitted and signed the free and informed consent form, which, together with the study, were approved by the ethics committee of the above-mentioned hospital.

The trigger points were identified through the palpation of the muscles by an examiner previously trained for six months in the standardization of the method as described by Travell et al.[11]

The muscles gluteus maximus, gluteus medius, gluteus minimus, piriformis, quadratus lumborum, and iliopsoas were evaluated with palpation, pressing transversely with the fingers, searching for tight bands in the muscle fibers.

After locating the trigger points and the patient identifying the pain, an algometer (Kratos - DDK 20) was used on the points that elicited the patient's pain with the palpation to determine the pain threshold by pressure. The pain threshold by pressure was determined with the minimum amount of pressure: when the sensation of pressure would turn to pain. The application of pressure with the algometer was interrupted the moment the subject reported feeling pain.

For the evaluation of each muscle group, the patient was positioned so as to facilitate access to the muscle, following the description of Travell et al.[11]

The palpation of the gluteus maximus was made with a patient lying on the non-afflicted side of the body with the thigh on top being flexed. There are three regions of this muscle that can develop trigger points. In the present study the first region was called PG1 and the second, PG2. Both were palpated with transverse finger movements over the muscle fibers. The PG1 is located laterally to the sacral insertion of the gluteus maximus and the PG2 is located slightly cranial to the ischial tuberosity. In the third region, called PG3 and located in the lower border of the muscle, the trigger points were palpated on the plane against the ischium.[11]

The gluteus medius was evaluated with the patient lying on the non-afflicted side of the body with the hip and knees flexed. In this muscle, there are also three regions to be palpated in search of trigger points on the border of the iliac bone, with the PG1 located more posterior and close to the sacrum, the PG3 in the anterior region of the muscle, and the PG2 located between these two regions. The muscle fibers were rolled against the bone with transverse movements of the fingers.[11]

The gluteus minimus has two regions for palpation. PG1 is located in the more anterior part of the gluteus minimus, and for its palpation the patient lies in the supine position with the thigh of the afflicted side extended. The tensor fascia lata can be identified doing an internal rotation of the thigh against resistance, and then the examiner can palpate the anterior fibers of the gluteus minimus anterior and posterior to the tensor fascia lata, distally to the level of the anterior superior spine. The PG2 is located in the posterior fibers of the gluteus minimus and its palpation was made with the patient lying on the non-afflicted side of the body with the thigh on top adducted and slightly flexed. The trigger points in this region were found above the line of the piriformis between its middle point and the junction of its medial and lateral third.[11]

In the piriformis evaluation, the patient was positioned lying on the non-afflicted side of the body with the thigh on top flexed 90 degrees to the front in relation to the bottom thigh, then a line was traced on the topmost border of the major trochanter passing through the sacroiliac extremity of the major ischial foramen. This muscle was palpated in search of trigger points in a region located laterally to the junction of the medial and lateral thirds of the piriformis line. One was more medial (PG1) in relation to the other (PG2).[11]

The palpation of the quadratus lumborum was made with the patient lying on the non-afflicted side of the body, with the arm on the side to be examined lifted towards the head of the table behind the patient's head. The

knee on top was positioned behind the lower knee, creating the appropriate space to examine this muscle. This muscle has three regions to be examined in search of trigger points. The PG1 is deep and is located at the angle in which the iliac crest and paravertebral muscular mass meet. In order to examine this region, a deep pressure was applied to the area above the iliac crest and anterior to the paravertebral muscles. Pressure was applied in the direction of the lumbar transverse processes.[11]

The PG2 is located along the internal part of the iliac crest, where iliocostal fibers are attached; the examiner's fingertip ran in the direction of the muscle fibers. The PG3 is at the angle in which the paravertebral muscle and the 12th rib meet. The finger pressure was applied deeply in the direction of the L1 and L2 transverse processes.[11]

In the iliopsoas evaluation, the patient was placed in the supine position. For the PG1 the examiner pressed the iliopsoas musculotendinous joint and the iliac fibers against the lateral wall of the femoral triangle. For the PG2, the examiner palpated the proximal fibers of the iliac muscle inside the iliac crest of the pelvis through the aponeurosis of the external abdominal oblique muscle with the fingers reaching the interior of the iliac crest.[11]

After the examiner finished these evaluations, he marked the region of maximum tightness of the points that elicited pain from the patient, either on the patient's skin or on his or her clothes, to locate it more easily. Then the examiner pressed the muscles and pointed randomly with the algometer three times until the pain threshold was reached, with an interval of 15 seconds for each measurement and with the instrument zeroed after each one of them. The value of the corresponding pressure was annotated in Kg/cm^2. After that, the average of the three measured values was calculated.[12]

The pressure limit for superficial muscles was established at 3 Kg/cm^2 and at 8 Kg/cm^2 for deep muscles in accordance with a previous study,[13] and when these values were reached without eliciting pain, the evaluation with the algometer was interrupted.

The average of the three measurements was calculated for each trigger point and, afterwards, the average of the pain thresholds of all the points of each muscle was also calculated. At the end of the data collection, a descriptive statistical analysis was made on the percentage of the population with myofascial dysfunction associated with low back pain and on the percentage of prevalence for each muscle.

RESULTS

Out of the 70 individuals participating in the study, 63 (90%) presented myofascial dysfunction. Among them, 53 (76%) presented trigger points in the quadratus lumborum, 48 (69%) in the gluteus medius, 39 (56%) in the piriformis, 28 (40%) in the gluteus minimus, 22 (31%) in the iliopsoas, and 20 (29%) in the gluteus maximus.

Among the individuals evaluated, 8.57% presented only one muscle afflicted with myofascial dysfunction, 20% presented two muscles afflicted, 25.7% had three or more muscles involved, and 10% of the individuals did not present any muscle afflicted by this dysfunction.

Out of the 53 individuals with trigger points in the quadratus lumborum, 77% presented a positive PG1, 49% presented a positive PG2, and 32%, a positive PG3. In the 22 participants who presented trigger points in the iliopsoas, 73% presented a positive PG1 and 50%, a positive PG2.

Out of the 20 individuals with trigger points in the gluteus maximus, 60% presented a positive PG1, 25% presented a positive PG2, and 35% presented a positive PG3. Among the 48 individuals with myofascial dysfunction in the gluteus medius, 46% presented trigger points in the PG1 region, 67% in the PG2 region, and 42% in the PG3 region.

Among the 12 volunteers with trigger points in the gluteus minimus, 43% presented a positive PG1 and 86%, a positive PG2. Lastly, of the 39 individuals who presented myofascial dysfunction in the piriformis, 56% presented a positive PG1 and 67% a positive PG2.

The values for the pain threshold by pressure on the different trigger points and the average of the pain threshold by general pressure on each muscle are shown in Table 1.

DISCUSSION

Myofascial dysfunction is responsible for 20 to 95% of the complaints for musculoskeletal pains in medical clinics and in pain treatment centers. In the present study, the prevalence of such dysfunction in individuals with chronic low back pain was 90%, which is consistent with the findings reported by Chen & Nizar.[14] This incidence may be justified by the population sample studied with individuals from a tertiary service presenting chronic pain at the time of evaluation and possibly increasing the prevalence of secondary trigger points to other musculoskeletal dysfunctions.

Another variable that justifies the high prevalence of dysfunction in the individuals studied is that 68% of the volunteers were females. Studies show that being female is a risk factor for the development of myofascial dysfunction due to the hormonal changes that happen during the second week of the menstrual cycle.[15]

The average age of the individuals with myofascial syndrome was 48 years (48 ± 11.76), and age increase can also be considered a risk factor for such dysfunction, due to aging leading to structural degeneration of bones and joints and the loss of muscular flexibility.[14]

Chen & Nizar[14] evaluated 126 individuals with chronic back pain to determine the prevalence of myofascial dysfunction as an etiology and the risk factors for this dysfunction. In the lower back, the authors evaluated the lumbar paravertebral muscles along with the piriformis, gluteus medius, minimus, maximus, and the quadratus lumborum. They concluded that the incidence of the dysfunction was 63.5%. Among the individuals evaluated, 57.5% presented only one muscle afflicted by myofascial dysfunction, 27.5% presented two muscles afflicted, and 8.8% presented three or more muscles with this dysfunction. The most afflicted muscle was the piriformis with 63.8% of the cases, followed by the paravertebral lumbar muscles with 37.9%, gluteus medius with 12.1%, gluteus minimus with 10.3%, quadratus lumborum with 6.9%, and gluteus maximus with 3.5%.

Table 1. Pain threshold by pressure on the trigger points of each muscle and average pain threshold by pressure on the muscles studied

	PG1 (Kg/cm^2)	PG2 (Kg/cm^2)	PG3 (Kg/cm^2)	Average (Kg/cm^2)
Quadratus lumborum	1.76	1.78	1.59	1.71
Iliopsoas	2.38	1.85	----------	2.11
Gluteus maximus	2.51	1.95	2.13	2.19
Gluteus medius	2.38	2.64	2.16	2.39
Gluteus minimus	2.93	2.24	----------	2.58
Piriformis	2.25	2.43	----------	2.34

In the present study, the most afflicted muscle was the quadratus lumborum with an incidence of 76%, followed by the gluteus medius with 69%, piriformis with 56%, gluteus minimus with 40%, gluteus maximus with 29%, and the least afflicted was the iliopsoas with only 31% prevalence. The number of individuals with more than three muscles afflicted was higher, representing 35.7% of the sample. This can be explained by the majority of the population studied being high demand workers, who suffered traumas and repetitive microtraumas and thus had increased muscle stress, creating fatigue and more susceptibility to additional trigger points.[16]

In the study by Chen & Nizar[14] the data for the population studied were similar to the present study, the pain of the individuals was also classified as chronic, the average age of the sample was 48 years, and the pressure applied to determine the presence of trigger points was 2 Kg, which is close to the pain threshold values obtained by pressure on all the muscles evaluated in the present study. A possible explanation for this difference is the work profile of the population evaluated that is not detailed in their article.

Farasyn et al.[10] made a study to evaluate the reliability of the algometer as an instigator of referred pain in individuals with subacute low back pain and irradiated pain to the thigh and leg. For that, they analyzed the pain threshold by pressure on the gluteus medius. The authors concluded that the pain threshold by pressure values less than 6 Kg/cm^2 corresponded to referred pain in the thigh and leg, representing a trigger point. In the present study, the pain threshold by pressure was lower; one explanation for this may be the presence of diverse trigger points in a single patient. Another factor is that individuals with chronic pain can develop central sensitization due to the sustained pain stimuli to the central nervous system and, thus, lowering the pain threshold.[10]

Therefore, the pain threshold by pressure values are of great importance, for in knowing them, they can be used as parameters to evaluate the presence of trigger points in the patient and also to compare them before and after the rehabilitation, so as to quantify its benefits.

CONCLUSION

In the sample analyzed, the data showed great prevalence of myofascial dysfunction in individuals with low back pain and suggest that this prevalence deserves specific attention in the treatment of low back pain.

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