Association Between Muscle Trigger Points, Ongoing Pain, Function, and Sleep Quality in Elderly Women With Bilateral Painful Knee Osteoarthritis

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Abstract

Objective: The objectives of this study were to investigate if referred pain elicited by active trigger points (TrPs) reproduced the symptoms in individuals with painful knee osteoarthritis (OA) and to determine the relationship between the presence of active TrPs, intensity of ongoing pain, function, quality of life, and sleep quality in individuals with painful knee OA.

Methods: Eighteen women with bilateral painful knee OA, aged 79 to 90 years, and 18 matched controls participated. Muscle TrPs were bilaterally explored in several muscles of the lower extremity. Trigger points were considered active if the elicited referred pain reproduced knee symptoms, and TrPs were considered latent if the elicited pain did not reproduce symptoms. Pain was collected with a numerical pain rate scale (0-10), function was assessed with Western Ontario and McMaster Universities, quality of life was assessed with the Medical Outcomes Study Short Form 36 questionnaire, and sleep quality was determined with the Pittsburgh Sleep Quality Index.

Results: Women with knee OA exhibited a greater number of active TrPs (mean, 1 ± 1; $P < .001$) but similar number of latent TrPs (mean, 4 ± 2) than healthy women (mean, 4 ± 3; $P = .613$). A greater number of active TrPs were associated with higher intensity of ongoing pain ($r = 0.605$; $P = .007$). Higher intensity of ongoing knee pain was associated with lower physical function ($P < .05$).

Conclusions: The referred pain elicited by active TrPs in the lower extremity muscles contributed to pain symptoms in painful knee OA. A higher number of active TrPs was associated with higher intensity of ongoing knee pain. (J Manipulative Physiol Ther 2015;xx:1-7)

Key Indexing Terms: *Osteoarthritis; Trigger Points; Myofascial Pain Syndrome; Disability Evaluation; Sleep*

Osteoarthritis (OA) is the most common form of arthritis, affecting a higher number of people in aging populations.[1] The estimated incidence of symptomatic knee OA ranges from 0.37% per year for males to 1.02% per year for females in the United States, and approximately 9.3% of the American population is diagnosed with symptomatic knee OA by age 60.[2]

Osteoarthritis is mainly featured by cartilage joint degradation, change in subchondral and marginal bone, synovial inflammation, and capsular thickening.[3] Individuals at different stages present with pain, but it is estimated that up to 40% of patients with radiologic damage do not report pain and that there is poor relationship between imaging findings and sensory symptoms.[4]

Recent studies have reported that spreading sensitization is particularly apparent in individuals with knee OA with high levels of pain in absence of moderate to severe radiographic findings.[5,6] The presence of nociceptive changes in OA-related pain can be one of the many mechanisms explaining discrepancies between imaging and clinical features.

One feature of spreading sensitization is the presence of muscle hyperalgesia.[7] Bajaj et al[8] reported that patients with knee OA exhibited larger pain areas and higher muscle referred pain intensity after infusion of hypertonic saline in

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the leg muscles in comparison with healthy controls. The presence of larger muscular referred pain areas after experimental stimulation has been related to spreading sensitization mechanisms in other local pain disorders, for example, lateral epicondylalgia,[9] temporomandibular disorders,[10] or tension-type headache.[11] In addition, the presence of referred pain areas elicited by trigger points (TrPs) has been also associated to sensitization mechanisms in the same conditions.[12-14] In fact, it has been previously proposed that TrPs can be involved in pain processes in subjects with knee pain.[15] Trigger points are usually defined as hypersensitive tender spots within taut bands of skeletal muscles that are painful on muscle stimulation and that usually elicit referred pain.[16] Trigger points are clinically classified as active or latent. Active TrPs reproduce the patient's symptoms, and the elicited referred pain during stimulation is recognized as a familiar phenomenon for the patient. Latent TrPs are not responsible of any symptom of the patient, and the pain is not recognized as a familiar phenomenon. This clinical distinction between active and latent TrPs is substantiated by histochemical findings because higher levels of several chemical mediators and algogenic substances (ie, bradykinin, serotonin, or substance P) were found in active TrPs as compared to latent TrPs and non-TrPs.[17]

There is scarce scientific information related to the presence of TrPs in patients with knee OA. An old case series found that treatment of TrPs in the semimembranosus muscle resulted in relief of persistent knee pain but without clarifying the cause of the pain.[18] Bajaj et al[19] analyzed the presence of TrPs in a small number of patients with hip, knee, and multiple joint OA and reported that OA-related pain was associated to latent, but not active, TrPs. Furthermore, there is preliminary evidence showing that treatment of active TrPs is effective for reducing symptoms in patients with knee OA.[20,21] However, no previous study has systematically investigated the presence of active TrPs in patients with knee OA and their relationship with other outcomes including knee pain, function, quality of life, or sleep quality.

Therefore, the primary aims of the current study were to investigate if the referred pain elicited by active TrPs reproduces the symptoms in subjects with painful knee OA and to determine the relationship between the presence of active TrPs, the intensity of ongoing pain, function, quality of life, and sleep quality in individuals with painful knee OA.

Methods

Participants

For this study, women diagnosed with painful knee OA from a clinic of physical therapy associated to a geriatric center participated. Knee OA was diagnosed according to American College of Rheumatology classification.[22] Clinical data including intensity and duration of the symptoms, radiologic evaluation, and medication were collected. All patients had bilateral weight-bearing, fixed flexion posterior-anterior and lateral x-rays of both knee regions. Degenerative profiles of the tibiofemoral joint were verified for each patient. Patient should exhibit moderate pain intensity with a numerical pain rate scale (NPRS, 0-10) score greater than or equal to 3 points and bilateral symptoms.

Participants were excluded if they presented any of the following: (1) previous lower extremity surgery, (2) diagnosis of lower extremity radiculopathy or myelopathy, or (3) any sensory dysfunction including nerve damage; (4) if they had received any therapeutic intervention in the past 6 months before the study; or (5) if they were mentally impaired (Mini-Mental State Examination [MMSE] <20/35).[23]

In addition, age- and sex-matched volunteers who had no knee pain or other lasting pain problems in the past year were included as healthy controls and recruited from the general population.

Participants were requested not to take any analgesic medication 24 hours before the examination. The study protocol was approved by human research committee of the Universidad Salamanca, Spain (registry 201200003354). Subjects signed an informed consent before participation in the study.

Demographic and Clinical Data

Demographic data including age, sex, weight, height, body mass index, medical history, and location of the symptoms were collected. An 11-point NPRS (0, no pain; 10, maximum pain) was used to determine the mean intensity of knee pain experienced in the preceding 24 hours.[24,25] Because patients exhibited bilateral knee pain, the mean of both sides was used for the analysis.

The functional status of the patients was evaluated using the Western Ontario and McMaster Universities (WOMAC) index. The WOMAC consists of a self-administered questionnaire reflecting 3 dimensions: pain (5 items), stiffness (5 items), and physical function (17 items) in patients with OA in the lower extremity.[26] Each subscale ranges from 0 to 20 (pain), 0 to 8 (stiffness), and 0 to 68 (function) points. A higher WOMAC score represents greater limitation. This questionnaire has shown high reliability (intraclass correlation coefficient, 0.92-0.97) in patients with knee OA.[27] In the current study, we used the validated Spanish version of the WOMAC, which is a valid, reliable, and responsive instrument in patients with knee OA.[28]

The health-related quality of life was assessed with the Medical Outcomes Study Short Form 36 (SF-36) questionnaire.[29] This questionnaire assesses 8 domains: physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. Each domain ranges from 0 (lowest level of functioning) to 100 (highest level of functioning) points.[30] The SF-36 questionnaire has shown the best ability to