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Original article

Secondary hyperalgesia occurs regardless of unilateral or bilateral knee osteoarthritis involvement in individuals with mild or moderate level

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ABSTRACT

Background: Secondary hyperalgesia in individuals with less severe levels of knee osteoarthritis remains unclear. The objective of this study was to measure the pressure pain threshold of individuals with mild or moderate knee osteoarthritis and compare with no osteoarthritis.

Methods: Ten healthy controls and 30 individuals with mild or moderate knee osteoarthritis divided into two groups (unilateral and bilateral involvement) were included. Dermatomes in lumbar levels (L1, L2, L3, L4 and L5) and sacral level (S1 and S2), myotomes (vastus medialis, vastus lateralis, rectus femoris, adductor longus, tibialis anterior, peroneus longus, iliacus, quadratus lumborum, and popliteus muscles), and sclerotomes in lumbar levels (L1-L2, L2-L3, L3-L4, L4-L5 supraspinous ligaments), over the L5-S1 and S1-S2 sacral areas, pes anserinus bursae, and at the patellar tendon pressure pain threshold were assessed and compared between individuals with and without knee osteoarthritis.

Results: Knee osteoarthritis groups (unilateral and bilateral) reported lower pressure pain threshold compared to the control group in most areas (dermatomes, myotomes, and sclerotomes). There were no between group differences in the supra-spinous ligaments and over the L5-S1 and S1-S2 sacral areas of the sclerotomes. No difference was seen between knee osteoarthritis.

Conclusion: These findings suggest that individuals with mild to moderate knee osteoarthritis had primary and secondary hyperalgesia, independent of unilateral or bilateral involvement. These results suggest that the pain have to be an assertive focus in the clinical practice, independent of the level of severity or involvement of knee osteoarthritis.

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A hiperalgesia secundária ocorre independentemente do envolvimento unilateral ou bilateral da osteoartrite de joelho em indivíduos com doença leve ou moderada

R E S U M O

Palavras-chave:

Osteoartrite de joelho

Dor

Limiar de dor à pressão

Hiperalgesia secundária

Introdução: A ocorrência de hiperalgesia secundária em indivíduos com níveis menos graves de osteoartrite de joelho ainda é incerta. O objetivo deste estudo foi medir o limiar de dor à pressão de indivíduos com osteoartrite de joelho leve ou moderada e comparar com indivíduos sem osteoartrite.

Métodos: Foram incluídos 10 controles saudáveis e 30 indivíduos com osteoartrite de joelho leve ou moderada, divididos em dois grupos (envolvimento unilateral e bilateral). Foi avaliado e comparado o limiar de dor à pressão em dermatômos nos níveis lombares (L1, L2, L3, L4, L5) e níveis sacrais (S1 e S2), miótomos (músculos vasto medial, vasto lateral, reto femoral, adutor longo, tibial anterior, fibular longo, ilíaco, quadrado do lombo e poplíteo) e esclerótomos nos níveis lombares (ligamentos supraespinais L1-L2, L2-L3, L3-L4, L4-L5), sobre as áreas sacrais L5-S1 e S1-S2, bolsa anserina e tendão patelar entre os indivíduos com e sem osteoartrite de joelho.

Resultados: Os grupos osteoartrite de joelho (unilateral e bilateral) relataram menor limiar de dor à pressão em comparação com o grupo controle na maior parte das áreas (dermatômos, miótomos e esclerótomos). Não houve diferenças entre os grupos nos ligamentos supraespinais e ao longo das áreas sacrais L5-S1 e S1-S2 dos esclerótomos. Não foi observada qualquer diferença entre os indivíduos com osteoartrite de joelho.

Conclusão: Esses achados sugerem que os indivíduos com osteoartrite de joelho leve a moderada tinham hiperalgesia primária e secundária, independentemente do acometimento unilateral ou bilateral. Esses resultados sugerem que a dor precisa ser um foco assertivo na prática clínica, independentemente do grau de gravidade ou envolvimento da osteoartrite de joelho.

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Introduction

The knee is the most common joint affected by osteoarthritis, and the prevalence increases with aging.¹ Pain is the main symptom of knee osteoarthritis (KOA), and its presence and severity are important determinants of decreased functional capacity.^{2,3} Primary hyperalgesia has been defined as increased activity of primary afferent nociceptors at the site of a determined injured tissue, while secondary hyperalgesia is defined as presence of pain in areas beyond the original injured area.⁴ Primary and secondary hyperalgesia may occur in KOA and result in modulation of nociceptors and spinal horn neurons, respectively.⁵

The pressure pain threshold (PPT) has been considered the most reliable parameter to classify inflammation in osteoarthritis,^{6,7} and has been used to detect the presence of secondary hyperalgesia in dermatomes, myotomes, and sclerotomes.^{2,5} PPT seems to have different levels between individuals with and without osteoarthritis,^{2,8} however, current evidence does not answer if PPT levels are different between the different severities (e.g., mild or moderate) of KOA.^{2,9,10} In the past, Gerecz-Simon et al.¹¹ evaluated individuals with knee OA, but just pain was mild and moderate. Also, they used only two points in lower limb. Recently, it has been demonstrated that individuals with moderate KOA present localized pain and not contralateral hyperalgesia,¹² however, in this study, although not mentioned, the characteristics

of the participants suggests that individuals had unilateral KOA. Therefore, assessing PPT in multiples points might bring meaningful information about the pain, as well as contribute to clinical approach. As joint damage occurs gradually in osteoarthritis (i.e., with progressive function loss of tissue stabilizers),¹³ secondary hyperalgesia would be expected to occur in the development process of osteoarthritis, and unilateral or bilateral involvement might play a role on this,¹⁴ resulting in different painful points. Thus, this study aimed to measure the PPT levels in mild or moderate KOA individuals with unilateral and bilateral involvement and compare to individuals without KOA. We hypothesized that some level of secondary hyperalgesia would be present in individuals with mild and moderate KOA and would be effect of unilateral or bilateral involvement.

Materials and methods

Participants

After the University Research Ethics Committee approval (No. 0012/2010) and conforms the Helsinki Declaration of 1975, the study recruitment was carried out in the Rheumatology Clinic of the university hospital and TV regional news. Four hundred-thirty individuals with KOA were contacted via telephone. Sixty individuals attended the personal evaluation to confirm their adjustment in the criteria for inclusion/exclusion.

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