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BRIEF REPORT

Osteoarthritis: a call for research on central pain mechanism and personalized prevention strategies

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Abstract

Osteoarthritis (OA) is one of the world's leading causes of pain, disability. Symptomatic OA should be suspected in patients with pain in the joints of the fingers, shoulders, hips, knees, or ankles, especially if those patients are older than 40 years. The socioeconomic cost of treating the condition and the burden of the expense is growing with the increasing and aging population. Joint-preserving interventions currently used to manage the condition include joint-protection technique instruction, manual therapy, adaptive equipment provision and instruction, heat modalities, orthoses, strengthening and range-of-motion exercises, adaptive technique instruction, patient education in symptom control techniques, and provision of a home exercise program. Some show potential, but at present, few have a proven ability to arrest or delay disease progression. Recent research regarding central pain mechanisms indicates treating central pain sensitization may be an effective treatment approach. Additional research is required to determine the efficacy of treatment and symptom management of OA.

Keywords Life style · Osteoarthritis · Pain

Osteoarthritis (OA) is one of the world's leading causes of pain and disability. The socioeconomic cost and burden are growing with the increasing and aging population [8]. Recent research [5] presents moderate quality evidence for commonly performed conservative interventions for the treatment of pain in OA. The clinical trials analyzed, support conservative interventions to decrease pain in OA. These studies looked at the nonpharmacological treatments as well as joint-protection technique instruction, manual therapy, adaptive equipment provision and instruction, heat modalities, orthoses, strengthening and range-of-motion exercises, adaptive technique instruction, patient education in symptom control techniques, and provision of a home exercise program. The treatment of central pain mechanisms was not included in these meta-analyses, because no recent trials have been conducted using this approach or because some of the recent trials had a small sample size. These omissions are unfortunate because these interventions may be equally effective.

Recent research provides evidence that the chronicity and recurrence of pain in OA are highly prevalent and can possibly be attributed to the concept of central sensitization (CS) [1]. This mechanism encompasses distorted sensory processing in the CNS, malfunctioning of descending pain-inhibitory mechanisms, enhanced activity of pain-facilitatory mechanisms, and long-term potentiation of the neural synapses in the anterior cingulated cortex that can amplify pain experiences by increasing its degree, duration, and spatial extent. Temporal summation (TS) is a phenomenon in which an individual experiences a progressive increase in pain intensity during the repetition of identical nociceptive stimuli. Despite conflicting evidence, several authors have concluded that a possible explanation for chronification of pain in the knee, hip, low back, shoulder, and hand can be found in the concept of CS. Radial nerve gliding applied to the symptomatic hand induced hypoanalgesic effects on the contralateral hand in people with

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thumb CMC OA, suggesting that central mechanisms may play a role in pain manifestation [9]. Further support for central mechanisms from another study found baseline differences on conditioned pain modulation between patients with painful OA of the hip and healthy controls, and conditioned pain modulation normalization in patients with arthritis after their pain had been successfully treated [4].

With the prevalence of OA increasing internationally, there is a need to study the impact of this disease on culturally diverse populations. Modification of lifestyle risks and factors is the current best strategy to prevent and manage OA. Increasingly, researchers report that lifestyle choices and modifications are largely motivated by cultural perceptions. It is frequently considered that, for many people, symptomatic OA is a largely preventable "lifestyle" disease. Recent research provides evidence of the effect of various lifestyle factors, such as physical activity, obesity, diet, smoking, alcohol, and injury, on the development of symptomatic OA. There is also research that provides evidence that the conjugation of physical activity and an extra virgin olive oil-enriched diet (phytoactive substances) determined a significant articular cartilage recovery process in early OA [7]. Although there is emerging evidence to support the use of lifestyle risk education for the treatment of OA, many clinicians do not routinely teach modification strategies to combat various lifestyle factors; however, lifestyle risk modification should be encouraged due to the lack of negative side effects and potential beneficial results in some patients [3].

A recent review reported that the current evidence suggests that OA has different phenotypes and this presents clinicians with a key opportunity to develop personalized and individualized prevention and treatment strategies for OA patients with different phenotypes of the disease [6]. It has been suggested that this is the era of "personalized prevention" for OA [6]. These personalized treatment strategies may include a combination of sleep strategy education, recommendations for moderate intensity exercises such as walking, recommendations for cessation of smoking and excessive alcohol consumption, and education and support for weight loss strategies [6]. Other studies report that lifestyle interventions involving modification of exercise and dietary behaviors yield superior improvements in relevant quality of life outcomes relative to either intervention alone [2].

Additional research is required to determine the efficacy of all treatment approaches for the management of OA. Additional research is required regarding the most effective method of teaching lifestyle management strategies to patients with OA. Cultural factors influence the uptake of OA management. Perhaps researchers need to reassess these therapeutic interventions (or misconceptions) and the use of other therapeutic options, such as the central sensitization and pain hypersensitivity. The treatment of central sensitization is not the best solution for local or acute pain, but could be more efficient than exercises or orthoses for individuals with chronic pain.

There is no resolutory therapy for this complicated disorder and there is still a crucial need to identify new nonpharmacological interventions for OA. Many existing conservative treatments are merely minor variations on those early physical therapy or orthosis interventions. Awareness is growing among clinicians that they should integrate the concept of CS during clinical reasoning and patient management. Do we accept status quo or search for additional strategies and interventions to help this ever-growing population?

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Compliance with ethical standards

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References

1. Clauw DJ, Hassett AL (2017) The role of centralised pain in osteoarthritis. Clin Exp Rheumatol, 35 Suppl 107(5):79–84
2. Focht BC (2012) Move to improve: how knee osteoarthritis patients can use exercise to enhance quality of life. ACSMs Health Fit J 16(5):24–28. https://doi.org/10.1249/FIT0b013e318264cae8
3. Fransen M, Simic M, Harmer AR (2014) Determinants of MSK health and disability: lifestyle determinants of symptomatic osteoarthritis. Best Pract Res Clin Rheumatol 28(3):435–460. https://doi.org/10.1016/j.berh.2014.07.002
4. Kosek, E., & Ordeberg, G. (2000). Lack of pressure pain modulation by heterotopic noxious conditioning stimulation in patients with painful osteoarthritis before, but not following, surgical pain relief *Pain,* 88(1), 69–78
5. Lue S, Koppikar S, Shaikh K, Mahendira D, Towheed TE (2017) Systematic review of non-surgical therapies for osteoarthritis of the hand: an update. Osteoarthr Cartil 25(9):1379–1389. https://doi.org/10.1016/j.joca.2017.05.016
6. Mobasheri A, Batt M (2016) An update on the pathophysiology of osteoarthritis. Ann Phys Rehabil Med 59(5–6):333–339. https://doi.org/10.1016/j.rehab.2016.07.004
7. Szychlinska MA, Castrogiovanni P, Trovato FM, Nsir H, Zarrouk M, Lo Furno D, Musumeci G (2018) Physical activity and Mediterranean diet based on olive tree phenolic compounds from two different geographical areas have protective effects on early osteoarthritis, muscle atrophy and hepatic steatosis. Eur J Nutr. https://doi.org/10.1007/s00394-018-1632-2
8. Villafane JH (2018) Does "time heal all wounds" still have a future in osteoarthritis? Clin Exp Rheumatol 36(3):513
9. Villafane JH, Bishop MD, Fernandez-de-Las-Penas C, Langford D (2013) Radial nerve mobilisation had bilateral sensory effects in people with thumb carpometacarpal osteoarthritis: a randomised trial. J Physiother 59(1):25–30. https://doi.org/10.1016/S1836-9553(13)70143-7