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Approach towards osteoarthritis in physiotherapy management

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Abstract

Osteoarthritis (OA) of the knee is a common chronic joint disease that is painful and debilitating. Several types of physiotherapy are available as non-invasive options for treating osteoarthritis (OA). The evidence supporting widely utilized physiotherapy interventions is compiled in this review. There is compelling evidence to demonstrate the short-term benefits of exercise on pain and function; however, the kind of exercise appears to have no bearing on the course of treatment. Exercise can be delivered effectively through individual, group, or at-home methods; however, effects may be enhanced by therapist contact. Improving exercise adherence is necessary to optimize results over the long run. Pain can be lessened by using knee tape to straighten the patella and release soft tissues. Additionally, there is proof that using knee braces for patients with osteoarthritis. Clinical investigations do not corroborate the symptomatic effects of lateral wedge shoe insoles, however biomechanical research demonstrate that they minimize knee strain. Individual shoe characteristics may also impact knee load, according to recent studies, and the impact of altered shoe designs is currently of interest. Although it shouldn't be used as a stand-alone treatment, manual therapy might have advantages. In conclusion, there is enough data to suggest that physiotherapy interventions can help people with knee OA feel less pain and perform better, even though the research is not conclusive.

Keywords: Osteoarthritis, physiotherapy interventions, biomechanical research, manual therapy

Introduction

Osteoarthritis (OA) is a long-term joint condition that typically affects the knee. Pain, stiffness, edema, joint instability, and muscle weakness are all possible side effects of osteoarthritis (OA), which can lower quality of life and impede physical function. In the multidisciplinary management of patients with knee OA, physiotherapy interventions are increasingly acknowledged as crucial components of non-pharmacological strategies to ameliorate symptoms. This article will provide a quick summary of the research supporting the usefulness of many common physical therapy interventions in treating knee osteoarthritis (OA), such as exercise, bracing, taping, insoles, and manual therapy. Because of their impact on knee stress, several of the treatments may also decrease the advancement of structural diseases, but a discussion of this is outside the purview of this article. Musculoskeletal conditions are one of the main causes of impairment in middle-aged adults. Osteoarthritis (OA) is a common condition that affects 237 million individuals worldwide. Over the last ten years, there has been a significant rise in the prevalence and burden of OA ^[1], and as the population ages and obesity rates rise, these trends are predicted to continue ^[2]. Although OA can develop in any joint, it most frequently affects the hands, hips, spine, and knees. The osteoarthritic process, which is characterized by the degeneration of cartilage, inflammation of the synovium, and remodelling of the subchondral bone, involves multiple tissues ^[2]. Osteoarthritis (OA) is a diverse ailment that is gradually gaining recognition as a group of illnesses with distinct characteristics, including post-traumatic, age-related, and metabolic OA ^[2-4]. In The previous few decades have seen a significant shift in nutrition and lifestyle. The number of overweight and obese people has increased as a result of the Western diet and an increasingly sedentary lifestyle. Numerous studies have confirmed the long-established link between obesity and osteoarthritis ^[5] and have provided ample evidence in the years since ^[6-10]. It was long believed that the primary cause of obesity was increased mechanical loading, which in turn caused mechanical stress, increased wear and tear, and eventually cartilage degeneration and OA ^[11].

A paradigm shift has recently taken place, nevertheless, since obesity is now linked to osteoarthritis (OA) in non-weightbearing joints, such as the hands, where systemic processes are probably more implicated [7, 8, 12]. Consequently, systemic impacts of obesity have surfaced as potential factors in OA. The metabolic syndrome has been researched the most among them, and contradictory findings have been published [13-18]. Similarly, adipokines and fatty acids, which are soluble mediators secreted by adipose tissue, may act as a moderator of the systemic effects of obesity. Adipokines and OA have been the subject of much research [19]. Focus on fatty acids and their possible involvement in OA development and progression.

Management by Physiotherapy

Exercise

Clinical recommendations recommend exercise therapy as the cornerstone of conservative management for individuals with varied degrees of knee OA, given the substantial body of evidence supporting its favourable clinical effects [20-25]. Exercise is important since it has less contraindications or side effects compared to basic analgesics, non-steroidal anti-inflammatory medicines and surgery [21]. An extensive Cochrane review conducted recently found 32 trials examining various land-based therapeutic exercise regimens [26]. A meta-analysis's findings indicated that mean treatment benefits were observed for both knee pain and function. A small-to-moderate effect on function and a small-to-moderate effect on quality of life have been found in another relatively recent Cochrane review, [27] despite the fact that the effects of aquatic exercise have been the subject of less rigorous research. An efficient exercise program can typically lead to improvements in muscle strength, neuromuscular control, and range of motion, joint stability, and fitness.

Exercise that strengthens the body is usually advised. Patients with osteoarthritis (OA) typically have weaker muscles as a result of decreased physical activity and pain tolerance [28-31]. With the greatest capacity to both produce and absorb stresses at the knee, the quadriceps are the largest group of muscles that traverse the knee joint. Numerous scientific investigations have demonstrated that training consistently results in increases in knee extension strength as well as decreases in pain and physical impairment in individuals with osteoarthritis. [26, 32] But no specific strength-training technique has been found to be better than another. Thirteen Stronger hip muscles have also been linked to knee OA, according to recent research [33-35]. The findings imply that strengthening hip muscles can reduce pain and enhance function [35]. This could prove especially helpful when some knee workouts are restricted by pain. Local mechanical stresses, such as knee malalignment, may affect the clinical response to strength training, however this has not been thoroughly investigated [36]. This emphasizes how crucial it is to provide patients with knee OA with customized assessment and management plans. It is advised to combine strengthening, aerobic, and functional exercise, although there is currently little evidence to support the superiority of one type of exercise over another. Exercise can also be given as private instruction, in group settings under supervision, or at home. It seems that symptom reduction is achievable with all three forms of exercise delivery. [26, 37] yet, working with a therapist could enhance results [26, 37]. A program's duration

and frequency of exercise are other factors to take into account. Most fitness recommendations would advise a Exercise regimens for those with knee OA have improved symptoms after 8-12 weeks, and physiological response can be reached with as few as 2-3 workouts per week [19]. The ideal amount of exercise, however, has not yet been established and need to be customized for every patient.

Taping

According to certain professional standards, one physiotherapy treatment technique for knee OA is taping the knee, namely the patella [24, 25]. Applying adhesive, rigid strapping tape to the patella and/or related soft tissue structures is known as knee taping. Realigning the patella with the ultimate goal of lowering knee discomfort by lowering patellofemoral joint (PFJ) tension and relieving uncomfortable soft tissues surrounding the knee joint. Numerous randomized controlled trials in individuals with knee OA, both with and without OA involvement of the PFJ, have shown immediate and short-term decreases in pain [42-44]. Although it may seem reasonable that the benefits of tape for pain relief would only last while the tape is worn, a study discovered that the benefits persisted for three weeks after the tape was removed [44]. Although the exact method by which tape relieves pain is unknown, it may involve altered patellar alignment [45] as well as improved muscle function and activation [46]. On the other hand, the latter has only been shown in individuals experiencing patellofemoral pain and is not yet verified in people with OA [47].

Bracing

For knee OA, a range of commercial braces are available; these vary in terms of cost, material, and style. The most basic form is a neoprene sleeve that is one piece, and studies have shown that this helps lessen pain [48-50]. If unicompartmental OA is present, an "unloader knee brace" may be utilized. It is a semi-rigid brace with metal side struts that is often custom-made from molded plastic and foam. By shifting the weight away from the uncomfortable side, the brace's design seeks to alter how force is distributed at the knee. Biomechanical research substantiates this load-reducing effect [51, 52]. Patients with unicompartmental OA may benefit symptomatically with these braces, according to several clinical trials [49, 53, 54], albeit the outcome may vary based on the brace and patient's attributes. It has been demonstrated that braces are less effective for obese patients [55], and that personalized braces perform better than braces that are purchased off the shelf. [37] Adherence is probably one of the main obstacles limiting the benefits of a brace for osteoarthritis in the knee. According to two trials, between 42 and 50 percent of patients stopped wearing the brace after six months [38, 39].

Insoles and shoes

Shoes and insoles have a lot of promise as easy, low-cost knee OA therapy options. Medial wedge insoles have been recommended for lateral compartment disease and lateral compartment OA. The majority of research has been done on lateral wedge insoles because medial compartment OA [59] is so common. When compared to walking barefoot or in shoes alone, lateral wedges for medial knee OA minimize the adduction moment by 4-12%, according to biomechanical research [60-66]. Consequently, the stress on

the medial compartment decreases^[67]. The most advantageous wedge designs are those with a 50-100 tilt^[61, 64] and full-length insoles^[61], as research indicates that wedge design elements like length and inclination angle may mediate biomechanical benefits. Although lateral wedges have been shown to have biomechanical effects, their application to lessen the pain, stiffness, and function associated with osteoarthritis in the knee has not been validated by randomized controlled trials^[68-70]. It's possible that some subgroups will respond better than others, with advantages being more likely to occur in people with less severe disease, younger people, lower lean mass, and less obesity^[68]. The clinical outcome of wedged insoles may also be influenced by variations in daily usage; a nonrandomized experiment indicated that the largest therapeutic advantages occurred after 5 to 10 hours of daily use^[54].

Manual therapy

Joint mobilization and manipulation are the most often used procedures in manual therapy. While manipulation is characterized as forceful small-amplitude, high-velocity movements of a joint frequently applied at the end of the range, mobilization is a manual approach that uses repetitive passive movement of low velocity and variable amplitudes applied at different locations within a range^[62]. According to surveys, manual therapy is frequently utilized in clinical practice for OA. Specifically, 96% of Irish physical therapists⁶³ and 64% of UK therapists⁶⁴ treat patients with hip and knee OA, respectively, using manual treatment. Even though manual therapy is frequently used, little is known about its effectiveness in treating osteoarthritis (OA) and even fewer studies have assessed it when used alone from other procedures like working out.

Dry Needling

A lesser-known treatment option for knee OA is dry needling therapy. 'Dry needling' refers to the insertion of thin monofilament needles, without the use of injectate. Dry needling is typically used to treat muscles, ligaments, tendons, subcutaneous fascia, scar tissue, peripheral nerves, connective tissue and neurovascular bundles for the management of a variety of neuromusculoskeletal pain syndromes^[65]. Increasing evidence has shown that it is effective in pain, stiffness and related disability associated with knee OA^[66], and this can help patients reduce their reliance on analgesic or anti-inflammatory medications. One such technique of dry needling is periosteal electrical dry needling, periosteal stimulation with needles inhibits peripheral pain processing, stimulates local vasodilation and alters vascular sympathetic. More specifically, electroacupuncture has been shown to activate A δ , C and A β pain fibers, which facilitates diffuse noxious inhibitory control and gate control within the dorsal horn of the spine. It has also been shown that it increases local opioid production while decreasing pro-inflammatory factors such as TNF- α , IL-4, IL-6, IL-8 and IL-10. Electroacupuncture causes the release of substance-P and CGRP. Periosteal needling, may lead to decreased inflammation of the densely innervated periosteum. Notably, CGRP in high quantities causes inflammation, but the concurrent release of substance-P in combination with electric stimulation in the vicinity of the periosteum may provide sustained, low levels of CGRP required for a potent anti-inflammatory effect. CGRP also

initiates a cascade of events mediated by protein kinase A (PKA). PKA stimulates nitric oxide synthase which exaggerate the vasodilation effect. The improved vasodilation enhances the microcirculation of degenerative joints, resulting in increased opioid delivery and decreased inflammatory factors in the synovia. Limited evidence also suggests that acupuncture may stimulate an increase in hyaluronic acid, allowing the synovial fluid to better lubricate the joint.^[66] One more study concluded that a mean of 9 sessions of Manual therapy (MT) and exercise plus electrical dry needling, using a 9-point standardized protocol targeting the knee locally at a frequency of 1 to 2 times per week over 6 weeks, resulted in greater improvements in pain, stiffness, function and related-disability. Patients receiving electrical dry needling were 1.7 times more likely to have completely stopped taking medication for their pain at 3 months^[64].

Conclusion

Research indicates that physiotherapy treatments can improve knee OA patients' range of motion, function, related-disability and reduce their level of discomfort. Treatments with physiotherapy aims to improve range of motion, strengthening the surrounding muscles, realignment of the lower limbs, to lessen the load on the knee joint, and restore normal neuromuscular function. It also improves the quality of life of patients with knee OA however Patients' reactions vary, and further research is required to determine which sub Lateral wedge insole groups are most likely to respond differently to various therapies.

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