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Review

Rehabilitation (exercise and strength training) and osteoarthritis: A critical narrative review

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ABSTRACT

Rehabilitation is widely recommended in national and international guidelines for managing osteoarthritis (OA) in primary care settings. According to the 2014 OA Research Society International (OARSI) recommendations, rehabilitation is even considered the core treatment of OA and is recommended for all patients. Rehabilitation for OA widely includes land- and water-based exercise, strength training, weight management, self-management and education, biomechanical interventions, and physically active lifestyle. We performed a critical narrative review of the efficacy and safety of rehabilitation for managing OA and discuss evidence-based international recommendations. The process of article selection was unsystematic. Articles were selected based on authors' expertise, self-knowledge, and reflective practice. For the purpose of the review, we focused on land- and water-based exercise and strength training for knee, hip and hand OA. Other aspects of rehabilitation in OA are treated elsewhere in this special issue. Exercise therapy is widely recommended for managing knee, hip and hand OA. However, the level of evidence varies according to OA location. Overall, consistent evidence suggests that exercise therapy and specific strengthening exercise or strength training for the lower limb reduce pain and improve physical function in knee OA. Evidence for other OA sites are less consistent. Therefore, because of the lack of specific studies, recommendations for hip and hand OA are mainly derived from studies of knee OA. In addition, no recommendations have been established regarding the exercise regimen. The efficacy and safety of exercise therapy and strength training need to be further evaluated in randomized controlled trials of patients with hip and hand OA. The optimal delivery of exercise programs also has to be more clearly defined.

1. Introduction

Treatment of osteoarthritis (OA) combines non-pharmacological and pharmacological modalities. Rehabilitation is widely recommended in national and international guidelines for managing OA in primary care settings [1–3]. According to the 2014 OA Research Society International (OARSI) recommendations, rehabilitation is even considered the core treatment of OA and is recommended for all patients [3]. Rehabilitation for OA widely includes land- and water-based exercise therapy, strength training, weight management, self-management and education, biomechanical interventions [3] and participation in regular physical activities [2–5]. The World Health Organization defines physical activity as all forms of activity involving skeletal muscles that require energy expenditure. Exercise therapy refers to a form of physical activity that is planned and structured [6] and is most often delivered by physical and occupational therapists [7].

Pharmacological treatments are usually identical whatever the anatomical site, and rehabilitation is adjusted to the individual patient, according to OA location [7]. For lower-limb and hand OA, prescribed physical activity or exercise therapy aim to improve joint range of motion, muscle strength, tendon lengthening,

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Table 1
Modalities of exercises for knee, hip and hand osteoarthritis (OA) and recommendations from international guidelines [11].

	ACR, 2012 [2]	EULAR, 2007 [34] and 2013 [1]	OARSI, 2008 [16] and 2014 [3]
Knee OA			
Regular individualized exercise regimen	–	LOE Ib: at least one RCT, LOA: 8.7/10	–
Overall exercise	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Low-impact aerobic exercise	Strong recommendation	–	–
Aerobic activity and exercise	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Land-based exercise including strength training, active ROM exercise, and aerobic activity	–	–	Appropriate, appropriateness score: 8/9 LOE: SR and MA of RCTs
Water-based exercise			Appropriate, appropriateness score: 7/9 LOE: SR and MA of RCTs and quasi-randomized trial
Strength training including resistance-based lower-limb and quadriceps strengthening exercises, and both weight-bearing and non-weightbearing interventions	–	–	Appropriate, appropriateness score: 8/9 LOE: SR and MA of RCTs
Strengthening (sustained isometric) exercise for both legs, including the quadriceps and proximal hip girdle muscles	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Adjunctive ROM/stretching exercises	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Mixed programs	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Balance	No recommendation	–	–
Supervised exercise with manual therapy	Conditional recommendation	–	–
Manual therapy alone	No recommendation	–	–
Hip OA			
Regular individualized exercise regimen	–	LOE Ib: at least one RCT, LOA: 8.7/10	–
Overall exercise	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Low-impact aerobic exercise	Strong recommendation	–	–
Land-based exercise	–	–	LOE IV: expert opinion/clinical experience
Water-based exercise	–	–	LOE Ib: RCTs
Endurance/strengthening	–	–	LOE IV: expert opinion/clinical experience
Mixed programs	–	LOE Ia: MA of RCTs, LOA: 8.5/10	–
Supervised exercise with manual therapy	Conditional recommendation	–	–
Hand OA			
Education and exercise	–	LOE IV, SOR 59/100	–

ACR: American College of Rheumatology; EULAR: European League Against Rheumatism; LOA: level of agreement: LOE: level of evidence; MA: meta-analysis; OARSI: Osteoarthritis Research Society International; RCT: randomized controlled trial; ROM: range of motion; SOR: strength of recommendation; SR: systematic review.

aerobic performance, and proprioception [7]. Available evidence suggests a small to moderate effect of exercise as compared with not exercising for hip or knee OA [8,9]. Clinical studies have shown that aerobic physical activity and muscle-strengthening exercise may help reduce OA symptoms and improve joint function [10]. The modalities of exercise are numerous (Table 1) [11] and should be adjusted to the affected joint and to the comorbidities. Exercise prescription includes intensity, frequency, duration, and mode. Intensity in exercise programs may be high, vigorous, moderate, or low depending on the treatment goal (e.g., muscle weakness) or the subject population [6]. The delivery of exercise programs varies by amount and magnitude of work (level of resistance, frequency, duration, and progression), supervision (type, mode of delivery) and setting (home, community/gym, healthcare setting) [6].

Even though rehabilitation is a key treatment modality in OA and widely recommended, the optimal content of exercise therapy programs remains inconsistent [7]. Here, we reviewed the literature relating to efficacy and safety of exercise therapy and strength training as well as evidence-based international recommendations about their use in managing knee, hip and hand OA.

2. Methods

A critical narrative review was conducted. The process of article selection was unsystematic. Selection of articles was based on authors' expertise, self-knowledge, and reflective practice. We focused on land- and water-based exercise programs and strength training for knee, hip and hand OA. Individual trials, systematic reviews and meta-analyses included in the latest American College of Rheumatology (ACR), European League Against Rheumatism (EULAR) and Osteoarthritis Research Society International (OARSI) international guidelines were searched. MEDLINE was searched via PubMed from inception to December 2015 for additional guidelines, trials, systematic reviews and meta-analyses with the MeSH terms "exercises," "knee osteoarthritis." Other aspects of rehabilitation in OA are treated elsewhere in this special issue.

3. Results

3.1. Exercise and strength training for knee OA

Exercise therapy for knee OA should improve joint range of motion, muscle and tendon lengthening, strength, and endurance and decrease pain and loading on the symptomatic compartment [7]. Functional improvements are expected in walking ability and daily activities, even sport. The possible modalities of exercise treatments are numerous and depend on the rhythm, duration and type or technique, conducted individually or in groups and supervised or not by a physiotherapist [7].

Exercise therapy can be divided into 2 modalities. The first is aerobic. Aerobic exercise is, by definition, nonspecific and aims to improve general physical performance [7]. The second type is analytic, focuses on the symptomatic joint, and aims to improve joint range of motion, to increase muscle strength and to decrease loading of the symptomatic joint compartment. Analytic exercise is based on a specific evaluation of the joint and muscle impairment [7].