

Review

A review of the clinical evidence for exercise in osteoarthritis of the hip and knee[☆]

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Abstract

Osteoarthritis (OA) is a chronic joint disease with the hip and knee being commonly affected lower limb sites. Osteoarthritis causes pain, stiffness, swelling, joint instability and muscle weakness, all of which can lead to impaired physical function and reduced quality of life. This review of evidence provides recommendations for exercise prescription in those with hip or knee OA. A narrative review was performed. Conservative non-pharmacological strategies, particularly exercise, are recommended by all clinical guidelines for the management of OA and meta-analyses support these exercise recommendations. Aerobic, strengthening, aquatic and Tai chi exercise are beneficial for improving pain and function in people with OA with benefits seen across the range of disease severities. The optimal exercise dosage is yet to be determined and an individualized approach to exercise prescription is required based on an assessment of impairments, patient preference, co-morbidities and accessibility. Maximising adherence is a key element dictating success of exercise therapy. This can be enhanced by the use of supervised exercise sessions (possibly in class format) in the initial exercise period followed by home exercises. Bringing patients back for intermittent consultations with the exercise practitioner, or attendance at “refresher” group exercise classes may also assist long-term adherence and improved patient outcomes. Few studies have evaluated the effects of exercise on structural disease progression and there is currently no evidence to show that exercise can be disease modifying. Exercise plays an important role in managing symptoms in those with hip and knee OA.

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1. Background

This paper provides an overview of appropriate exercise intervention for the special needs of people with osteoarthritis (OA) of the hip or knee. It is beyond the scope of this paper to discuss exercise prescription for the prevention of OA or following joint replacement surgery. Instead, it will

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focus on exercise for the management of symptoms in those with established hip and knee OA and briefly mention the limited research into the effects of exercise on structural disease progression.

Osteoarthritis is a chronic localized joint disease and a leading cause of musculoskeletal pain and disability. In 2007, 7.8% of Australians had OA¹ and this is projected to increase to 11% by 2050 due to population ageing and rising obesity rates. The knees, followed by the hips, are the most commonly affected weight-bearing joints.

The OA disease process involves the whole joint including cartilage, bone, ligament and muscle with changes such as joint space narrowing, bony osteophytes and sclerosis seen on X-ray. Risk factors are multifactorial and include older age, female gender, obesity (particularly in knee OA), previous joint injury, genetics and muscle weakness. Pain is the dominant symptom although it is important to note that the severity of pain and the extent of changes on X-ray are not well correlated. Pain together with joint stiffness, instability, swelling and muscle weakness leads to physical and psychological disability and impaired quality of life. Individuals with hip or knee OA have difficulty with activities of daily living, such as walking, stair-climbing and housekeeping. Furthermore people with OA commonly have a number of co-existing obesity-related disorders such as heart disease, hypertension and diabetes² and the majority of people with OA do not achieve recommended levels of moderate physical activity.³

There is currently no cure for OA and treatment options may be non-pharmacological, pharmacological or surgical. Total knee or hip joint replacement is common for advanced disease. Clinical guidelines advocate conservative non-pharmacological strategies, including exercise, given their ease of application, small number of potential adverse effects, and relatively low costs.^{4,5}

2. Role of exercise in treatment of hip and knee osteoarthritis

Given the large body of evidence demonstrating the beneficial clinical effects of exercise in people with lower limb OA varying in severity from mild to severe, exercise therapy is regarded as the corner-stone of conservative management for the disease.^{3–5} The main goals of exercise in this patient group are to reduce pain, improve physical function and optimize participation in social, domestic, occupational and recreational pursuits⁵. Regular exercise can improve physiological impairments associated with OA including muscle strength, joint range of motion, proprioception, balance and cardiovascular fitness.^{6–9} Other potential benefits of exercise for this patient group include improvements in mobility, falls risk, body weight, psychological state and metabolic abnormalities. Exercise therapy for people with lower limb OA may take many forms however given the significant impact of muscle weakness on pain and function in OA,¹⁰ muscle

strengthening is a key component of most exercise regimes for knee and hip OA.

Land-based exercise has been consistently shown to reduce knee pain and improve physical function in people with knee OA.¹¹ A recent Cochrane Review identified 32 clinical trials investigating land-based therapeutic exercise for knee OA.¹² A wide range of therapeutic exercise programs were assessed, including those delivered individually to the patient, class-based programs and exercises designed to be undertaken by the patient at home. Treatment content varied from the relatively simple (e.g. quadriceps muscle strengthening, aerobic walking programs) through to very complex (e.g. including manual therapy, upper limb and/or truncal muscle strengthening and balance coordination in addition to lower limb muscle strengthening). A meta-analysis showed moderate treatment benefits with effect sizes of 0.40 (95% CI 0.30–0.50) for pain and 0.37 (95% CI 0.25–0.49) for physical function.¹² These effect sizes are similar to those effects achieved from simple analgesia and non-steroidal anti-inflammatory drugs but with much fewer side effects.¹¹

Systematic reviews have evaluated specifically the efficacy of strengthening^{13,14} and aerobic exercise¹³ in people with OA at any joint (but predominantly knee). Clinical trials of strengthening exercise have spanned isometric, isotonic, isokinetic, concentric, concentric/eccentric and dynamic modalities. Strengthening improves strength, pain and physical function although the effects on quality of life and depression are yet to be confirmed. There appears to be no evidence that the type of strengthening exercise influences outcome.¹³ Regarding aerobic exercise, 12 trials were identified.¹³ Results indicated that aerobic exercise benefits pain, joint tenderness, functional status and respiratory capacity.

In contrast to knee OA, there is much less research into the role of exercise in hip OA. A recent Cochrane Review of land-based exercise for hip OA could only identify five clinical trials for inclusion.¹⁵ The authors demonstrated a small treatment effect for pain, but no benefit regarding self-reported physical function. These findings are consistent with those of another recent systematic review where the authors concluded that there was insufficient evidence to suggest that exercise therapy alone can be an effective short-term management approach for reducing pain levels and improving function, and quality of life in people with hip OA.¹⁶ These reviews conflict with another meta-analysis that included water-based programs to evaluate the efficacy of all types of exercise for hip OA.¹⁷ The review concluded that therapeutic exercise, especially that incorporating specialized supervised exercise training and an element of strengthening, is an efficacious treatment for hip OA.

Although hydrotherapy is frequently advocated for patients with OA, relatively little robust research has been conducted in this area compared to land-based exercise. A Cochrane Review evaluating the effectiveness and safety of aquatic-exercise interventions for knee and hip OA identified only six trials for inclusion.¹⁸ When all patients with knee

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