The role of exercise in management of rheumatological disease

CPD

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Background
Exercise was once viewed as having a deleterious effect on joint pain and function in those with rheumatic diseases. Positive evidence, both related to exercises at specific joints and for exercise in the management of comorbidities and for general illness prevention, is now well established.

Objective
The aim of this article is to provide an update on the role of therapeutic exercise at individual joints and the utility of general exercise programs in the management of comorbidities and prevention of chronic disease in those with rheumatic disease.

Discussion
Major international rheumatology bodies now recommend multiple forms of exercise as part of the non-pharmacological management of both osteoarthritis and the more classically inflammatory rheumatic disorders.

IN THE PAST, ARTHRITIS was thought to be simply a process caused by joint overuse 'wear and tear', injury or complex inflammatory processes. As articular cartilage and associated joint structures were damaged, significant further exercise involving affected joints was not recommended. Indeed, currently accepted advice is to avoid exercise that involves an acutely inflamed joint, and caution is advised in prescribing exercise to patients who already have significant joint damage, especially of weight-bearing joints. In these cases, high-impact exercise is relatively contraindicated; if exercise is prescribed, it should involve modalities that do not excessively load the joint, such as water walking, swimming, cycling, walking or strengthening.[1] Exercise on an apparently quiescent joint should be modified if exercise exacerbates the patient's usual degree of pain or initiates a painful episode. Otherwise, current evidence indicates that both local exercise around individual joints and general exercise for its systemic benefits should be encouraged.[2]

The focus of this article will be on data related to osteoarthritis (OA) and, as an exemplar of inflammatory joint diseases, rheumatoid arthritis (RA).

Osteoarthritis

OA is no longer thought to be a non-inflammatory 'wear and tear' process. It is now thought to be an active response to injury associated with failure of the 'synovial joint organ', which comprises structures in and around the joint. These include muscles, ligaments, entheses, synovial tissue and subchondral bone. There is good evidence that OA is a low-grade inflammatory disease associated with obesity, metabolic syndrome, innate immunity and age-related inflammation.[3,4] A number of the aforementioned chronic diseases are associated with chronic low-grade inflammation. Furthermore, markers of systemic inflammation have been shown to be associated with increased knee OA structural progression and increased pain.[5]

Concerns have been expressed by both patients and some clinicians that exercise may damage articular cartilage in patients at risk of or with established knee OA. Some reassurance has been provided by two systematic reviews.

Bricca and colleagues reviewed two papers relating to subjects at increased risk of OA and 12 involving patients with established OA.[6] The majority of studies used supervised therapeutic exercise alone (weight-bearing or non–weight bearing), with a number combining this with a home exercise program. In the studies on those at increased risk, one found no effect on cartilage defects, and the other found positive effects on glycosaminoglycans. In the cases of established OA, six studies

reported no effect on cartilage thickness, volume or defects, and one reported a negative effect.

A 2015 systematic review of 49 studies, 48 of which were randomised controlled trials (RCTs), assessed clinical outcomes.[7] Included were adults of mean age >45 years with knee pain or OA, who were undertaking physical activity over at least three months. Exercise interventions combining strengthening, stretching and aerobic components were most common. There was no evidence found of serious adverse events, increases in pain, decreases in physical function, progression of structural OA on imaging or increased total knee replacements, at the group level.

Physical activity levels in older adults with knee pain are low, as shown in studies of patients awaiting hip and knee joint replacement for OA and in patients with early OA.[8] Farr and colleagues found that patients with OA accumulated little vigorous physical activity, and most (70%) did not achieve recommended levels for activity at moderate or greater intensity.[9]

Knee osteoarthritis

The 2018 guidelines from the Osteoarthritis Research Society International (OARSI) endorsed, as a Core recommendation in cases of knee OA, 'structed land-based exercise programs' such as 'strengthening and/or cardio and/or balance training/ neuromuscular exercise' or 'mind–body exercise including Tai Chi or yoga'. A lower-level recommendation was made for aquatic exercise.[10] The recommendations for aerobic and strength training are broadly in agreement with those of the European League Against Rheumatism (EULAR) for pain management in arthritis.[11]

A 2015 Cochrane review of exercise in patients with OA of the knee found high-quality evidence from 44 trials indicated that exercise reduced pain immediately after treatment.[12] Moderate-quality evidence from 44 trials showed that exercise improved physical function immediately after treatment. High-quality evidence from 13 studies revealed that exercise improved quality of life immediately after treatment. Data from 12 studies indicated a sustained treatment effect for pain for at least 2–6 months after cessation of formal treatment. Exercise was generally of moderate- to moderately high–intensity, and specific modalities used varied significantly, but walking, cycling and resistance training were frequently used.

The most recent relevant meta-analysis (2019) assessed the relative efficacy of multiple types of exercise for knee and hip OA.[13] The meta-analysis included 103 trials involving 9134 participants. It was determined that aerobic exercise was the most beneficial for pain and performance (walking speed, strength, range of motion). Mind–body exercise, which had a pain benefit equivalent to that of aerobic exercise, was found to be the best for function. Strengthening and flexibility/ skill exercises improved multiple outcomes at a moderate level. All forms of exercise improved quality of life.

Patients with knee OA often have multiple comorbidities including obesity, cardiovascular disease (CVD), diabetes and metabolic syndrome. Among individuals with hip and/or knee OA, severity of OA disability is associated with a significant increase in all-cause mortality and serious CVD events.[14] In terms of general exercise, patients with OA should be encouraged to comply with The Royal Australian College of General Practitioners (RACGP) guidelines for exercise as part of the management of these comorbidities. Disappointingly, in studies of aerobic exercise in patients with knee OA, the interventions used did not meet the American College of Sports Medicine/ RACGP recommended exercise dose for the general population (which is the same for minimum recommended levels of physical activity in both guidelines).[15]

Patellofemoral osteoarthritis

When compared with education alone, a combination of exercise, education, manual therapy and taping has been shown to improve short-term patient ratings of improvement and pain severity in patients with patellofemoral OA.[16] No significant effects on activities of daily living (ADL) were observed. In this study, exercise included functional retraining exercises for the quadriceps and hip muscles, as well as quadriceps and hip muscle strengthening.

CASE

A woman aged 53 years presented with a six-year history of bilateral knee pain. This was mild-to-moderate in severity and had been diagnosed as OA. Current management included paracetamol, a nonsteroidal anti-inflammatory drug (NSAID) and two self-prescribed, non–evidence based supplements. She was frustrated by 'taking all these pills' without apparent improvement and with gradual weight gain, and she had recently felt that the NSAID may have been exacerbating her reflux oesophagitis. She had a significant family history of CVD and hyperlipidaemia. Borderline hypertension had been noted in the past. Clinical examination of the knees revealed findings consistent with OA with sparing of the patellofemoral joints. The patient's body mass index was 31 kg/m^2.

In association with medication reduction, a multidisciplinary program of exercise and weight loss was suggested. Having previously been an active sportswoman, the patient was responsive to this suggestion.

Taking into account the patient's functional impairments and comorbidities, discussion focused on exercise that would both reduce the patient's cardiovascular risk and be of specific benefit for the OA. Patient preference is important for adherence and, in this case, was for water-based activities and cycling, which the patient had enjoyed earlier in life. Taking advantage of the Chronic Disease Management plan, referral was made to a dietitian to assist with weight loss and lipid management and to a physiotherapist who was known to provide water-based classes at a local swimming pool. These included water aerobics and light, non–weight bearing running in the deep part of the pool while using a flotation device. It was suggested that the addition of swimming to the program would both provide

variety and assist in attainment of the RACGP-recommended exercise goals for the general population. In addition, specific exercises for strengthening the muscles around the knee were prescribed, and a home program of these, which included cycling, was developed. The patient was cautioned to initiate the new activities gradually and build up slowly; to report any symptoms related to the exercise sessions; and that alteration in the knee symptoms, weight and cardiovascular risk factors would take some time and persistence.

Hip osteoarthritis

The 2018 guidelines from OARSI endorsed, as a Core recommendation in cases of hip OA, 'structured land-based exercise programs' such as 'strengthening and/or cardio and/or balance training/ neuromuscular'.[10] A lower-level recommendation was made for mind–body exercises, with no recommendation for aquatic exercise. The recommendations for aerobic and strength training are broadly in agreement with those of the EULAR recommendations for pain management in arthritis.[11]

A 2014 Cochrane review of 10 RCTs indicated that there was high-quality evidence that, in patients with hip OA, exercise reduced pain slightly and improved physical function slightly.[17] Exercise was defined as any land-based therapeutic exercise regimen aiming to relieve the symptoms of hip OA, regardless of content, duration, frequency or intensity. This included any exercise designed to improve muscle strength, range of joint movement or aerobic capacity (or combinations of the three).

Hand osteoarthritis

The 2018 update of the EULAR recommendations for the management of hand arthritis indicated that 'exercises to improve function and muscle strength, as well as to reduce pain, should be considered for every patient'.[18] This recommendation was based primarily on a Cochrane review of seven studies that found that hand exercises had small beneficial effects on self-reported pain and function, joint stiffness and grip strength, with few and non-severe adverse effects.[19]

The *2019 American College of Rheumatology/Arthritis Foundation guideline for the management of osteoarthritis of the knee, hip and hand* indicates there is currently insufficient evidence to recommend specific therapeutic exercise programs.[20] In addition, the guideline indicates that, while the majority of exercise studies use aerobic or strengthening modalities, a specific hierarchy of these forms of exercise cannot be derived from current literature. While various therapeutic exercise interventions are effective, this advice indicates that exercise programs should be individualised on the basis of identified deficits and patient preferences for mode of exercise.

Exercise and rheumatoid arthritis

RA is a chronic autoimmune disease characterised by persistent synovitis and systemic manifestations. The main causes of death in RA are cardiovascular, infective and respiratory disorders. CVD risk in patients with RA is substantially elevated when compared with the general population. For RA, the magnitude of this excess risk, a relative risk of 1.5,[21] appears comparable to that reported for patients with diabetes.

Sedentary behaviour is very frequent in patients with RA and is related to compromised physical function and persistent fatigue. This behaviour may lead to worse disease-related outcomes. A vicious cycle may occur in which compromised physical function, increased fatigue and increased local disease activity may reduce exercise levels, which may further exacerbate inflammation and contribute to the severity of RA-related health outcomes.[22]

In 2015, Verhoeven and colleagues[23] reviewed the evidence for benefit of exercise in RA and concluded that worse disease activity scores (DAS28) are associated with physical inactivity.

Physical activity is associated with:

- development of less severe disease
- slower radiographic progression in small joints but exacerbated radiographic progression in large joints
- decreased bone loss at the femur but no effect on spinal bone density
- a slower rate of development of atherosclerosis, improved endothelial function and improved heart rate variability
- decreases in fatigue and pain
- enhanced self-esteem
- decreased symptoms of depression
- improved quality of life and quality of sleep.[23]

In the studies reviewed, aerobic exercise was the most commonly advocated type of physical activity. Most interventions were of short duration (four weeks) and involved aerobic activity (running or cycling) for 60 minutes per day, five days per week.

Baillet and colleagues reviewed the evidence for resistance training in RA.[24] Ten RCTs were included in their meta-analysis. Resistance training was performed for 30 minutes 2–3 times per week for between five and 24 weeks. Benefits consisted of decreases in disability (Health Assessment Questionnaire [HAQ] score), functional impairment, erythrocyte sedimentation rate, and tender and swollen joint counts. No effects on the DAS28 or structural damage were reported. Other exercise modalities for which there is some evidence of benefit include yoga – which was shown to significantly improve the HAQ score, pain and self-esteem – and Tai Chi and dancing.

Cardiorespiratory fitness is low in patients with RA. Higher levels of aerobic capacity are associated with a better cardiovascular profile in this population.[25] EULAR updated its guidelines for management of cardiovascular risk in inflammatory arthritis in 2016.[26] A short summary of these recommendations follows:

- To lower CVD risk, disease activity should be carefully controlled.
- CVD risk assessment is recommended at least every five years.
- For patients with RA, CVD risk prediction models should be adjusted by a 1.5 multiplication factor.

- All patients should be advised of the benefits of a healthy diet, regular exercise and smoking cessation.

Levels of exercise appropriate for prevention of cardiovascular disease in RA are consistent with those promulgated by the RACGP for the general population.

Exercise interventions recommended for pain management in RA can be applied to most cases of inflammatory arthritis.[11]

Conclusion

It is recommended to ask all patients with arthritis about their exercise history and assess for suitability of exercise programs involving joints specifically affected. Programs can be recommended to reduce cardiovascular risk and prevent potential, or manage current, comorbidities.

In relation to selection of forms of exercise, it is appropriate that a shared decision-making approach be used. In general, low-impact exercises, in which less force is applied across joints, are the most appropriate. Examples of low-impact activities include walking, strength training, cycling, yoga, Tai Chi or exercises in water including swimming, non-weight bearing walking or running using a flotation device, or formal hydrotherapy sessions usually conducted by a physiotherapist. Advice about specific exercise around individual joints is best provided by an experienced physiotherapist. Consultation with an exercise physiologist may be appropriate. This is an ideal situation in which a Chronic Disease Management plan could be used. In complex cases, the advice of the treating rheumatologist should be sought; for complex exercise advice, consultation with a physician in sport and exercise medicine or physician in rehabilitation medicine may be appropriate.

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