Exercise prescription in the management of rheumatoid arthritis

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Abstract

Background: Over the last few years, the types of exercises prescribed for patients with rheumatoid arthritis (RA) have changed. There is also increasing knowledge on the physical status and physical activity levels of these patients. This article aims to give an overview of the physical status, physical activity levels and appropriate exercise prescription for patients with RA.

Method: A literature search was conducted of scientific journals and text, including Medline and PubMed (1980-2012). Literature was selected for its in-depth data and well researched information. Key search terms included "RA and exercise therapy", as well as "physical activity levels and physical status of patients with RA".

Results: The literature indicated that RA has a major impact on physical and psychological health. Over the past decade, there has been growing evidence of the health benefits of physical activity for patients with RA. Despite this evidence, patients with RA are less physically active than the general population. The types of exercises prescribed for patients with RA have changed from the traditionally prescribed isometric and range-of-motion exercises. However, proper choice and appropriate utilisation of exercise is essential in order to provide a therapeutic effect.

Conclusion: Although pharmacological interventions have largely improved RA management, exercise therapy remains an important part of treatment. Despite the known benefits of physical activity and exercise, patients with RA are less physically active than the general population.

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Introduction

Arthritis and other rheumatic conditions are among the most prevalent chronic conditions. Arthritis is one of the main causes of disability. It limits everyday activities, such as dressing, climbing stairs, getting in and out of bed, or walking.[1] Rheumatoid arthritis (RA) is the most common type of chronic inflammatory arthritis. The inflammatory process associated with RA manifests itself primarily in the synovial tissue.[2] It can affect any joint, large or small. Other parts of the body may be involved in the inflammatory process.[3] The care of patients with RA is complex and often includes healthcare providers from different disciplines.[4] Four major treatment approaches are recognised in the management of RA, including medication, physical exercise, joint protection and lifestyle changes, and surgical intervention.[5] Even if pharmacological interventions have largely improved RA management, exercise therapy remains an important part of treatment.[6]

Method

A literature search was conducted of scientific journals and text, including Medline and PubMed (1980-2012). Literature was selected for its in-depth data and well-researched information. Key search terms included "RA and exercise therapy", as well as "physical activity levels and physical status of patients with RA" (Figure 1).

Physical status or condition of patients with rheumatoid arthritis

RA has a major impact on physical and psychological health.[7] In spite of progress in treatment, it remains a chronic, disabling disease with a high rate of morbidity.[8]

RA causes various physical impairments in those who are affected by the disease.[9] Some of these include an inhibition of muscle contraction, myositis, muscle atrophy, loss of muscle strength, loss of joint motion and reduced aerobic capacity.[10] Rheumatoid cachexia is a term that is used to describe the concurrent decreased body mass, increased resting energy expenditure and increased whole body catabolism that often occurs with RA. The end result of cachexia is skeletal muscle wasting and increased fat mass.[11]

Patients with RA also suffer a 60% greater risk of cardiovascular disease.[12] The cause of cardiovascular disease is multifactorial, but low body mass index,

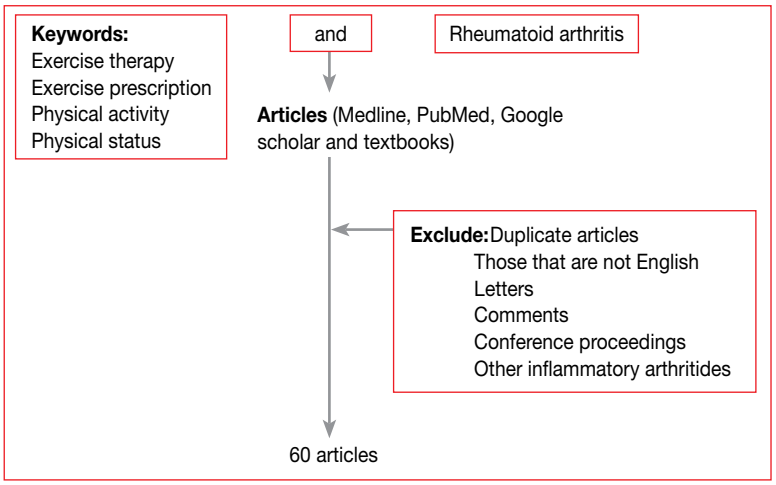

Figure 1: Database search (1980-2012)

inflammation-related dyslipidaemia and immune dysregulation leading to the development of atherosclerosis of the coronary artery, impairment of the cardiac autonomic system that may predispose patients to arrhythmias, as well as decreased physical activity, are major contributing factors.[7,13]

Studies have shown that health-related quality of life (HRQOL) or feeling well is an important patient outcome, together with the management of pain, sleep and fatigue, as well as emotional and physical well-being in patients with chronic diseases. HRQOL is determined by a multitude of interacting factors, including individual attitudes, social networks and aerobic fitness, as well as the nature of the disease itself.[7] Unfortunately, patients with RA have long been shown to have decreased HRQOL.[14]

Physical activity levels of patients with rheumatoid arthritis

Over the past decade, there has been growing evidence of the health benefits of physical activity for patients with RA. Despite this evidence, patients with RA are less physically active than the general population.[15,16] In a recent study, it was shown that a group of patients with RA spent almost two hours more each day participating in sedentary activities than their healthy matched controls. The same study also found that in general, patients with RA were significantly more sedentary, compared to the control group.[17]

Various factors contribute to inactivity levels in patients with RA. The presence of constant pain limits their ability to function normally, and as a result, physical activity levels are lowered.[18] Unemployment, possibly related to RA impairment, seems to contribute to diminished physical activity levels.[12] Furthermore, exercise restrictions, traditionally given to patients with RA because of concerns about aggravating joint inflammation and accelerating joint damage, may also contribute to inactivity and deconditioning.[19]

In general, it appears that patients with RA spend more time than controls in participating in light and moderate activities, and less in vigorous activities. A higher functional class seems to relate to higher submaximal energy expenditure and lower levels of physical activity and aerobic capacity.[18] Joint swelling, pain and systemic symptoms lead to a decrease in physical activity, especially during the exacerbation of disease.[20]

Besides the health, physical and psychological benefits of physical activity for patients with RA, it appears that patients with RA who are more habitually physically active fare better on most functional assessments than patients with RA with lower habitual physical activity levels.[17]

Exercise prescription for patients with rheumatoid arthritis

The benefits of appropriate exercise for patients with RA are vast. In the past, it was thought that dynamic exercises enhanced pain and disease activity, and provoked joint damage. Therefore isometric and range-of-motion (ROM) exercises were primarily prescribed. Numerous research studies have found that this is not the case with proper choice and appropriate utilisation of exercises.[6,8,14] Thus, the types of exercises prescribed for patients with RA have changed over the past few years.[21] Rest and exercise are complementary elements of the management of active disease. The best balance should be found for each patient.[22,23]

Range-of-motion or stretching exercises

ROM is a major focus of exercise in joint disease because the health of many joint structures and their ability to repair themselves is dependent upon motion of the joint. The maintenance of functional ROM is also necessary for daily activity and efficiency of movement. When activities are performed with the joints in nonoptimal positions because of limited joint motion, muscles are placed at a biomechanical disadvantage. Therefore, greater forces are placed across the joints and fatigue occurs earlier.[22,24,25]

Unfortunately, daily activities don't move the joints through their full ROM, and therefore they cannot replace stretching and ROM exercises. ROM exercises involve moving each joint, as far as can comfortably be achieved, in all directions.[26] ROM exercises may be passive, active or active-assistive.[27] ROM exercises should be carried out as a therapeutic procedure for all joints that demonstrate arthritic involvement, as well as other joints, as a precautionary measure. Active exercise is preferable. Passive motion should be used only when absolutely necessary, e.g. acutely inflamed joints, where the patient is unable to move because of pain or spasm and/or severe myositis. When performing ROM exercises, it is essential to respect the physiology of the joint, and to work within the residual ROM of the affected joint, while avoiding compensatory movement.[22,24,28]

It is usually recommended that ROM exercises are performed once or twice daily, with 6-10 repetitions of

Table I: Summary exercise prescription guidelines for patients with rheumatoid arthritis[1,22,24,25,28-33]

Exercise variables	Range-of-motion and stretching exercises	Cardiorespiratory exercises	Strengthening exercises
Frequency	Once to twice daily	3-5 times per week	Three times per week
Intensity	Respect the physiology of the joint and work within its residual range of motion	Moderate intensity (50- 70% of maximum heart rate), based on fitness and current disease status	Low to moderate load (40-70% of one repetition, maximum)
Duration and repetitions	Range-of-motion exercises: 6-10 repetitions of each range, or static stretches held for 10-30 seconds (2-4 repetitions)	30-40 minutes per day (continuously or carried out in short bouts). The duration of the exercise can be manipulated with intensity to provide the desired exercise stimulus	*Dynamic:* Moderate to high repetition (8-15 repetitions), depending on load (1-3 sets) or *Isometric*: Held for six seconds (5-10 repetitions)
Type	Range-of-motion exercises (passive, active or active-assistive), or static stretches	Weightbearing, e.g. walking and aerobic dance, or non-weightbearing, e.g. swimming, cycling and rowing	Dynamic or isometric (various pieces of equipment, e.g. elastic bands or tubing, dumbbells, pulley or cable systems and exercise balls)

Note: Exercise variables (frequency, intensity, duration and type) need to be manipulated according to the current disease activity, biomechanical integrity of the joints involved, fitness level and goals of the patient with rheumatoid arthritis).

each range. A joint with acute inflammation should be put through its range only 2-3 times per session. Overzealous stretching (not working within the residual ROM of the joint) or improper technique (using compensatory movements) can be harmful to a joint, especially if it is inflamed or unstable. Having a biokineticist or physiotherapist to initially monitor and teach the patient proper technique is essential (Table I).[1,22,29]

Cardiorespiratory exercises

Cardiorespiratory function and exercise tolerance appear very limited in individuals with RA, as much owing to physical inactivity, as to the disease. A proper level of aerobic fitness is necessary to maintain the performance of daily living activities.[34] Furthermore, cardiorespiratory exercise is important because the life expectancy of patients with RA is lower than that of the general population, and several lines of evidence suggest that the risk of cardiovascular co-morbidity in RA may be increased as a result of reduced physical activity and aerobic fitness.[34,35]

In the past, the treatment of RA often excluded aerobic exercise for fear of increasing joint inflammation and accelerating the disease process. However, properly designed cardiorespiratory exercises which take into account the level of joint stability, pain, and other limiting factors, can be very beneficial to patients with RA who are not in the acute phase of their disease.[22] Exercises that use smooth and repetitive motions are recommended. Previous studies on the effect of aerobic exercise on patients with RA made use of cycling, aquatics, aerobic dance or walking.[36-39] Janse van Rensburg et al found that patients with RA improved significantly in terms of flexibility, strength and aerobic capacity measured after a 12-week aerobic exercise intervention (walking or aquatics), combined with strengthening and stretching exercises.[39] Furthermore, the exercise group improved significantly more than the control group with respect to disease activity scores (DAS28).[39]Adaptations or precautionary steps, such as walking on softer surfaces (for example, grass) can reduce the stress load on the lower limb joints. Using appropriate exercise gear or equipment may also be beneficial, e.g. ensuring that the patient has shoes designed specifically for walking to help absorb the shock, or using custom orthotics (rigid or semi-rigid) for biomechanical correction of structures.[1,40,41]

In general, cardiorespiratory exercise at a moderate intensity for 3-5 days a week is recommended.[30] However, it is advisable that intensity is based on pre-exercise fitness assessment and current disease status.[25] Although caution is advocated with regard to high-intensity exercise prescription because of possible injury and relapse in individuals with RA, some studies have shown that patients with moderate disease may be able to tolerate high-intensity exercise.[23,42] In a recent study by De Jong et al on the long-term effects of a high-intensity exercise programme, it was found that there were no detrimental effects on disease activity or radiological damage of the large joints.[42] The duration of the exercise session is highly variable and can be manipulated with respect to intensity to provide the desired exercise stimulus[4] (Table I).

Strengthening exercises

Muscle weakness, contractures and atrophy often contribute to the clinical picture of patients with RA.[43] Atrophy of type II fibres is most common.[44] Adequate muscle strength and endurance functions to absorb impact and shock in weight bearing, and optimal strength also serves to protect and preserve the joint. Strengthening exercises provide enough resistance or overload so that the muscle fibre responds with physiological change or increased recruitment. Such resistance can be provided in an isometric, isotonic or isokinetic mode, depending on the biomechanical integrity of the joints involved and the status of the disease activity.[28]

In patients with RA with acute forms of the disease, static or isometric exercises can be used to prevent a possible decrease in muscle function.[45] Contractions that are held for six seconds, repeated 5-10 times, are generally

recommended. Even brief isometric contraction increases the strength of a muscle.[31,32] It is practical for patients with RA to strengthen muscles isometrically because many everyday tasks use isometric contractions.[31] Isotonic exercise is a dynamic form of exercise. It follows a natural progression: assisted contractions, movements without resistance, non-weightbearing movements, movements against gravity and movements against resistance. Caution has been advised when participating in dynamic muscle contractions when joints are actively inflamed and painful.[28] However, studies have shown that individually tailored dynamic strength training can improve muscle strength and physical function without negative effects on disease activity or structural joint damage.[46] Häkinnen et al found that regular dynamic strength improved muscle strength (19-59%) in patients with early RA, without detrimental effects on disease activity or structural joint damage.[46] Generally, low-load, high-repetition muscle training is recommended and has been shown to be clinically safe.[33] Various pieces of equipment may be used to provide resistance for dynamic muscle contractions, but the procedure for holding the weights or resistance should not cause stress to the finger or wrist joint.[47] Each joint should be used in its most stable and anatomic plane and excessive force in flexion and ulnar deviation avoided.[21]

Thus, strengthening exercise prescription must be tailored to the needs of the patient with RA, taking into consideration factors relating to age, disease severity, strength, amount of joint destruction and the patient's special needs. In addition, isometric or dynamic muscle work, combined with mass muscle contractions, using normal patterns, may provide the greatest potential for improvement in functional performance.[4,48]

Although, the positive effects of strength training are well described in several studies carried out on patients with RA, the positive results that are achieved disappear rapidly if there is a total or partial cessation of training.[46,48-50] Therefore, patients with RA need to be motivated to keep up with their training. A patient education programme that includes an explanation of the goals and benefits of exercise could possibly improve long-term compliance (Table I).[51]

Other exercises or activities

Recreational activities are important and benefit both the fitness and psychological state. Many patients with RA can continue exercises that they enjoy. In some cases, adaptive devices, such as wrist splints used when participating in recreational activities, such as tennis, may be necessary. However, some activities should be avoided, such as high-impact ones and sport that involves jumping and coming down hard, as this may aggravate arthritic joints.[1,6,41]

Hydrotherapy or aquatic exercises have been shown to increase muscle strength and joint ROM, improve aerobic capacity, reduce pain and enhance function in patients with arthritis.[52] The buoyancy of water makes it a favourable choice for patients with muscular and joint disease. However, the importance and unique benefits of land-based exercises should also be considered when prescribing exercises for patients with RA, such as improving bone mineral density (BMD), since osteoporosis is a well-known extra-articular complication of RA.[53] Previous studies on swimming, cycling or rowing suggest that these typical non-weightbearing exercises do not generate the necessary ground-reaction forces on the skeleton to increase BMD.[54-56] The results of a study conducted by Nolte et al indicated that both exercise therapies (land- and water-based) had a positive influence on various physical status parameters and did not appear to enhance disease activity, although there was a greater reduction in joint swelling and tenderness in the water-based exercise group. Therefore, it was suggested that an optimal combination of land and water exercises should be prescribed to patients with RA, dependent on the patients' needs and disease activity at that period of time.[57]

Physical assessment and possible adverse effects of exercise

Balancing joint health, intensity of exercise and socially desirable activities is necessary to achieve maximum benefits from the exercises and to produce age-appropriate, enjoyable and safe exercise opportunities.[4] Thus, appropriate physical assessment and monitoring of exercise response by a biokineticist, physiotherapist or exercise specialist is highly recommended for patients with RA. Exercise testing may be problematic in this patient group because performance is primarily limited by joint pain, instead of cardiovascular function. Non-weightbearing modes of exercise and/or arm ergometry may be useful because they avoid excessive stress and allow patients with RA to attain a more reliable stress level.[58] Patients should also be warned against excessive exercise and taught its signs, such as post-exercise pain lasting longer than two hours, undue fatigue, increased weakness, decreased ROM and increased swelling.[9]

Conclusion

RA has a major impact on physical and psychological health.[7] Four major treatment approaches are recognised in the management of RA, including medication, physical exercise, joint protection and lifestyle changes, and surgical intervention.[5] Despite the known benefits of physical activity and exercise, patients with RA are less physically active than the general population.[15,16] The types of exercises prescribed for patients with RA have changed over the last few years.[21] A comprehensive exercise programme for patients with RA should include cardiorespiratory exercise of a moderate intensity 3-5 times a week, strength training exercises for three days of the week, as well as stretching or ROM exercises at least once daily (Table I).[59,60] Certain recreational activities can also be enjoyed and benefit the fitness and psychological state of patients with RA.[1,6,41]

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