

43. Rheumatoid arthritis

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Summary

The pathophysiology of rheumatoid arthritis (RA), characterised by reduced joint flexibility, muscle function and fitness together with an increased risk of cardiovascular disease and premature death, provides an indication for physical activity and exercise. There is evidence to suggest that moderate intensity exercise will improve the strength and fitness in patients with RA without increasing the level of pain, disease activity or joint destruction. The joint flexibility should be checked on a regular basis and if needed, the range of motion exercised. The strength and aerobic fitness training recommended to patients with RA is similar to the training recommended to people without RA except that it should be a gradual process where the exercise intensity is adapted to the disease development and specific attention is given to initial indications of pain. Regular physical activity with a moderate intensity improves the quality of life and muscle function in patients with RA. Suitable forms of exercise include cycling, cross-country skiing, walking, Nordic walking, water gymnastics, dancing, light fitness and strength training. Extra caution should be observed in connection with inner organ engagement, cortisone treatment, large joint destruction or joint replacement surgery.

Definition

Prevalence/Incidence

Rheumatoid arthritis affects 0.5–1 percent of the population. Twice as many women as men get rheumatoid arthritis and disease onset can occur at any age, but is most common between the ages of 45–65. The incidence rate is approximately 25–50 new cases per 100,000 residents each year (1).

Cause

The fundamental cause of RA is largely unknown. It is characterised by the defence cells and immune system, which are normally activated to fight off infections and other exterior “assaults”, being activated and remaining activated despite the absence of exterior invaders, such as bacteria, viruses or micro-organisms. This inability to suppress or down-regulate the immune system leads to the body’s own organs and structures being attacked and damaged.

Pathophysiology

Rheumatoid arthritis is a chronic, systemic and inflammatory disease. Common symptoms include periodic onsets of symmetric polyarthritis characterised by inflammation of the synovial joint-lining membranes (synovitis), tendon sheaths (tendovaginitis) and bursae sacks (bursitis). Bone and cartilage destruction is a common occurrence as is a gradual weakening of the bones (osteoporosis) and an increased risk of osteoporosis-related fractures (2, 3). Apart from joint problems, general symptoms of inflammation also exist in, for example, the pericardium and pleura and the blood vessels in skin and inner organs. Secondary amyloidosis is caused by collagen deposits accumulating in one or more organ systems in the body, especially the kidneys, and is a serious adverse complication that may set in after a long period of inflammation. In relation to the general population, persons with rheumatoid arthritis are at an increased risk of cardiovascular disease and premature death (4).

The pain experienced by patients with RA is predominantly of a nociceptive character, i.e. in the skin, muscles, etc. and associated with the inflammatory tissue process. Neurogenic pain is also experienced by patients with RA. This is central or peripheral nerve damage caused by, for example, cervical spine instability, median nerve entrapment or vasculitis (inflammation of blood vessels). Fibromyalgia is another relatively common pain condition in patients with RA causing widespread pain and tenderness throughout the body. *Fatigue* is often due to general symptoms of inflammation, but may also be associated with physical inactivity. The stress experienced by many patients is thought to be caused by the unpredictable nature of the disease and consequential feelings of anxiety, depression and uncertainty (4).

Cartilage and bone destruction is also a consequence of the inflammation having a tendency to attack and destroy adjacent tissues, initially noticeable where the synovial membrane attaches to the bone. *Osteoporosis* is thought to be a combined effect of the actual disease process, physical inactivity and, if applicable, cortisone treatment. *A reduced range of joint* motion accompanies increased joint fluid, thickened joint capsules and changes in load conditions as a consequence of cartilage and bone destruction. The *reduced muscle function* is partly explained by muscle inflammation and partly by changes in the joints. This may lead to extended tendons, ligaments and joint capsules and as a result, joint instability, a reduced muscle mass and strength. The joint swelling will also have a direct impact on the ability of surrounding muscles to contract. The unfavourable position of the joints restrains optimum muscle contraction and the impaired

biomechanical conditions give rise to pain, changes in load conditions and a movement pattern that requires extra energy. As a result, physical activity is further reduced in patients with RA which combined with fatigue and, at times, a direct engagement of the heart and lungs can lead to *reduced aerobic fitness*.

Symptoms

Pain is the cardinal symptom of RA which, although it varies in intensity, localisation and quality, is considered to be chronic. Fatigue and reactions to stress are also common.

According to a Swedish study, a large number of patients with RA exhibit reduced joint flexibility, muscle function and aerobic fitness early in the course of the disease despite adequate medical treatment. A normative comparison of age-gender-matched data showed that 72 per cent had a reduced muscle function while 92 per cent had a reduced grip strength. Around 80 per cent of the women and 50 per cent of the men had a lower than average oxygen uptake capacity. Only around half (53 %) reported to have a sufficient level of physical activity to maintain good health (6).

Diagnostics

The diagnostic criteria for RA have been defined by the American College of Rheumatology (7). At least four of the following seven criteria have to be fulfilled: Arthritis in the small joints of the hand and in at least three joints/joint areas, symmetry, morning stiffness, rheumatic nodules, decalcification of bone on joints or erosions (bone cavities) as shown on X-ray and finally, positive rheumatoid factor.

Because of the large number of individual variations in disease manifestations and consequences, a functional classification system has long been used for rheumatoid arthritis (8). Four classification criteria apply where Class I represents an independent life without any major symptoms, Class II is an independent life despite symptoms of pain, stiffness and reduced physical capacity, Class III is a partly dependent life and finally, Class IV represents complete dependency. Nearly 90 per cent of patients with RA belong to Class I or II.

Prognosis

The varied disease progression makes it difficult to establish individual prognoses. Even if the symptoms of rheumatoid arthritis may subside and fully disappear after a short period of time, the majority develop into chronic symptoms. However, alternating acute flares of the disease and calmer periods of remission usually lead to a gradual deterioration. Occasionally, the clinical picture presents severe, rapidly progressive joint destruction with system engagement. However, modern medical treatments have contributed to substantially improving the prognosis and disease progression in patients with RA (9).

Current treatment principles

Rheumatoid arthritis has traditionally been treated with medication, surgery and various forms of rehabilitation. The treatment is usually administered by doctors, nurses, occupational therapists, social workers and physiotherapists and aimed at alleviating inflammatory activity and other symptoms of the disease, preventing joint damage and potential disability as well as maintaining a good quality of life. However, treatment perceptions and objectives have developed significantly over the past few years with remissions or near remissions now being a realistic target (9).

Pharmaceuticals used for treating RA include cortisone, non-steroid anti-inflammatory drugs (NSAID), slow acting anti-rheumatic drugs (SAARD) or disease-modifying anti-rheumatic drugs (DMARD) in addition to biological treatments such as TNF-alpha blockers and inhibitors, interleukin 1, CD 20+ B-cells and T-cells co-stimulation. Treatment with inflammatory inhibitors should be administered effectively and as early as possible in the course of the disease so as to reduce future joint damage and functional disorders. Cortisone is an anti-inflammatory and effective medicinal product that is administered orally in tablet form or as an injection directly into the inflamed joint or tendon. NSAID is a generic term for a group of anti-inflammatory medicinal drugs that are quick and effective to alleviate pain (within a couple of hours) and used in patients with RA to ease pain and morning stiffness. SAARDs (slow acting anti-rheumatic drugs) such as gold salt, chloroquine phosphate, sulfasalazine and methotrexate affect the actual rheumatic disease progression and have been used for many years. Biological treatments, preferably in combination with methotrexate, have revolutionised the treatment of RA in recent years. Near total remission is obtained in many cases or at least a successful inhibition of the inflammation for the duration of the treatment. This means that the disease and arthritis are no longer clinically perceptible. Modern biological treatment also seems to stop the bone and joint destruction identifiable on x-ray (10).

The most common surgical treatment of RA is arthroplasty, arthrodesis, synovectomy of joints and tendons, nerve decompression and reconstructive tendon surgery. However, the use of surgery in patients with RA has decreased over the past few years as new and successful biological treatments have emerged. This gradual decrease in surgery is expected to continue.

All forms of rehabilitation should be implemented on the basis of team work in close collaboration with the patient, focusing on the goals of the patient. Patient education is a very important aspect of rehabilitation and includes informing the patient about the benefits and prospects of physical activity. Pain relief, trying out various mobility aids, psychological and social support plus various forms of physiotherapy and physical exercise are also essential aspects of rehabilitation.

Effects of physical activity

Acute effects

Patients with rheumatoid arthritis often experience increased levels of pain when commencing physical activity or exercise. This temporary pain increase is seen as a harmless soreness caused by joints and muscles being subjected to an unusual load. The pain is usually transient and is not a hinder to continued activity.

Long-term effects

There are indications that regular and moderately intensive physical activity on a daily basis results in improved muscle function and a better quality of life in patients with early rheumatoid arthritis (11).

There are few studies on joint flexibility exercise for patients with RA, but a general level of physical activity appears to be beneficial for maintaining joint flexibility (12–14). Just like healthy patients, patients with rheumatoid arthritis are able to improve their aerobic capacity, muscle function, bone density, daily activity performance and quality of life with the implementation of physical activity (15–19). Recent studies of moderate to high-intensity exercise indicate that, regardless of whether the patient's disease status is stable or active, previous concerns over increased disease activity were unwarranted (12, 16, 20). The few studies that have examined the effects of moderate-intensity exercise on the progression of joint destruction showed no negative effects (15, 21). However, long periods of high-intensity exercise appeared to accelerate joint destruction in individuals with an initial destruction of large joints, particularly the shoulder joints and subtalar joints of the foot (22).

Indications

Physical activity and exercise are only used as secondary prevention in patients with RA as primary prevention is not possible.

For reasons of stress and fatigue and an increased risk of osteoporosis and premature death, mainly caused by cardiovascular disease, the positive health-related effects gained with physical activity are of specific relevance to patients with RA. Also, as mentioned above under "Pathophysiology", it is recommended that joint flexibility, strength and aerobic training programmes are adapted to the individual patient with the aim of maintaining optimal biomechanical properties and preventing a gradual decline in aerobic capacity. Physical activity can also help reduce symptoms of stress, anxiety and depression and stop social isolation.

Prescription

All patients with RA should be encouraged to be physically active so as to improve and maintain their physical and mental health and reduce the risk of comorbidity. Also, it is important to discuss how physical activities can be incorporated into the daily life of the patient. Because of the inconsistent progress of the disease, every organised physical exercise should be adapted to the individual patient for the purpose of improving bodily functions.

It is recommended that the joint range of motion is monitored and exercised, especially in case of an active disease status and threatening contractions. For patients with a very active disease status or significant disability (Functional Class IV), the emphasis should be on flexibility exercise together with innervation training of major muscle groups in the abdomen, seat and front thighs. Low-intensity exercise, either on land or in water, can be safely recommended for all patients with RA regardless of their disease status. In order to increase oxygen uptake capacity, muscle function and ability to carry out daily chores, the patient needs to perform moderate to high-intensity exercise for 30 minutes at least 3 times a week. Moderate to high-intensity exercise is also required to increase bone density.

The prescription specified in Table 1 is based on a systematic review of randomized controlled studies on physical exercise (15), but is not much different from general exercise recommendations. However, the following should be noted in relation to RA:

1. To reduce the risk of aggravated symptoms in connection with increased physical activity in patients with RA, physical activity should be slowly introduced, i.e. initial loads should be smaller than generally recommended and gradually increased in periods of 2–3 weeks.
2. Due to the intermittent nature of rheumatoid arthritis, it is not possible, as with other diseases, to consistently upgrade the exercise, but rather it must be adapted to the variations of the disease.
3. Specific attention paid to a possible increase in the initial pain will facilitate continued exercise.

There are indications that focusing on the goals of the exercise rather than on the symptoms that the exercise may potentially give rise to is beneficial to patients classified as belonging to either functional Class I or II with a stable disease status (23). However, it is still common for the so-called 24-hour rule to be applied and the load temporarily reduced if the increase in pain continues for more than 24 hours after exercise.

Table 1. Prescription of physical activity and exercise for patients with RA.

| Objective | Frequency (times/week) | Duration (min./session) | Intensity % of APM* | Intensity acc. to RPE** | Load % of 1 RM*** |
|-------------------------------|---------------------------|----------------------------|------------------------|----------------------------|----------------------|
| Promote health | 4–7 | 30 | 50–70 | 10–14 | – |
| Improve aerobic fitness | 3 | 30–60 | 60–80 | 11–15 | – |
| Increase strength | 2–3 | | | | 50–80 |
| Improve muscular endurance | 2–3 | | | | 30–40 |

* APM = Age-Predicted Maximum Heart Rate (220 – age).

** RPE = Rating of Perceived Exertion according to the Borg RPE scale.

*** RM = Repetition Maximum. 1 RM is the maximum weight that can be lifted through the entire exercise movement one time.

Suitable forms of exercise for patients with RA are cycling, cross-country skiing, Nordic walking, walking, light fitness training, dancing and strength training using either apparatus or rubber expanders. Exercising in a heated swimming pool can be very beneficial as the water offloads the body weight at the same time as it provides a gentle and even resistance to movement.

Because RA is a lifelong illness, the onset of which usually occurs at middle-age, it is important that the exercise can be as independent as possible. A number of studies indicate that patients with RA who initially exercise under the supervision of a physiotherapist have managed to continue their exercise independently with telephone support once a month and regular physiotherapy treatments 2–4 times a year for assessment, feedback and adjustment of intensity and load (20, 24, 25). Focusing on the benefits of exercise, e.g. an enhanced feeling of being in control, better general fitness, ease of movements and social support, can be motivating and help the individual to find an activity that he/she enjoys and will continue with for a long period of time (26, 27).

One vital aspect of physiotherapy check-up appointments is discussing the correct types of shoes and soles since engagement of the small joints in the foot is often a significant obstacle to physical activity and exercise in patients with RA.

Functional mechanisms

As far as one knows, there is hardly any difference between the functional mechanisms of physical activity in medically well-controlled patients with RA and the functional mechanisms of physical activity in the general public. Positive effects of exercise seen in patients with RA have also been proposed to be due to auto-synovectomy (28), a change in the neuropeptide concentration (29), decreased cachexia with an increased percentage of fat-free body mass (30) and molecular mechanisms such as a raised concentration of serum IGF-1 (31).

Functional tests/need for health checks

Standard health checks should be carried out, i.e. cardiovascular disease screening. Submaximal cycling or treadmill tests are used to assess the level of aerobic fitness while strength levels are assessed using various types of weight-lifting equipment. An evaluation of the effects of physical exercise can also be made using the different function tests and questionnaires found in the so-called REFORM folder (32) and on NRRK's (the National Research Centre for Rehabilitation in Rheumatology) website (www.nrrk.no).

Interactions with medical treatment

Cortisone is a catabolic steroid with alleviating effects that reduces the connective tissue strength in for example ligaments and tendons with an increased risk of rupture. Consequently, extreme physical activity is not recommended in connection with a cortisone treatment. The anti-inflammatory agents of cortisone also benefit from rest. It is recommended that patients undergoing a course of intra-articular cortisone injections should be prescribed rest, preferably bed rest, for the first 24 hours followed by at least one week of refraining from pronounced physical activity or exercise. When injections are given directly into muscular attachments or around tendons, the risk of rupture will remain for far longer, sometimes several months, and as a result, large physical loads should be avoided for a relatively long time. In the event of a long-term low-dose peroral cortisone treatment, the benefits of physical activity and exercising may surpass potential risk factors although this requires an individual assessment.

Subjecting a tender or painful joint to exercise and physical load is facilitated by administering an NSAID prior to exertion. This will not negatively affect the movement organs, at least not in the short term. However, the long-term effects of NSAIDs are unclear, although the general consensus is that it is better to uphold a certain level of mobility and strength, especially in the case of rheumatic sufferers. There are no indications that physical activity or exercise should be restrained during a course of SAARD (slow acting anti-rheumatic drug) treatments.

Contraindications

There are no absolute contraindications for physical activity as a consequence of RA. The conditions described below are all perceived as relative contraindications requiring specialist care.

Inflammation of the membrane surrounding the heart (pericarditis), congestive heart failure, inflammation of the lining around the lungs (pleuritis), pulmonary fibrosis, inflammation of blood vessels (vasculitis) and engagement of the kidney may occur in patients with RA. Patients with these types of complications require special training and guidance by healthcare professionals.

In the case of osteoporosis, a relatively common condition in patients with RA, physical activity constitutes an important part of the treatment, stimulating and strengthening the skeleton. However, it is important not to forget the increased risk of fractures and consequently, the necessity of being extra aware and cautious to prevent falls or similar accidents from happening. Caution should also be observed in connection with cortisone treatment. See above under “Interactions with medical treatment”.

Patients suffering with large joint destruction should be advised to weigh up the benefits of high-intensity training over the risk of an accelerated joint destruction. Exercise programmes designed for patients with large joint destruction should to the greatest extent possible protect shoulder joints and subtalar joints.

Caution should also be observed in the event of joint replacement surgery, especially in association with heavy-load strength training. However, physical activity and exercise is normally beneficial to maintain maximum muscle function and mobility before and after joint replacement surgery.

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