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Review Article

AN OVERVIEW OF RHEUMATOID ARTHRITIS AND EFFECT OF PHYSIOTHERAPY

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Abstract:

Rheumatoid arthritis (RA) is frequently treated with physiotherapy methods. These treatments encompass cryotherapy/thermotherapy, electrotherapy, and physical therapy. This is due to the influence of multiple factors on the illness process, making it challenging to accurately identify the effectiveness of the treatments being studied. Nevertheless, a wide range of physiotherapy agents are frequently employed in routine clinical practice, with their utilization primarily relying on individual anecdotal evidence. The objective of managing rheumatoid arthritis is to attain analgesia and prevent articular degeneration and impairment in functionality. Physiotherapy and rehabilitation applications greatly enhance medical treatment by enhancing the management of RA and decreasing disabilities in everyday activities for people with RA.

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INTRODUCTION:

Rheumatoid arthritis (RA) is a persistent, symmetrical, inflammatory autoimmune condition that primarily targets tiny joints, gradually spreading to larger joints, and finally impacting the skin, eyes, heart, kidneys, and lungs. Frequently, the bone and cartilage within joints undergo destruction, while tendons and ligaments experience a weakening [1]. The extensive harm to the joints leads to abnormalities and the gradual deterioration of bones, typically resulting in significant discomfort for the patient. Typical manifestations of RA include prolonged morning stiffness in the affected joints lasting more than 30 minutes, weariness, fever, weight loss, sore and swollen joints that emit warmth, and the presence of rheumatoid nodules beneath the skin. This condition often manifests between the ages of 35 and 60, characterized by periods of remission and exacerbation. Juvenile rheumatoid arthritis (JRA) is a condition that can affect children under the age of 16. It is comparable to rheumatoid arthritis (RA), but it does not involve the presence of rheumatoid factor [2, 3]. The estimated prevalence of rheumatoid arthritis (RA) is approximately 1-2% in Western countries and 1% globally [4,5].

Presently, the standard procedure entails the utilization of disease-modifying medications, and biological agents have the potential to significantly enhance disease activity and reduce structural harm [6]. Nevertheless, it is important to take into account the difficulties that arise in the existing approach to managing RA. Certain individuals provide challenges in terms of treatment efficacy, as they struggle to attain the desired clinical remissions or maintain low disease activity [7]. Exercise therapy is a promising nonpharmacological treatment for managing symptoms and improving daily functioning in patients with RA [8]. Furthermore, implementing exercise intervention has proven to be highly successful in enhancing cardiorespiratory fitness, lowering the likelihood of developing cardiovascular illness, and diminishing disease activity and severity in individuals with RA [9]. Therefore, the European Alliance of Associations for Rheumatology (EULAR) recommended in 2018 that physical exercise therapy, when used alongside medication therapy, is a cost-effective technique.

A comprehensive analysis conducted by Metsios *et al.* examined the physiological processes via which exercise mitigates inflammation, improves psychological well-being, and reduces cardiovascular risk in individuals with rheumatoid arthritis (RA). The study also offers a detailed guide on how to integrate

exercise into the management of RA [11]. Furthermore, a comprehensive analysis conducted by Sveaas *et al.* revealed strong evidence indicating that exercises have a positive impact on lowering disease activity in individuals with RA [12].

DISCUSSION:

Rheumatoid arthritis (RA) is a persistent autoimmune condition characterized by an abnormal tissue healing process triggered by various immune cells and disrupted communication networks [13]. Physical exercise has a significant impact on the immune system, leading to the regulation of immunological functions. This regulation can potentially decrease the activity of rheumatoid arthritis (RA) disease. One short session of intense exercise (lasting a few minutes) leads to a 2 to 3 times rise in the number of leukocytes, while longer periods of exercise (0.5-3 hours) can increase the leukocyte count up to five times [14]. While an elevated leukocyte count is often a sign of infection or inflammation, it often returns to its pre-activity level within 6-24 hours after the exercise is stopped. Following endurance workouts, there is a significant decrease in the number of lymphocytes in the blood, dropping by 30-50% below the level before the activity. This decrease can reach a level that is considered clinically low, which is less than $1.0 \times 10^9/L$. This information is supported by references 14 and 15. Furthermore, exercise has the ability to primarily stimulate the movement of neutrophils and lymphocytes, resulting in an enhancement of their effector/cytotoxic capabilities [15].

There is increasing evidence to suggest that exercise and regular physical activity improve the immune function of both adaptive and innate cells in healthy people [14,16]. Multiple studies have investigated the impact of physical activity on the immune response in individuals diagnosed with rheumatoid arthritis (RA). A study examined the impact of an 8-week bicycle exercise on the immune response of patients with RA. It found a temporary increase in lymphoproliferative response during the acute phase of the exercise, but no significant changes in the levels of blood mononuclear cell populations in the post-exercise resting state [17]. A separate study examined the immunological responses to physical activity in individuals with rheumatoid arthritis (RA) and saw no alterations in lymphocyte proliferation and natural killer cells. This indicates that exercise does not improve the fundamental activities of primary cells in individuals with RA [18]. A recent study investigated the impact of exercise training on immune function in stable patients with rheumatoid arthritis (RA). The study

found that exercise increased the movement of neutrophils towards chemokines (CXCL-8) and decreased the frequency of proinflammatory monocytes (CD14+/CD16+) in the bloodstream [19]. RA is marked by the impaired movement of neutrophils in the bloodstream and an elevated occurrence of proinflammatory monocytes. Exercise has the potential to decrease RA disease activity by enhancing the functioning of the innate immune system in these two areas stated above [19].

Exercise therapies have been found to be efficacious in enhancing physical capacity, mitigating pain, and enhancing aerobic function in individuals diagnosed with rheumatoid arthritis (RA). Furthermore, physical activity can effectively enhance one's overall well-being, mental state, sleep quality, and reduce fatigue. It also does not worsen the progression or severity of some disorders, such as swollen joints and joint stiffness [20,21]. Engaging in exercise training for extended durations, ranging from 12 to 96 weeks, can lead to a reduction in disease activity or clinical severity [21]. The efficacy of exercise for individuals with RA can be observed within a timeframe of 2 to 96 weeks, indicating that even short-term exercise can have clinical benefits. Due to safety concerns, the majority of exercise routines employ moderate intensities for both strength training (i.e., 50%–70% of one repetition maximum: 1 RM) and aerobic training (i.e., 50%–70% of maximum heart rate: HRmax or peak oxygen uptake: VO2 max). Nevertheless, multiple studies have demonstrated the efficacy of

high-intensity strengthening activities (i.e., exercises with a maximum load of 70% or more) and aerobic exercises (i.e., exercises that elevate heart rate to the maximum or achieve a VO2 max of 70% or more) for patients with RA. Furthermore, there have been no known side events associated with these exercises [21,22]. Therefore, exercises that have moderate-to-high intensities have been proven to be both clinically helpful and safe for people with RA. Exercise therapy demonstrate efficacy and safety for patients with different phases of rheumatoid arthritis, ranging from 0.5 to 50 years in duration. Exercises have a significant impact in promoting clinical remission in patients with early stages of rheumatoid arthritis (RA), namely those with a duration of 5 years or less [23]. Exercise therapies are both safe and cost-effective methods that offer an advantageous chance for the early treatment of rheumatoid arthritis as a first-line therapy [24].

Physical activity triggers several physiological reactions, such as the activation of the immune system, inflammation, matrix metalloproteinase (MMP) production, oxidative stress, and epigenetic adjustments [25]. Exercise has the potential to decrease the activity of rheumatoid arthritis (RA) by affecting various biological components, including immune cells and immunology, inflammatory response and inflammatory factors, MMP (matrix metalloproteinase), oxidative stress, and epigenetic expression. This information is illustrated in Figure 1 and is supported by reference [26].

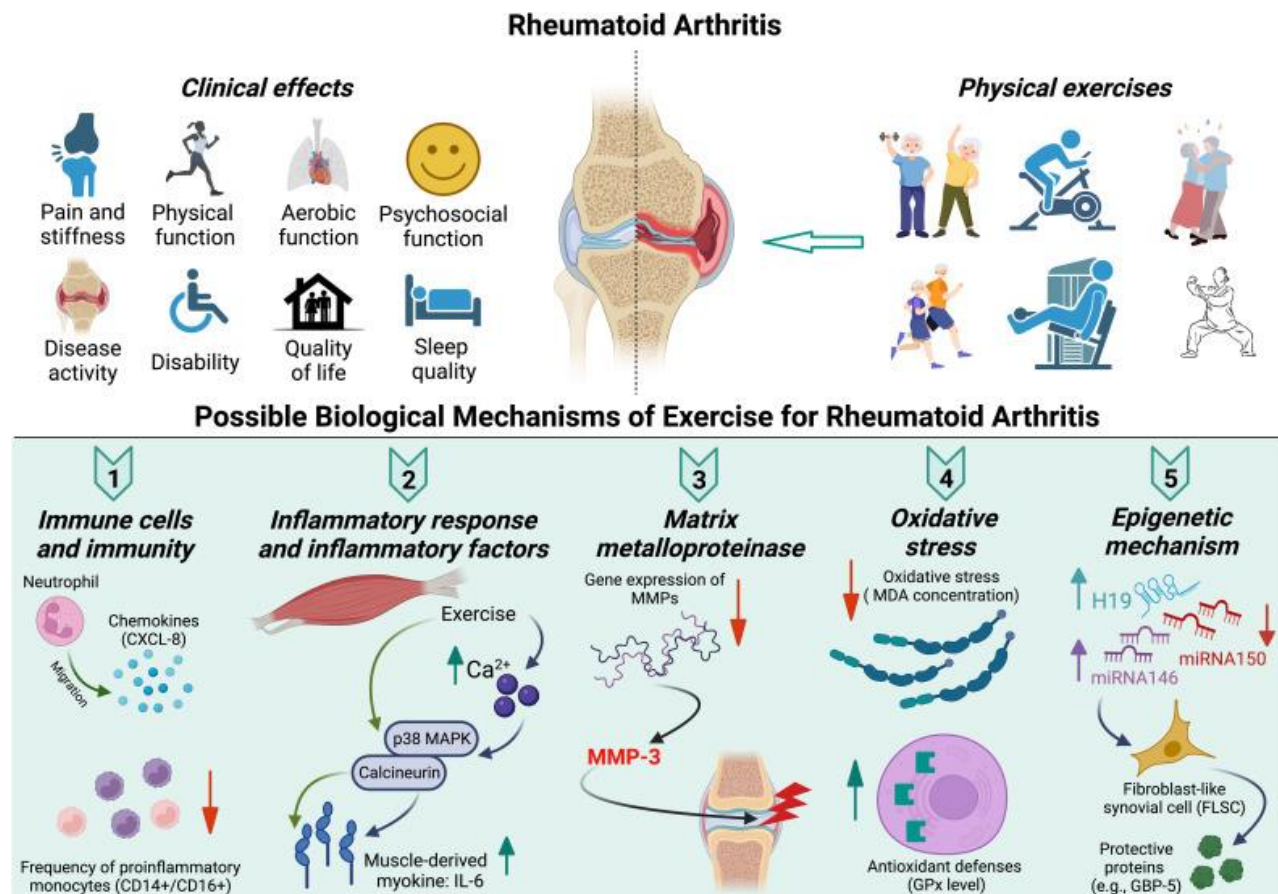


Figure 1: Clinical effects and possible biological mechanisms of exercise for rheumatoid arthritis.

Implementing joint protection techniques, such as incorporating periods of rest and utilizing splints, employing compressive gloves, utilizing assistive devices, and employing adaptive equipment, can have advantageous outcomes in effectively controlling symptoms and deformities associated with rheumatoid arthritis (RA).

During the acute stage of the disease, it is advisable to immobilize the joints. Bed rest alleviates discomfort in instances of significant joint involvement. At this stage, it is crucial to immobilize the joints in a functioning position. The recommended rest position is as follows: the shoulder joint should be in 45° abduction, both wrist joints should be in 20° to 30° dorsal flexion, the fingers should be slightly flexed, the hips should be at 45° abduction without any flexion, the knees should be fully extended, and the feet should be in a neutral position [25]. Splints are employed to achieve the appropriate resting posture and functional alignment of the affected active joints. Enhanced adherence can be achieved by providing the patient with splints composed of pliable materials [26]. Orthosis and splinting are utilized to achieve the following objectives[27]: to alleviate pain and

inflammation, to hinder the progression of deformities, to mitigate joint stress, to provide joint support, and to reduce joint stiffness.

Multiple studies have demonstrated the advantageous effects of wrist splints in managing pain and inflammation, as well as in averting the formation of deformities [28,29]. The utilization of a flexible wrist orthosis results in a notable enhancement in hand grip strength, with a rise ranging from 20% to 25% [30]. Several ring orthoses have been created to avert finger abnormalities. The primary determinants of patient adherence to the orthosis include the dimensions of the orthosis, the thermal output it generates on the skin, the rigidity of the components in contact with the skin, and its potential interference with hand functionality. To decrease joint tension in the feet, one can use a medial arc supporting pad placed on the sole of the foot, as well as a metatarsal pad. Viscoelastic soles can reduce the impact force experienced by the upper part of the shin bone during walking, by as much as 40% [31]. If there is atlantoaxial involvement, it may be advisable to consider using a Philadelphia corset. Orthosis offers superior immobilization and can be utilized when there is cervical instability.

According to a study, individuals who utilize compression gloves have experienced a decrease in joint inflammation and an improvement in their overall state of being [32]. Nevertheless, there is a lack of empirical evidence supporting the notion that gloves enhance grip strength or hand functionality. To enhance the condition of patients with hand or finger irritation, compression gloves might be utilized for specific time periods, such as one hour or exclusively during nighttime [33]. The application of gentle compression is advantageous due to its ability to confine joint swelling and therefore reduce discomfort.

Occupational therapy enhances the functional capacity of individuals diagnosed with rheumatoid arthritis (RA). Assistive technologies and adaptive equipment used in occupational therapy interventions have positive effects on joint protection and energy conservation in individuals with arthritis [34]. Assistive devices are employed to mitigate functional impairments, alleviate discomfort, and maintain patients' autonomy and self-sufficiency. The use of a cane can decrease the load on the hip joint by 50% [35]. Indeed, the majority of these instruments are initially intended for individuals with neurological impairments. Consequently, specific modifications may be necessary to enable their utilization in patients with arthritis. Enhanced toilet seats, expanded grasping handles, and bathroom-related accommodations can all greatly improve daily living. The occupational therapist primarily determines the methods required to enhance the patient's compliance with the environment and promote functional independence. Patient should be provided with catalogues showcasing a range of assistive equipment models tailored to meet different needs [35].

Massage is a frequently employed therapeutic technique that boosts flexibility, fosters integration with other treatment methods, promotes overall well-being, and aids in reducing inflammation and swelling in joints. Dhondt et al. (2016) found that pain thresholds at the massage site, as well as at the knee and ankle, were reduced following the application of oscillatory hand massage to the intervertebral paraspinal area. Massage has been proven to be efficacious in alleviating symptoms of sadness, anxiety, mood disorders, and pain [37]. This discovery raises the question of whether there are any alterations in peripheral nociceptive perception and central information in individuals with rheumatoid arthritis (RA). Furthermore, massage therapy has been shown to reduce levels of stress hormones [38].

Muscle weakness in patients with rheumatoid arthritis (RA) might arise due to immobility or a decrease in everyday activities. Preserving optimal muscle strength is crucial not just for athletic performance, but also for stabilizing the joints and averting traumatic accidents. Exercise therapy may be suggested to have advantageous impacts on enhancing physical capacity rather than diminishing illness activity [439].

Before implementing an exercise regimen for patients with RA, it is important to take into account the following factors: the extent to which the joints are affected (localized or systemic), the stage of the disease, the patient's age, and their adherence to the prescribed therapy. The duration and intensity of the workout are tailored to the individual patient. Exercise treatment may incorporate a variety of components such as range of motion (ROM) exercises, stretching, strengthening exercises, aerobic conditioning exercises, and ordinary daily activities [39].

During the acute phase of arthritis, it is advisable to avoid any strenuous exercises. Nevertheless, it is imperative to mobilize each joint within its range of motion (ROM) at least once daily to avoid the development of contracture. Isometric workouts can effectively maintain muscle tone in acutely inflamed joints without worsening the clinical disease activity. For optimal results, it is recommended to maintain moderate contractures for a duration of 6 seconds and perform 5-10 repetitions daily. It is important to note that performing isometric workouts at an intensity over 40% of maximum voluntary contraction can result in reduced blood circulation and post-exercise tiredness. When the illness activity is minimal, it is advisable to engage in isotonic workouts with extremely little weights. Studies have shown that performing low-intensity isokinetic knee exercises at 50% of the maximum voluntary contraction can be both safe and helpful for patients with rheumatoid arthritis (RA) [40]. If discomfort persists for a duration beyond 2 hours or if there is excessive exhaustion, loss of strength, or an increase in joint swelling following an exercise program, it is advisable to alter the program. In healthy individuals, walking does not cause an increase in intra-articular pressure. However, in a knee that is inflamed and has excess fluid, walking does lead to an increase in intra-articular pressure. Therefore, those suffering from active arthritis should specifically refrain from engaging in activities such as ascending stairs or engaging in weightlifting. Avoid subjecting the tendons to undue tension during stretching activities. Tendons or joint capsules might be injured during abrupt extensions. Ultimately,

during the chronic phase of arthritis when the condition is dormant, it is advisable to engage in conditioning exercises such as swimming, walking, and cycling, while ensuring sufficient intervals of rest. They enhance muscle endurance and aerobic capacity while also improving overall patient functionality, hence promoting a sense of well-being [40].

CONCLUSION:

Physiotherapy is crucial in assisting individuals with RA in effectively managing their condition. Physiotherapists collaborate with occupational therapists to instruct patients on joint protection techniques, utilization of assistive equipment, and implementation of therapeutic activities. The efficacy of exercise as a treatment for rheumatoid arthritis (RA) has been thoroughly investigated. Empirical research has demonstrated that exercise therapy, varying in forms, durations, and intensities, can be therapeutically beneficial for individuals with RA. Significantly, engaging in extended exercise sessions can reduce the activity of rheumatoid arthritis. To optimize the advantages for individuals with rheumatoid arthritis (RA), it is crucial to use exercise techniques that align with their specific symptoms. For individuals with rheumatoid arthritis (RA), engaging in any form of exercise is preferable to not exercising at all. However, the optimal intensity, frequency, and duration of exercise to achieve improved outcomes have not been established.

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