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Managing Psoriatic Arthritis With Different Types of Physical Activity: A Literature Review

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Abstract

Up to 30% of people with psoriasis may develop psoriatic arthritis (PsA), a complicated inflammatory disease characterized by skin signs, joint discomfort, and swelling. Although pharmaceutical therapies have been the primary component of traditional PsA care, the advantages of physical activity are becoming more widely acknowledged. This review looks at how exercise can help manage PsA, with particular emphasis on several types of exercise, including resistance training, functional training, aerobic training, and high-intensity interval training (HIIT). Research indicates that resistance training increases muscle strength and functional ability while aerobic exercise lessens tiredness and musculoskeletal pain. Without escalating disease activity, HIIT reduces fatigue and enhances cardiorespiratory fitness. The review also looks at the relationship between physical activity and PsA symptoms including enthesitis and bone marrow edema (BME). Research shows that exercise does not worsen BME, and even if it can cause enthesitis, the advantages of exercise in terms of lowering overall disease activity and enhancing quality of life exceed the dangers. To sum up, customized exercise regimens are crucial for PsA management and have a major positive impact on patient well-being and disease control.

Keywords :psoriatic arthritis, literature review, enthesitis, physical activity, aerobic training, resistance training, HIIT

INTRODUCTION

Approximately thirty percent of people with psoriasis develop psoriatic arthritis (PsA), a chronic autoimmune disease. PsA is characterized by a mix of musculoskeletal and dermatological symptoms, which can cause joint pain, stiffness, edema, and a major decline in quality of life. The intricate interaction of genetic, immunological, and environmental variables in the pathophysiology of PsA leads to inflammatory processes affecting the skin, joints, and entheses. The mainstay of traditional PsA care has been the use of pharmaceuticals to reduce inflammation and avoid structural damage. Nonetheless, the importance of non-pharmacological approaches—physical exercise in particular—in the all-encompassing therapy of PsA is becoming increasingly acknowledged.

The purpose of this review of the literature is to give a summary of the research available on the benefits of physical activity for PsA management. This review looks at several exercise regimens in an effort to show how beneficial physical activity may be as an additional therapy for Parkinson's disease.

METHODS

In conducting this literature review, a comprehensive search of openly accessible websites and databases was performed to gather relevant information on the management of Psoriatic Arthritis (PsA). The primary aim was to include a wide range of perspectives and findings from reputable sources. The research strategy for the subchapters "Definition," "Symptoms," and "Epidemiology" in the "PSORIATIC ARTHRITIS" chapter utilised an open-access search engine. For the subchapters "Pathology" and "Diagnosing Psoriatic Arthritis" in the same chapter, as well as the chapters "PHYSICAL TRAINING IN PsA PATIENTS," "Aerobic Training," "Resistance Training," "HIIT," "Correlation of Bone Marrow Edema and Physical Activity," "Resistance vs. Functional Training," and "Enthesitis vs. Physical Activity," the research was conducted using PubMed and Google Scholar databases.

Keywords such as "psoriasis," "psoriatic arthritis," "physical activity," "exercise," "resistance training," "HIIT," "aerobic training," "functional training," "enthesitis," "BME," "bone marrow edema," "MRI," and "ultrasound" were used to locate relevant literature, with no restrictions applied.

Articles and guidelines were selected based on their relevance, credibility, and the date of publication. In terms of usage of websites, only sources from reputable organisations, such as the American College of Rheumatology and the National Psoriasis Foundation, were included to ensure reliability. From each selected source, key information was extracted and summarised.

By utilising openly accessible websites and databases, this literature review aimed to provide a comprehensive overview of current non-pharmacological management strategies for PsA, narrowed down to an analysis of different types of physical activities. The inclusion of freely available sources ensures that the findings are accessible and verifiable by a wide audience, promoting transparency and inclusivity in the research process.

PSORIATIC ARTHRITIS

Definition

Psoriatic arthritis (PsA) is an autoimmune disease that manifests in patients with psoriasis, characterised by a complex interplay of genetic, immunological, and environmental factors [1]. It can affect any joint in the body and it includes the existence of dermatological symptoms as well [1,2,3]. It often leads to joint pain, stiffness, and swelling [1,2,3]. PsA can develop with mild or severe symptoms [3].

Symptoms

Clinically, PsA is heterogeneous, presenting with varying patterns of joint involvement and symptoms that can significantly impact a patient's quality of life:

- **Joint pain and swelling:** affecting both peripheral and spondylitis [3]**,**
- **Dactylitis:** characterised by severe swelling of entire digits, giving them a sausage-like appearance [3],
- **Enthesitis:** leading to pain in areas such as the Achilles tendon or plantar fascia [3],

- **Morning stiffness** fading with movement [1].

Additional symptoms may include:

- **Reduced range of motion** in the affected joints.
- **Dermatological manifestations**: associated with psoriasis, which commonly precedes the joint symptoms,
- **Nail changes**: such as pitting, onycholysis, and subungual hyperkeratosis,
- **Fatigue**: Feeling extremely tired is common among people with PsA. [3]

Ocular inflammation, such as conjunctivitis or uveitis [4], and comorbidities like **cardiovascular disease** and **metabolic syndrome** are also associated with PsA [5].

Pathology

The inflammatory process begins with the activation of the innate immune system, leading to the release of a cytokine cascade. The signaling proteins that are released bind to their transmembrane receptors, which triggers the release of additional cytokines and attracts various cells, including endothelial and epithelial cells, macrophages, fibroblasts, keratinocytes, chondrocytes, osteoclasts, and osteoblasts. This activation of the immune system results in inflammation of the enthesis, synovial membrane, erosions, and lesions in the articular cartilage and skin [6]. Genetic predisposition plays a significant role, with HLA-B27 and other genetic markers being linked to the disease. Environmental triggers such as infections, physical trauma, and stress can exacerbate the condition [6].

Epidemiology

PsA affects up to 30% of patients with psoriasis [3] and can occur at any age but is most commonly diagnosed in individuals between the ages of 30 and 50 [1,3]. The condition affects men and women equally [1,3]. A family history of PsA or psoriasis increases the risk of developing PsA [3].

Diagnosing Psoriatic Arthritis

Diagnosing psoriatic arthritis (PsA) requires a multifaceted approach and even though describing it in detail is not within the frame of this paper, it is important to emphasise the nature of structural damage found in this disease.

Certain characteristic traits such as synovitis, tenosynovitis, and enthesitis can be detected with the use of ultrasound with greater sensitivity and at an earlier stage than X-rays [7,8] and can visualise power Doppler signals indicative of active inflammation [8]. Magnetic resonance imaging (MRI) is particularly valuable in identifying bone marrow edema, soft tissue inflammation, and early joint and entheseal changes [9].

It is essential to point out that such findings can never be analysed without the context of clinical examination and laboratory tests. However, they need to be taken into account in order to assess changes, both positive and negative, that appear as a result of exercise and physiotherapy.

PHYSICAL TRAINING IN PsA PATIENTS

Engaging in physical exercise is a crucial aspect in PsA management, offering benefits that go beyond improving musculoskeletal health. Regular exercise, combined with a nutritious diet helps in building cardiovascular health, preventing endothelial dysfunction, and reducing systemic inflammation [10,11]. For those with PsA, physical activity enhances joint flexibility and strengthens bones and muscles, therefore helping them preserve functional abilities. Additionally, exercising helps maintain a body mass index (BMI) within the norm which seems to be yet another positive aspect as obesity is a known risk factor for PsA [10,12].

Beyond the physical benefits, exercise can significantly improve the mental health of PsA patients. Regular physical activity boosts plasma endorphin levels, which helps reduce pain perception and mental distress commonly experienced by individuals with PsO or PsA. These conditions are frequently associated with sleep disorders, depression and fatigue [10,13]. Furthermore, engaging in regular exercise can effectively counteract psychological stress, a significant trigger for psoriasis. By incorporating physical activity into their routine, individuals can improve their overall well-being and better manage the psychological and physical challenges associated with PsO and PsA[10,14].

These statements align with results of a certain HUNT study, a population-based longitudinal survey conducted in Norway with over 35,000 participants. Findings showed that higher levels of physical activity were associated with a lower risk of PsA. Moreover, high levels of physical activity seemed to mitigate the risk of PsA in overweight and obese individuals [15].

Aerobic training

It is impossible to fully separate PsA patients as a separate group, unrelated to individuals being treated solely for psoriasis. A study by Dhake et al. aimed to evaluate the impact of a 16-week aerobic training program on fatigue and musculoskeletal pain in male patients with psoriasis without psoriatic arthritis (PsA). A total of 118 participants were randomly assigned to either the experimental group, which engaged in treadmill sessions three times a week, or the control group. The training regimen included a warm-up, 35- to 50-minute treadmill exercise at 50 to 65 percent of peak heart rate, and a cool-down. Pre- and post-intervention assessments using the FACIT-Fatigue Scale, HAQ-DI, and VAS indicated significant improvements in fatigue and pain levels. Additionally, enhancements in fat mass percentage, lipid profile, and maximal oxygen consumption were observed, without any increase in markers of muscle damage [16].

Similar conclusions can be reached if one chooses another inflammatory arthritis as a reference point; in a randomized controlled multicenter trial done by Lange *et. al.* involving 74 participants (aged 65-75) suffering from rheumatoid arthritis (RA), patients were randomized to either a gym-based exercise intervention or a home-based light-intensity exercise regimen. No significant difference was found between the groups in the HAQ DI score. However, the intervention group demonstrated a significant improvement in aerobic capacity compared to baseline. Additionally, there was a significant improvement in endurance test results within the intervention group compared to the control group. A higher percentage of the intervention group (71%) rated their health as much or very much improved compared to the control group (24%) [17].

Even though those findings were not done strictly on patients suffering from PsA, it is essential to emphasise the importance of those results with regard to this paper. Research concerning implementation of aerobic training as a method of non-pharmacological treatment of PsA may be scarce, therefore at times it is necessary to reach further. Nonetheless, the results suggest that a moderate-intensity aerobic training program could be safe, well-tolerated, and effective for patients with PsA, even though special caution should be applied. More research is needed to fully establish its role in the treatment process.

Resistance Training

A type of physical exercise which has gathered wide attention from researchers is resistance training. A study by Roger-Silva *et al.* aimed to assess its effectiveness in patients with

psoriatic arthritis through a randomised controlled trial involving 41 patients aged 18 to 65 years, all diagnosed with PsA. Participants involved in the intervention group (IG) underwent resistance exercise twice weekly for 12 weeks, performing 3 sets of 12 repetitions per session at an intensity of 60% of one maximum repetition, with 1-2 minute intervals between exercises. By week 12, the IG showed significant improvements in functional capacity (HAQ-S), disease activity (BASDAI), and quality of life domains "pain" and "general health status" compared to the control group. The IG also exhibited increased muscle strength in most exercises. Overall, resistance training effectively enhanced functional capacity, disease activity, and quality of life in PsA patients [18].

Further evidence supports the benefits of resistance training in arthritis patients. A group of researchers used a 12-week Kaatsu blood flow restriction (BFR) training program demonstrated positive effects on disease activity parameters in arthritis patients. BFR training showed comparable, and in some cases more favourable, results than conventional resistance training (CRT), suggesting it as an effective alternative [19].

Yet another study used a specific progressive resistance training program (PRTP) to evaluate pre- and post-treatment status of individuals with inflammatory arthritis (IA) attending Rheumatology Physiotherapy. Participants underwent supervised PRTP sessions for 1 hour each week over 10 weeks, performing seven resistance exercises per session at 70-80% of their 1RM, with three sets of 8-12 repetitions. The outcome measured from this program demonstrated statistically significant improvements, reinforcing the effectiveness of resistance training in this patient population [20].

Another argument can be found in the pre-mentioned study by Lange *et al.* Similar to the aerobic training findings, no significant difference in perceived health measured with HAQ-DI was found between the two groups, however there was a significant improvement noted when comparing to the baseline. Additionally, the intervention group showed significant improvements in three out of four performance-based tests. Overall, resistance exercise significantly improved strength in older adults with inflammatory arthritis, with participants reporting substantial improvements in their well-being [17].

Collectively, these findings underscore the multifaceted benefits of resistance training and structured physical exercise programs in managing psoriatic arthritis and other rheumatic conditions.

HIIT

High-intensity interval training (HIIT) has also been shown to benefit people with psoriatic arthritis. For instance, a study by Thomsen et al. conducted randomised controlled trials with PsA patients, where participants either engaged in high-intensity interval training (HIIT) for 11 weeks or continued their usual exercise routines. The HIIT protocol included a 10-minute warm-up, followed by four 4-minute high-intensity intervals at 85-95% of maximum heart rate, each interspersed with 3-minute moderate-intensity periods at 70% of maximum heart rate. The HIIT group experienced reduced fatigue without an increase in disease activity, indicating that HIIT enhances physical activity levels and reduces fatigue in PsA patients [21].

A different 12-week supervised HIIT program, conducted in a physiotherapy primary care setting, demonstrated significant enhancements in cardiorespiratory fitness (CRF) for patients with inflammatory arthritis (IA), with these benefits persisting at a 6-month follow-up [22].

Correlation of bone marrow edema and physical activity

Previously, it has been hypothesised that vigorous exercise and induced mechanical stress can lead to development of bone marrow edema (BME). However, a study by Varkas et al. found that not only BME measured by MRI can be present in healthy, active individuals without any symptoms of back but it also didn't significantly increase as a result of physical activity [23]. Moreover, a different team of researchers decided to investigate MR images of the spine in PsA patients for changes in BME following HIIT. This study involved 19 PsA patients (4 men, median age 52 years) who underwent 11 weeks of HIIT, and a control group of 20 PsA patients (8 men, median age 45 years) who made no changes to their physical exercise habits. Results showed no significant changes in BME in the MR images of the spine post-HIIT, as evaluated by a radiologist, SPARCC, and texture analysis [24]. This indicates that HIIT is safe for PsA patients.

What is more, the 2018 American College of Rheumatology/National Psoriasis Foundation (ACR/NPF) guidelines only conditionally recommend low-impact exercise over high-impact exercise, as the evidence level is described as "very low." Therefore, depending on patients'

preferences, high-impact exercise may also be considered. However, it is important to note that these guidelines do not provide any strong or even moderate recommendations regarding non-pharmacological treatments for PsA patients [25]. This poses a notable limitation.

Overall, HIIT appears to be a safe and effective exercise modality for PsA patients, providing significant benefits in physical fitness and fatigue reduction without exacerbating disease activity.

Resistance vs functional training

At the start of the study comparing functional training and resistance exercise in patients with psoriatic arthritis, the clinical and demographic characteristics of the groups were comparable. Both groups exhibited significant intra-group improvements in the BASFI, BASDAI, HAQ-s, and DAS-28 scores. Regarding quality of life, both groups saw significant intra-group enhancements across all domains, with the exception of the "emotional aspect" domain in the resistance exercise group. In terms of muscle strength, all exercises showed significant improvement within both groups, except the "alternate biceps (bilateral)" exercise [26].

Enthesitis vs physical activity

Enthesitis is one of the most important symptoms of PsA and spondyloarthritis in general. It is a diffuse process, affecting adjacent bones and soft tissues [3]. Although its pathogenesis can prove to be complicated, evidence has shown that microdamage caused by biomechanical stress can trigger this state of inflammation [27]. That phenomenon explains the findings of Wervers *et al.* which say that PsA patients who avoided any kind physical activity had a significantly reduced rate of ultrasound enthesitis [28]. In the same study, comparison of PsA patients with the group of healthy volunteers showed similar levels of inflammation, however the former had much more structural damage in their entheses [28]. This seems to prove that enthesitis is a particularly dangerous phenomenon for individuals with inflammatory arthritis.

Although it is suggested that patients should be in remission before starting physical activity, studies demonstrate clear beneficial effects of exercise in PsA on disease activity, well-being, and comorbidities, and these benefits appear to outweigh the risk of enthesitis induced by mechanical stress [29].

CONCLUSIONS

Physical activity plays a pivotal role in managing PsA. This literature review underscores the multifaceted benefits of exercise, extending beyond mere musculoskeletal improvements. Regular physical activity, when combined with a balanced diet, plays a significant role in enhancing cardiovascular health, reducing systemic inflammation, and preventing endothelial dysfunction. For individuals with PsA, maintaining joint flexibility and muscle strength through exercise helps preserve functional abilities and improve overall physical fitness. Additionally, keeping a healthy body mass index (BMI) through physical activity is particularly advantageous, given that obesity is a known risk factor for PsA.

Exercise also offers substantial mental health benefits for PsA patients. Increased plasma endorphin levels from regular physical activity help alleviate pain perception and mental distress, which are prevalent among individuals with psoriasis or PsA. Regular exercise can mitigate common comorbidities such as sleep disorders, depression, and fatigue. Counteracting psychological stress is essential as it is a significant trigger for psoriasis, thus aiding in better overall disease management and improved quality of life.

Studies have highlighted the positive impact of various types of exercise, including aerobic, resistance, and high-intensity interval training (HIIT), on the physical and mental health of patients with inflammatory conditions. Aerobic training has been shown to improve aerobic capacity, endurance, and overall physical fitness, as evidenced by studies conducted on patients with psoriasis and rheumatoid arthritis (RA). Similarly, resistance training has demonstrated significant improvements in muscle strength, functional capacity, and quality of life for PsA patients. These findings are supported by research involving different types of inflammatory arthritis, which reinforces the potential benefits of such exercise modalities for PsA management.

HIIT has emerged as a safe and effective exercise option for PsA patients, providing notable improvements in physical fitness and fatigue reduction without exacerbating disease activity. Studies have shown that HIIT does not significantly increase bone marrow edema (BME) in patients, suggesting its safety and efficacy in managing PsA.

Enthesitis, a hallmark of PsA, can be influenced by physical activity. While PsA patients who avoid physical activity exhibit lower levels of enthesitis, those who engage in regular exercise experience significant benefits in disease management. Structural damage observed in PsA patients, despite similar inflammation levels to healthy individuals, underscores the

importance of managing enthesitis effectively. Studies suggest that the overall benefits of exercise in managing PsA outweigh the risks of enthesitis induced by mechanical stress.

In summary, while there are risks associated with enthesitis and mechanical stress from physical activity, the overall benefits of regular exercise in managing PsA are substantial. Exercise programs tailored to individual capabilities and disease status should be integral to PsA treatment plans, enhancing patient outcomes and quality of life.

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