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REVIEW / DERLEME

Effects of Pilates Exercises in Rheumatological Diseases

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ABSTRACT

Rheumatic diseases encompass a wide range of chronic, inflammatory, and autoimmune conditions, including rheumatoid arthritis, ankylosing spondylitis, fibromyalgia syndrome, juvenile idiopathic arthritis, and systemic lupus erythematosus. These conditions are often associated with pain, joint stiffness, muscle weakness, reduced physical fitness, psychosocial issues, and a decline in quality of life. Traditionally, pharmacological treatments have been the cornerstone of disease management. However, in recent years, exercise has gained recognition as an important complementary approach in therapeutic strategies. Regular exercise has been shown to have multifaceted effects such as increasing muscle strength and flexibility, relieving pain, reducing fatigue, supporting cardiovascular functions and strengthening psychosocial well-being. Thanks to controlled and fluid movements, exercise structure targeting the central muscle group and its respiratory-focused approach, Pilates provides both physical and psychosocial benefits in rheumatic diseases. Studies in the literature have shown that Pilates has positive effects in many areas such as disease activity, posture, balance, respiratory functions and quality of life. In this context, Pilates exercises have come to the fore in recent years. Therefore, in the management of rheumatic diseases, it is recommended to implement Pilates-based exercise programs that will be designed according to individual needs and disease characteristics. This review aims to comprehensively examine the effects of Pilates exercises on rheumatic diseases in the light of current literature.
Keywords: Ankylosing spondylitis, fibromyalgia, juvenile idiopathic arthritis, pilates exercises, rheumatoid arthritis.

Romatolojik Hastalıklarda Pilates Egzersizlerinin Etkileri

ÖZET

Romatolojik hastalıklar; romatoid artrit, ankilozan spondilit, fibromiyalji sendromu, juvenil idiyopatik artrit ve sistemik lupus eritematozus gibi kronik, inflamatuvar ve otoimmün özellikler gösteren rahatsızlıkları içeren geniş bir hastalık grubudur. Bu hastalıklar sıklıkla ağrı, eklem tutukluğu, kas güçsüzlüğü, fiziksel uygunlukta azalma, psikososyal sorunlar ve yaşam kalitesinde düşüş ile ilişkilidir. Geleneksel olarak farmakolojik tedavi yöntemleri hastalık yönetiminin temelini oluşturmakla birlikte, son yıllarda egzersiz, tedavi planlarında önemli bir tamamlayıcı yaklaşım olarak kabul görmektedir. Düzenli egzersizin; kas gücü ve esnekliği artırma, ağrıyı hafifletme, yorgunluğu azaltma, kardiyovasküler fonksiyonları destekleme ve psikososyal iyilik halini güçlendirme gibi çok yönlü etkileri olduğu gösterilmiştir. Kontrollü ve akıcı hareketler, merkez kas grubunu hedefleyen egzersiz yapısı ve solunum odaklı yaklaşımı sayesinde Pilates, romatizmal hastalıklarda hem fiziksel hem de psikososyal yarar sağlamaktadır. Literatürde yapılan çalışmalar; Pilates'in hastalık aktivitesi, postür, denge, solunum fonksiyonları ve yaşam kalitesi gibi birçok alanda olumlu etkileri olduğunu ortaya koymuştur. Bu bağlamda, Pilates egzersizleri son yıllarda ön plana çıkmıştır. Dolayısıyla romatolojik hastalıkların yönetiminde, kişisel ihtiyaçlara ve hastalık özelliklerine uygun olarak düzenlenecek Pilates temelli egzersiz programlarının uygulanması önerilmektedir. Bu derleme, güncel literatür ışığında Pilates egzersizlerinin romatizmal hastalıklar üzerindeki etkilerini kapsamlı şekilde incelemeyi amaçlamaktadır.
Anahtar Kelimeler: Ankilozan spondilit, fibromiyalji, juvenil idiyopatik artrit, pilates egzersizleri, romatoid artrit.

1. Introduction

Inflammatory rheumatic diseases such as rheumatoid arthritis (RA), axial spondyloarthritis, and systemic lupus erythematosus (SLE) are common conditions that significantly affect the population. These diseases pose a lifetime risk to approximately 8.4% of women and 5.1% of men (1). This high prevalence contributes substantially to the global burden of disability (2). Autoimmune rheumatic diseases are systemic disorders that primarily affect joints, bones, and soft tissues (3). Characterized by systemic inflammation, they share common clinical features such as chronic pain, decreased physical fitness, and reduced health-related quality of life (4–7). Although clinical presentations may vary, these diseases are often associated with poor prognosis (8). The main goal of treatment strategies is to prevent and control inflammation.

Rheumatologic conditions present complex clinical pictures involving multiple concurrent symptoms, which often progress in a vicious cycle. Thus, therapeutic approaches typically combine pharmacological and non-pharmacological strategies. At this point, adopting a multidisciplinary approach becomes essential (9). Multidisciplinary teams often include rheumatologists, rehabilitation specialists, occupational therapists, physiotherapists, social workers, nurses, manual therapists, podiatrists, dietitians, psychologists, vocational counselors, and orthopedic surgeons. Among these, physiotherapists play a central role in delivering targeted interventions that address functional limitations and promote activity-based rehabilitation, particularly in inpatient settings for individuals with inflammatory rheumatic diseases (9,10). Physiotherapy interventions play a key role within this comprehensive framework.

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Daha önce bildiri olarak sunulmuş ise bildiri türü, yeri ve tarihi: Makele herhangi bir bilimsel etkinlikte sunulmamıştır.

In recent years, patient-centered programs have been developed to encourage active participation, with exercise emerging as a particularly important component. Studies emphasize the positive effects of exercise on overall health and well-being in both diseased and healthy populations. Moreover, exercise has been shown to offer protective benefits against various chronic illnesses. The notion that "exercise is medicine" has been widely accepted, especially in the context of chronic disease management (11,12).

Exercise induces homeostatic changes, triggering physiological adaptations across virtually every organ system, including the circulatory, nervous, endocrine, musculoskeletal, connective (bone, ligament, tendon), gastrointestinal, immune, and renal systems (12). These adaptations improve skeletal muscle function and consequently enhance cardiovascular, metabolic, and immune responses. Through these mechanisms, exercise exerts anti-inflammatory effects and improves comorbid conditions and cardiovascular risk factors in patients with inflammatory rheumatic diseases. Therefore, exercise plays a critical role in interrupting the chronic inflammatory cycle associated with conditions such as RA, SLE, juvenile idiopathic arthritis (JIA), ankylosing spondylitis (AS), fibromyalgia (FMS), and systemic sclerosis (11).

A variety of exercise modalities may be utilized in therapeutic programs, including aerobic, resistance, flexibility, and balance exercises. In recent years, Pilates has also gained popularity as a clinical approach in rehabilitation settings. Originally developed in the 1920s by Joseph Pilates, this exercise method focuses on posture, endurance, flexibility, and breath control through core stabilization exercises. By the early 2000s, Australian physiotherapists had adapted the method for clinical practice, referring to it as "Clinical Pilates" or "Modified Pilates" (13). Pilates is widely recognized as a safe and effective exercise approach for both healthy individuals and patients.

It is based on six fundamental principles: (1) centering, (2) concentration, (3) control, (4) precision, (5) flow, and (6) correct breathing. Pilates exercises may be performed individually or in groups and include mat exercises, performed on a mat on the floor, and equipment-based exercises utilizing devices such as reformers, cadillacs, wunda chairs, and ladder barrels (14,15). Joseph Pilates emphasized the importance of balanced strengthening and stretching of all body muscles and created over 500 exercises for this purpose. He also introduced the concept of the "core" as a cylindrical structure composed of the diaphragm superiorly, the transversus abdominis anteriorly, the thoracolumbar fascia laterally, the multifidus muscles posteriorly, and the pelvic floor muscles inferiorly. Targeting these muscles through Pilates exercises enhances postural stability and reduces the risk of injury during movement. Given these characteristics, Pilates-based interventions have increasingly drawn attention for their potential therapeutic benefits in rheumatologic conditions, particularly in improving postural alignment, muscular control, and functional capacity (16,17).

1.1. Rheumatoid Arthritis and Pilates Exercises

RA is an inflammatory and chronic disease affecting approximately 0.5–1% of the general population. It is characterized by pain, stiffness, and synovitis, which may progress to bone and cartilage erosion in later stages (18). The primary goal of RA treatment is to reduce symptoms, improve functional status, and provide long-term protection against joint damage, disease progression, and associated comorbidities. In this regard, both pharmacological and non-pharmacological approaches are utilized. Exercise interventions, tailored to the individual needs of patients, are increasingly integrated into treatment programs.

The European League Against Rheumatism (EULAR) recommends physical activity and exercise as integral components of management strategies for individuals with RA (19, 20). Beyond improving musculoskeletal health, regular exercise has been shown to positively impact cardiovascular risk factors, such as cholesterol, triglycerides, systolic blood pressure, insulin resistance, and obesity (21,22). Accordingly, various exercise modalities—including swimming, yoga, dynamic strength training, aerobic exercises, dance, and Tai Chi—have been employed in RA populations to enhance physical function and overall well-being (23). However, despite this diversity, studies specifically investigating the effects of Pilates exercises in individuals with RA remain limited.

In a study conducted by Khalili and colleagues (24) involving 30 male patients with RA, participants were divided into two groups, with one group undergoing Pilates exercises three times per week for eight weeks. At the end of the intervention, Pilates was found to strengthen muscles, reduce pain, increase muscle endurance, and improve quality of life.

Similarly, in a study conducted by Yentür et al. (25), 30 patients with RA were randomly assigned to three groups and subjected to different treatment protocols for eight weeks. The group that performed Pilates exercises showed significant improvements in fatigue, depression, aerobic capacity, and quality of life. Although similar benefits—excluding pain reduction—were observed in the aerobic and combined exercise groups, no statistically significant differences were found among the groups .

The anti-inflammatory effects of aerobic exercise in rheumatic diseases have been well documented in the literature (11). Similarly, Pilates interventions have been associated with reductions in pain, improvements in muscle endurance, enhancements in quality of life, and better functional capacity in individuals with RA (25). These parallel outcomes suggest that Pilates may also exert modulatory effects on inflammatory processes. Therefore, the integration of clinical Pilates into standard rehabilitation protocols could serve as a supportive strategy to enhance treatment outcomes.

1.2. Ankylosing Spondylitis and Pilates Exercises

AS is a chronic, systemic inflammatory rheumatic disease classified within the group of spondyloarthritis (SpA) disorders (26). These conditions share common clinical, laboratory, radiological, and genetic features, including HLA-B27 positivity and a familial predisposition. Clinically, AS is characterized by involvement of the axial skeleton and peripheral joints, although extra-articular manifestations may also occur due to its systemic nature. The prevalence of AS varies between populations and is closely related to the frequency of the HLA-B27 genetic marker, which is positive in the majority of patients (27). Regarding gender distribution, AS is reported to be two to three times more common in men than in women (28).

The most frequent clinical feature observed in AS patients is axial spine involvement, typically presenting as inflammatory back pain. This pain usually begins insidiously with sacroiliitis, affecting the lower back and hip regions and accompanied by morning stiffness lasting longer than 30 minutes (29). Notably, AS is one of the rare diseases where pain improves with exercise (30), highlighting the crucial role of physical activity in its early diagnosis and treatment. Viitanen et al. (31) emphasized the effectiveness of physical therapy in enhancing spinal mobility in AS patients. Supporting this perspective, a meta-analysis demonstrated that various exercise models, including home-based programs, swimming, and Pilates, are effective in reducing disease activity and enhancing functional outcomes in AS patients (32). Nghiem et al. (33) emphasized the importance of integrating core stabilization exercises into therapeutic programs to maintain or improve spinal mobility. Given these

benefits, Pilates has recently become an important component of rehabilitation programs

Pilates exercises aim to strengthen the core muscle group (transversus abdominis, multifidus, pelvic floor muscles, and diaphragm) to enhance spinal stabilization (34,35). The core region serves as a natural corset for the spine and pelvis, playing a key role in postural control. In a study by Altan et al. (17), the effects of Pilates training on pain, functional status, and quality of life in AS patients were investigated. Participants were randomly assigned to two groups: one received Pilates training three times per week for 12 weeks, while the control group continued with standard treatment. Assessments conducted at baseline, week 12, and week 24 demonstrated that Pilates was an effective and safe intervention for improving physical capacity, while also enhancing chest expansion due to its focus on breathing control.

Similarly, in a study conducted by Öksüz et al. (36), an aerobic exercise program combined with Pilates was implemented for eight weeks in AS patients. The results revealed that, in addition to the benefits of aerobic exercise, clinical Pilates produced superior improvements in spinal mobility, disease activity, upper extremity flexibility, dynamic balance, quality of life, and fatigue severity.

In another study by Yentür et al. (37), home-based exercise programs were compared with Pilates training. Both groups exhibited significant improvements in chest wall mobility, maximum inspiratory pressure, and aerobic capacity. However, greater improvements in maximum expiratory pressure, spinal mobility, and disease activity were observed in the Pilates group.

In a comparative study conducted by Roşu et al. (38), the effects of Pilates, McKenzie, and Heckscher exercise programs were evaluated in patients with AS. While all exercise protocols yielded positive outcomes across various clinical parameters, the Pilates intervention demonstrated superior results in certain measures compared to the other methods. Furthermore, Herrington and Davies (39) demonstrated that Pilates training enhanced the ability to activate the transversus abdominis muscle, which may explain the improvements seen in the Bath Ankylosing Spondylitis Functional Index (BASFI) scores, a key indicator of functional status in AS.

Kısacık et al. (40) reported significant improvements in depression symptoms and quality of life using a Pilates-based Cognitive Exercise Therapy Approach (BETY). In a long-term follow-up study by Rodríguez-López et al. (41), AS patients who underwent Pilates training for 12 months exhibited consistent improvements in disease activity, spinal mobility, and functional capacity. Zaggelidou et al. (42) showed that Pilates combined with walking produced positive effects on cardiovascular fitness, functional capacity, and disease activity. Differently, in a randomized controlled trial comparing Aqua Stretch and Aqua Pilates, Gandomi et al. (43) reported significant improvements in the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Metrology Index (BASMI), and BASFI scores with both programs, but found no superiority between them. The literature clearly demonstrates that Pilates exercises improve trunk stabilization, enhance respiratory capacity, and increase quality of life in individuals with AS, while also leading to significant improvements in BASMI, BASDAI, and BASFI scores.

1.3. Fibromyalgia Syndrome and Pilates Exercises

FMS is a chronic rheumatologic disorder characterized by widespread pain and increased sensitivity in specific anatomical regions. This condition is frequently accompanied by systemic symptoms such as fatigue, depression, anxiety, sleep disturbances, headaches, migraines, and gastrointestinal issues (44). FMS predominantly affects women, with a female-to-male ratio of approximately 3:1 (45). Although its etiology and pathophysiology remain incompletely understood, treatment strategies generally rely on symptomatic management and personalized interventions (46).

Since its recognition, various treatment modalities, ranging from antidepressants to biofeedback and electroacupuncture, have been proposed (44). Pharmacological agents, particularly analgesics and antidepressants, should be used cautiously and monitored closely, especially in pediatric and adolescent populations. A systematic review by Häuser et al. demonstrated that the efficacy of pharmacological agents in FMS is generally limited, and long-term use may result in significant adverse effects (47). These findings underscore the inadequacy of pharmacological management alone and emphasize the importance of multidisciplinary approaches. In addition to pharmacological interventions, exercise programs have been strongly recommended for the management of FMS. The German Scientific Medical Societies Association (AWMF) advocates for physical therapy and exercise, while the EULAR supports exercise with the highest level of recommendation (46,48).

Randomized controlled trials and systematic reviews have consistently shown that regular physical activity reduces chronic pain intensity and improves physical function (49, 50). Moreover, exercise has been associated with better sleep quality, enhanced cognitive functions, and overall improved health status (51). Among the various exercise modalities, aerobic exercises, strengthening routines, and flexibility training have demonstrated particular efficacy in FMS management (52). However, many patients experience fatigue, often due to disrupted deep sleep, which can make adherence to standard aerobic exercise programs challenging (53). Consequently, adapting exercise interventions to patient tolerance and individual needs is of paramount importance.

Recent research has highlighted Pilates as an effective and safe complementary therapy in FMS management. Pilates, a movement system emphasizing controlled motions, central stabilization, and breathing techniques, has been shown to promote both physical and psychosocial improvements in individuals with FMS (54). In a randomized controlled trial protocol by Franco et al. (55), the modified Pilates method was hypothesized to be more effective and cost-efficient than aerobic exercise in managing fibromyalgia symptoms. The study targeted core symptoms such as pain intensity, fatigue, sleep disturbances, kinesiophobia, specific disability, functional capacity, and health-related quality of life. It was anticipated that the Pilates intervention would provide longer-lasting symptom relief—particularly in pain reduction, sleep quality, and physical function—maintained over 6 to 12 months of follow-up, compared to aerobic exercise. Furthermore, various studies have reported reductions in pain intensity, improvements in muscle strength, enhanced postural control, and significant increases in quality of life following Pilates interventions (56,57).

The adaptability of Pilates to individual levels and progression has been noted to improve exercise adherence, reduce early fatigue, and facilitate program completion (58). Additionally, Pilates promotes holistic muscle training, which supports postural correction and balance development (17). Several studies have also indicated that Pilates improves sleep quality, reduces fatigue, and alleviates depressive symptoms (59). Moreover, group-based Pilates sessions appear to offer superior benefits for anxiety and functional improvement compared to individual sessions (60). Combining Pilates with water-based exercises or electro-muscle stimulation has been suggested to further enhance outcomes related to pain, anxiety, and physical function (61, 62).

In conclusion, Pilates exercises are considered an effective, safe, and adaptable intervention for managing fibromyalgia syndrome. These exercises contribute significantly to pain control, functional improvement, and enhanced quality of life, making them a valuable component of comprehensive FMS management programs.

1.4. Systemic Lupus Erythematosus and Pilates Exercises

SLE is a serious autoimmune disease that can affect multiple major organ systems. The pathogenesis of SLE is characterized by the formation of autoantibodies and immune system dysregulation, which lead to aberrant inflammatory responses and consequent damage to various organs and tissues (63). SLE is a heterogeneous disease, meaning that its symptoms can vary significantly among individuals. Although the disease may affect people of all ages, approximately 90% of patients are women (64).

The management of SLE is tailored according to the organs involved and the severity of the disease. Pharmacological treatments are customized to meet individual patient needs (65). Alongside pharmacological approaches, exercise has increasingly been recognized as an important adjunct intervention (66). Recent systematic reviews have confirmed that exercise can be safely implemented in patients with SLE without exacerbating disease activity. Furthermore, it has been shown to play a beneficial role in the management of key clinical outcomes, particularly fatigue (67).

Among the various types of exercise studied in the context of SLE, aerobic and resistance training have been the most extensively investigated. However, studies focusing on the use of Pilates exercises in this population remain limited. In a randomized controlled trial conducted by Ismail et al. (68), 60 obese female patients with SLE participated in a Pilates program five days per week for 12 weeks. The results demonstrated significant improvements in lipoprotein profiles, including reductions in triglycerides and low-density lipoprotein (LDL) levels. Similarly, Hashemi et al. (69) investigated the combined effects of aerobic (running) and anaerobic (Pilates) exercise programs in patients with SLE. Their findings indicated that this combined intervention led to significant improvements in fatigue, functional capacity, myocardial metabolism, muscular endurance, flexibility, and overall quality of life. These findings suggest that although research on Pilates in patients with SLE is still emerging, it may represent a safe and effective exercise modality with potential benefits in metabolic regulation, fatigue reduction, functional enhancement, and overall quality of life improvement.

1.5. Juvenile Idiopathic Arthritis and Pilates Exercises

JIA is one of the most common chronic inflammatory diseases of childhood. It is characterized by persistent joint inflammation due to immune system dysfunction (70). Inflammation typically begins before the age of 16 and symptoms persist for at least six weeks (71). As a result of chronic inflammation, children may experience classic arthritic symptoms, including joint swelling, increased warmth, pain, and functional loss. Additionally, systemic manifestations such as growth retardation, morning stiffness, sleep disturbances, and fatigue are frequently observed (72).

Compared to their healthy peers, children with JIA generally exhibit lower levels of physical fitness and reduced participation in physical activities (73). This often leads to a significant decline in quality of life and can result in social isolation. Therefore, the role of exercise in the management of JIA is essential (74).

Therapeutic exercise programs are considered effective interventions for improving long-term outcomes in JIA. These programs are designed to reduce pain, enhance muscle function, promote physical activity, and improve overall quality of life (75). Among these approaches, Pilates exercises represent a versatile method focusing on stability, muscle control, flexibility, breathing, and postural development (15). For children with JIA, Pilates is often perceived as an enjoyable activity and contributes to pain control without inducing excessive fatigue.

In a pilot study conducted by Unal et al. (76), clinical Pilates exercises were shown to be effective in reducing pain and improving overall health perception in children with JIA. Based on these findings, clinical Pilates is recommended as a safe and feasible exercise model for this population. Similarly, in another study by Calık et al. (77), clinical Pilates exercises were found to improve both physical and psychosocial well-being in children and adolescents with JIA. According to a study by Kısa et al. (78), Pilates exercises were more effective than three-dimensional scoliosis exercises in enhancing posture control, weight transfer, and dynamic balance in children diagnosed with JIA. Azab et al. (79) also reported that supplementing traditional physiotherapy programs with Pilates exercises led to significant reductions in pain intensity, improvements in cardiorespiratory fitness, and enhanced quality of life in children with JIA.

Moreover, Pilates has been reported to strengthen abdominal muscles, improve diaphragmatic function, increase respiratory capacity, and contribute to better cardiovascular fitness (80). Finally, a study by Mendonça et al. (81) demonstrated that Pilates exercises improved both physical and psychosocial aspects of quality of life in individuals with JIA, and that these benefits were maintained at a 6-month follow-up.

In light of these findings, it is recommended that therapeutic exercise programs designed for children with JIA be implemented at least three times per week, tailored to individual needs, and supervised by professionals (75,82). Especially during active disease phases, low-to-moderate intensity exercises should be prioritized, and methods such as Pilates should be integrated into the treatment plan within a biopsychosocial framework.

2. Conclusion and Recommendations

Rheumatologic diseases are characterized by chronic inflammatory processes that significantly impair quality of life. Managing these diseases through a multidisciplinary approach is essential, and alongside pharmacological treatments, individualized exercise programs have become an integral part of therapy. The data presented in this review demonstrate that Pilates exercises support both physical and psychosocial well-being in individuals with rheumatologic conditions such as rheumatoid arthritis, ankylosing spondylitis, fibromyalgia syndrome, systemic lupus erythematosus, and juvenile idiopathic arthritis. In addition to its stabilizing effects on the musculoskeletal system, Pilates improves respiratory function, balance, and postural control. Its controlled, low-to-moderate intensity structure enhances exercise adherence, making it particularly valuable for this patient group. Studies in the literature support the effectiveness of Pilates in pain management, functional capacity improvement, and enhanced quality of life. However, more high-quality, randomized controlled trials are needed to evaluate the long-term effects of Pilates on disease activity. In clinical practice, personalized and supervised Pilates programs are recommended to optimize treatment success and promote long-term healthy behaviors in patients.

This review assessed the effects of Pilates exercises on rheumatologic diseases based on current literature and available research. However, several limitations exist. First, most studies on Pilates have been conducted with small sample sizes and short intervention periods, which limits the generalizability of findings. Although many studies employed randomized controlled designs, methodological differences (such as the duration, frequency, intensity of exercise programs, and participant characteristics) complicate direct comparisons of

results. Furthermore, insufficient research exists to fully evaluate the long-term effects of Pilates and its impact on disease progression. Notably, there is limited research specifically investigating Pilates interventions in certain rheumatologic conditions such as SLE and JIA. Additionally, a lack of head-to-head comparisons between different types of exercise interventions further constrains the scope of this review. Finally, in some of the studies examined, co-interventions (such as diet or electrotherapy) were included, making it difficult to isolate the specific effects of Pilates. Future research should focus on larger sample sizes, longer follow-up periods, and standardized Pilates protocols to provide stronger evidence.

3. Contribution to the Field

A review of current literature shows that studies focusing on this topic are relatively few. This article aims to fill this gap by comprehensively examining the role of Pilates exercises in the management of rheumatological diseases based on current scientific evidence, emphasizing that clinicians should not overlook this issue.

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Conflict of Interest

There is no conflict of interest with any person and/or institution.

Authorship Contribution

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