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# THE IMPACT OF PHYSICAL ACTIVITY ON QUALITY OF LIFE IN PATIENTS WITH ANKYLOSING SPONDYLITIS (AS) - A REVIEW OF CLINICAL AND FUNCTIONAL BENEFITS

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**ABSTRACT**

**Introduction:** Ankylosing spondylitis (AS) is a chronic and progressive systemic disease of unknown cause, characterized by inflammation and ossification. This disease affects the sacroiliac joints and the joints of the spine, including the costovertebral and costotransverse joints, as well as the peripheral joints and tendon attachment sites. Due to the long-term and difficult course of AS, improving quality of life is one of the key goals of therapeutic measures. Regular physical activity is considered an important element of comprehensive treatment, supporting both pharmacological and rehabilitative treatment.
**Objectives:** The aim of this study is to analyze the impact of physical activity on the quality of life of patients with AS. Specific objectives include: examining differences in quality of life in the context of physical activity levels (assessed, among others, using the SF-36 and ASQoL questionnaires), to identify the most effective forms of exercise (e.g., stretching, swimming, yoga, Nordic walking), to analyze the relationship between physical activity and pain intensity and mobility, and to assess compliance with activity recommendations in this group of patients.
**Methodes:** This work is based on review materials, the most recent research, and compilations and comparisons of materials.
**Results:** An analysis of existing studies emphasizes that regular physical activity helps reduce pain, improves mobility, has a positive effect on mental well-being, and may slow the progression of the disease.
**Conclusion:** In summary, physical activity is a key element in improving the quality of life of people with AS. Its importance as part of therapy should be emphasized in daily clinical practice, and the greatest benefits are achieved by tailoring the exercise plan to the specific needs of the patient.

**KEYWORDS**

Ankylosing Spondylitis, Physical Activity, Joint Disease, Spinal Disease, Rehabilitative Treatment, Quality of Life

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## 1. Introduction

Ankylosing spondylitis (AS) is a chronic, immune-mediated arthropathy that predominantly impacts the axial skeleton, especially the sacroiliac joints and vertebral column. This condition is part of a wider category of spondyloarthropathies, which encompasses axial psoriatic arthritis. AS primarily impacts young adults and is marked by persistent back pain, morning stiffness, growing spinal rigidity, and, in advanced stages, considerable functional disability resulting from vertebral fusion. The disease may also present with various extra-articular symptoms, including conjunctivitis, inflammatory bowel disease, and cardiovascular issues. The global prevalence of AS ranges from 0.1% to 1.4%, influenced by genetic predisposition and the presence of the HLA-B27 variant, which is closely linked to the condition.

The etiology of AS is intricate and multifaceted, encompassing genetic predisposition, aberrant immunological responses, and environmental influences. Recent investigations into disease mechanisms have underscored the significance of proinflammatory cytokines, including tumor necrosis factor alpha (TNF-α) and interleukin-17 (IL-17) (Ke et al., 2025). The advent of biological treatments, especially TNF inhibitors and IL-17 antagonists, has transformed the management of AS, offering substantial symptom alleviation and disease regulation for several patients. A considerable number of patients do not respond sufficiently to or tolerate these drugs, highlighting the necessity for other therapeutic choices (Hu et al., 2025).

Chronic inflammation in ankylosing spondylitis results in disability and diminished quality of life, exacerbating patient suffering and decreasing treatment desire. Psychosocial factors are significant, encompassing interpersonal connections, occupational performance, autonomy, and self-worth.

Physical activity is essential in the management of ankylosing spondylitis (AS). Clinical recommendations from EULAR (European League Against Rheumatism) and ASAS (Assessment of SpondyloArthritis International Society) advocate for regular exercise as an integral component of a comprehensive treatment regimen with pharmacological interventions (Rausch Osthoff et al., 2018; Zochling et al., 2006). Exercises designed to enhance spine mobility, posture, and muscular strength can inhibit the advancement of stiffness, augment range of motion, and alleviate pain and morning rigidity (Luo et al., 2024). Experts often propose activities such as stretching, breathing exercises, Nordic walking, swimming, yoga, and aquatic exercise.

The research and clinical practice reveal inadequate emphasis on physical activity as an essential component of AS treatment. Certain patients lack adequate assistance in integrating exercise into their daily lives, while others apprehend exacerbation of symptoms (Zimba, Guła, et al., 2024; Zimba, Kocyigit, et al., 2024). An evaluation of the clinical and functional advantages of exercise can establish a basis for the broader dissemination and reinforcement of exercise guidelines among patients and professionals, while also fostering innovative educational and therapeutic approaches that promote physical activity.

This paper aims to examine existing studies and guidelines about the influence of physical activity on the quality of life of individuals with ankylosing spondylitis, considering clinical and functional dimensions. This paper seeks to elucidate the theoretical and pathophysiological foundations of exercise's influence on illness progression, outline the extent of existing recommendations for physical activity, and highlight the educational and therapeutic requirements for fostering activity within this patient population.

## 2. Aim of the study

This study aims to thoroughly analyze the impact of regular physical activity on the lives of people with ankylosing spondylitis (AS). The use of the term “life” has a special meaning, as it encompasses not only the daily struggle with the symptoms of the disease, but also the overall improvement in the quality of life.

The paper focuses on the impact of physical activity on the emotional sphere and well-being of patients, and explains the mechanisms by which exercise can influence the development of the disease, both directly and indirectly. Patients' subjective perceptions of their quality of life (measured using standard tools such as

SF-36 and ASQoL) and objective indicators of function, which take into account pain levels, range of motion, and ability to perform daily tasks, will be assessed.

It will also be crucial to specify and select the most effective forms of physical activity, tailored to the individual needs and capabilities of people with ankylosing spondylitis.

In addition, the study includes an assessment of the degree of compliance with exercise recommendations in this group of patients. The results of the study will form the basis for the development of specific guidelines that can be used in the daily care of patients and in the creation of personalized therapeutic programs.

## 3. Literature Review Methodology

### 3.1. Study Selection Criteria and Search Strategy

A comprehensive literature search was conducted across multiple electronic databases including PubMed/MEDLINE, EMBASE, Cochrane Library, Web of Science, and CINAHL from inception to December 2024. The search strategy combined Medical Subject Headings (MeSH) terms and free-text keywords related to ankylosing spondylitis ("ankylosing spondylitis," "axial spondyloarthritis," "Bechterew disease"), physical activity ("exercise," "physical therapy," "rehabilitation," "sports," "fitness"), and quality of life ("quality of life," "health-related quality of life," "functional capacity," "patient-reported outcomes").

Inclusion criteria encompassed: (1) peer-reviewed original research articles, systematic reviews, and meta-analyses published in English; (2) studies involving adult patients (≥18 years) with confirmed AS diagnosis according to modified New York criteria or Assessment of Spondyloarthritis International Society (ASAS) classification criteria (Linden et al., 1984; Rudwaleit et al., 2009); (3) investigations examining the relationship between physical activity interventions and quality of life outcomes; and (4) studies utilizing validated outcome measures. Exclusion criteria included case reports, conference abstracts, studies with insufficient data, and investigations not primarily focused on physical activity interventions or quality of life outcomes.

### 3.2. Study Population Characteristics

The reviewed studies encompassed diverse patient populations with established AS diagnosis. Patient demographics typically included:

- Age Distribution: Most studies included patients with mean ages ranging from 35-50 years, representing the typical demographic profile of AS patients (Braun & Sieper, 2007; Dean et al., 2014). The age range reflects the chronic nature of the condition and the importance of maintaining physical function across different life stages.
- Gender Distribution: Studies generally included both male and female participants, with male predominance reflecting the epidemiological pattern of AS (male-to-female ratio approximately 2-3:1) (Hamilton et al., 2015; Reveille et al., 2012). Several investigations specifically examined gender differences in response to physical activity interventions.
- Disease Duration and Severity: The reviewed literature encompassed patients with varying disease durations, from early-stage disease (less than 2 years since diagnosis) to established, long-standing disease (>10 years duration) (Sieper & Poddubnyy, 2017; Ward et al., 2019a). Disease severity ranged from mild to moderate activity levels, as assessed by standardized measures.
- Diagnostic Criteria: All included studies required participants to meet either the modified New York criteria for AS or the newer ASAS classification criteria for axial spondyloarthritis, ensuring diagnostic consistency across investigations (Linden et al., 1984; Poddubnyy et al., 2011; Rudwaleit et al., 2009).

### 3.3. Outcome Measures and Assessment Tools

The literature review identified several validated instruments consistently used across studies to evaluate treatment outcomes:

#### 3.3.1. Quality of Life Assessment

Ankylosing Spondylitis Quality of Life Questionnaire (ASQoL): This disease-specific instrument consists of 18 items addressing the impact of AS on various life domains, with scores ranging from 0-18 (higher scores indicating poorer quality of life) (Doward et al., 2003; Duruöz et al., 2013). The ASQoL demonstrates good psychometric properties and responsiveness to change in AS populations (Haywood, 2002).

Short Form-36 Health Survey (SF-36): This generic health-related quality of life measure comprises 36 items across eight domains: physical functioning, role limitations due to physical problems, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health (MCHORNEY et al., 1993). The SF-36 allows comparison with general population norms and other chronic conditions.

### 3.3.2. Disease Activity and Functional Assessment

- Bath Ankylosing Spondylitis Disease Activity Index (BASDAI): This patient-reported outcome measure evaluates disease activity through six questions addressing fatigue, spinal pain, joint pain/swelling, areas of localized tenderness, and morning stiffness intensity and duration, scored on 0-10 numerical rating scales (Garrett et al., 1994; Machado et al., 2011).
- Bath Ankylosing Spondylitis Functional Index (BASFI): This instrument assesses functional limitation through 10 questions evaluating patients' ability to perform daily activities, each scored on a 0-10 visual analog scale (Calin et al., 1994; Şentürk, 2022).
- Bath Ankylosing Spondylitis Metrology Index (BASMI): This composite index measures spinal mobility through five clinical measurements: cervical rotation, tragus-to-wall distance, lumbar side flexion, modified Schober's test, and intermalleolar distance (Jenkinson et al., 1994; Viitanen et al., 2000).

### 3.3.3. Pain Assessment

Visual Analog Scale (VAS) for Pain: Studies consistently employed VAS scales (0-100 mm) to quantify pain intensity, with 0 representing no pain and 100 representing worst imaginable pain (Hawker et al., 2011; Jensen, 2003). This standardized approach allows for meaningful comparison across investigations.

### 3.3.4. Physical Activity Measurement

International Physical Activity Questionnaire (IPAQ): Several studies utilized the IPAQ to assess habitual physical activity levels, categorizing participants into low, moderate, or high physical activity levels based on metabolic equivalent (MET) calculations (CRAIG et al., 2003; Lee et al., 2011).

Custom Physical Activity Questionnaires: Some investigations employed study-specific questionnaires designed to capture AS-relevant physical activities and exercise preferences (Alam et al., 2025; Bot et al., 2004).

## 3.4. Intervention Characteristics

The reviewed literature encompassed various physical activity interventions with distinct characteristics:

### 3.4.1. Program Duration and Frequency

Most intervention studies implemented programs lasting 8-12 weeks, with session frequencies typically ranging from 2-3 times per week (Dagfinrud et al., 2008; O'Dwyer et al., 2014). This duration allows for measurable physiological adaptations while maintaining participant compliance.

### 3.4.2. Exercise Modalities

- Stretching and Flexibility Training: Systematic incorporation of spinal and peripheral joint stretching exercises targeting areas commonly affected by AS, including thoracic extension, cervical rotation, and hip flexor stretching (Analay et al., 2003; Ince et al., 2006).
- Respiratory Exercises: Breathing techniques and chest expansion exercises designed to maintain thoracic mobility and respiratory function, particularly important given AS-related thoracic involvement (DURCAN et al., 2012; Sweeney et al., 2002).
- Aerobic Conditioning: Low-impact cardiovascular activities including Nordic walking, aquatic exercises, cycling, and structured walking programs tailored to individual capacity and joint limitations (Dagfinrud et al., 2005; Karapolat et al., 2008).
- Resistance Training: Progressive strengthening exercises focusing on postural muscles, core stability, and general muscular endurance using bodyweight, elastic resistance, or light weights (Lim et al., 2005; Rankovic et al., 2009).
- Specialized Activities: Some studies incorporated discipline-specific approaches such as Pilates, yoga, tai chi, or sports-specific training programs (Altan et al., 2012; Liang et al., 2015).

## 3.5. Statistical Analysis Approaches

The reviewed studies employed various analytical methods to evaluate intervention effectiveness:

- Pre-Post Intervention Analysis: Paired t-tests or Wilcoxon signed-rank tests were commonly used to compare outcome measures before and after physical activity interventions, with effect sizes calculated to determine clinical significance (Sullivan & Feinn, 2012).

- Correlation Analysis: Pearson or Spearman correlation coefficients were frequently employed to examine relationships between physical activity levels and quality of life measures, providing insights into dose-response relationships (Akoglu, 2018; Schober et al., 2018).
- Regression Modeling: Multiple regression analyses were utilized to identify predictors of treatment response and control for potential confounding variables such as age, disease duration, and baseline disease activity (Austin & Steyerberg, 2015; HARRELL et al., 1996).
- Between-Group Comparisons: Randomized controlled trials employed independent t-tests, Mann-Whitney U tests, or analysis of covariance (ANCOVA) to compare outcomes between intervention and control groups (Altman & Bland, 2005; Kahan et al., 2014).
- Time-Series Analysis: Longitudinal studies utilized repeated measures ANOVA or mixed-effects modeling to examine changes over multiple time points and account for individual variation in response patterns (Cnaan et al., 1997; Fitzmaurice et al., 2011).

Statistical significance was typically set at $p<0.05$, with confidence intervals reported to enhance interpretation of clinical significance alongside statistical significance.

## 4. Results

Regular physical activity in patients with ankylosing spondylitis (axSpA) improves quality of life, reduces disease activity, and enhances function and mobility, as measured by BASDAI, BASFI, and BASMI. Meta-analyses and systematic reviews show that programs combining aerobic exercise of moderate to high intensity with resistance and range-of-motion training improve physical function and reduce axial symptoms, including pain, morning stiffness, and fatigue. They also exert beneficial effects on sleep quality and emotional well-being (Sveaas, Bilberg, et al., 2020; Sveaas, Dagfinrud, et al., 2020). Clinical trials indicate that the strongest benefits occur in multimodal protocols that integrate different exercise modalities. These effects, however, require regular continuation or supervised implementation, as they diminish after discontinuation (Sveaas, Bilberg, et al., 2020; Wang et al., 2024). Randomized controlled trials confirm clinically relevant reductions in BASDAI and BASFI scores and improvements in quality-of-life domains. Importantly, these outcomes are achieved with a favorable safety profile, even when higher-intensity exercise is applied in patients with stable disease. Current recommendations from the Assessment of SpondyloArthritis International Society (ASAS) and the European Alliance of Associations for Rheumatology (EULAR) identify physical activity as a cornerstone of non-pharmacological management in axSpA (Wang et al., 2024).

Different exercise modalities, including continuous and interval aerobic training, aquatic programs, combined protocols, and mind–body interventions, have shown consistent reductions in disease activity and improvements in health-related quality of life (HRQoL). The most reproducible and substantial effects are observed in structured programs that include aerobic and resistance components, performed regularly and in a systematic manner (Boudjani et al., 2023)

High-intensity interval training (HIIT) has demonstrated beneficial effects in protocols using repeated bouts of high-intensity work at approximately 85–95% HRmax, combined with resistance training. These interventions reduce ASDAS and BASDAI, enhance physical capacity, and promote cardiovascular adaptations without increasing inflammatory activity (Sveaas, Bilberg, et al., 2020). Moderate-intensity walking, performed for 150–300 minutes per week, is also associated with improvements in disease activity, pain reduction, and favorable immunological changes, as confirmed in contemporary randomized trials (Ramiro et al., 2023; Zhang et al., 2025).

Comparative analyses suggest that aerobic and combined programs produce stronger and more durable effects than stretching alone. Aquatic exercise reduces pain, functional impairment measured by BASFI, and HRQoL limitations. However, its superiority over structured land-based programs has not been consistently confirmed. Therefore, the choice of modality should take into account patient preference, tolerance of mechanical load, and access to rehabilitation services (Roberts et al., 2024).

Mind–body interventions, including yoga, tai chi, pilates, and qigong, provide moderate but consistent improvements in pain, BASDAI and BASFI scores, spinal mobility, and functional capacity. The strongest evidence comes from programs delivered two to three times per week over at least eight weeks, which result in clinically meaningful improvements. These modalities are especially suitable for patients preferring lower mechanical loads or presenting with functional limitations. They should be regarded as complementary rather than alternative approaches to aerobic and resistance training. Although the effects are generally smaller than those of combined aerobic and resistance programs, mind–body interventions remain a supportive component of comprehensive management (Ramiro et al., 2023; Zhu et al., 2024).

In summary, regular physical activity is a key element of non-pharmacological treatment in axSpA. The greatest benefits are achieved in multimodal programs that combine aerobic and resistance components. Intervention choice should be guided by patient preference, functional capacity, and access to rehabilitation, which are critical factors for adherence and long-term effectiveness. These interventions are safe and well tolerated in patients with stable disease.

## 5. Discussion

### 5.1. Comparison with the Literature

The present review indicates that regular physical activity in patients with ankylosing spondylitis (AS) is associated with significant improvements in quality of life (QoL) as measured by both generic instruments (e.g., SF-36) and disease-specific scales (e.g., ASQoL). These findings are consistent with multiple clinical trials and systematic reviews reporting beneficial effects of exercise on physical function, thoracic mobility, spinal range of motion, and pain parameters (Dagfinrud et al., 2005; Durmuş et al., 2009; Liang et al., 2015; Zhu et al., 2024). Including both supervised programs and home-based exercise, a consistent trend emerges: greater frequency and long-term engagement in training are associated with more pronounced functional and QoL benefits.

Compared with studies focused solely on short-term effects, our analysis supports the view that maintaining physical activity over extended periods is crucial for sustaining therapeutic gains (Liang et al., 2015; Ward et al., 2019b). Discrepancies among studies are most often attributable to heterogeneity in exercise programs (type, intensity, duration), patient inclusion criteria (age, disease duration, inflammatory activity), and QoL assessment tools—factors that must be considered in cross-study comparisons.

### 5.2. Potential Mechanisms for QoL Improvement Through Exercise

The mechanisms by which physical activity improves QoL in AS are multifactorial, encompassing biological, biomechanical, and psychological components:

- **Pain reduction and decreased inflammation** - Regular exercise may alter the pro- and anti-inflammatory cytokine profile and enhance local tissue metabolism (Petersen & Pedersen, 2005). Moderate physical activity positively influences pain perception and may reduce nocturnal pain and morning stiffness, thereby improving sleep and daily function (Dagfinrud et al., 2005; Petersen & Pedersen, 2005).
- **Postural and spinal mechanics improvement** - Strengthening of paraspinal, dorsal, and core musculature enhances central and postural stability. Improved posture reduces overloading of musculoskeletal structures, decreasing movement-related pain and increasing functional capacity (Durmuş et al., 2009).
- **Increased range of motion and flexibility** - Mobilization, stretching, and breathing exercises improve thoracic and spinal mobility, which is of particular importance in AS, where chest expansion limitations impact exercise tolerance and overall comfort (Dagfinrud et al., 2005; Zhu et al., 2024).
- **Neurochemical and psychological effects** - Physical activity induces the release of endorphins, endocannabinoids, and other neurotransmitters modulating pain perception and mood. Better psychological well-being, reduced anxiety, and alleviation of depressive symptoms indirectly contribute to QoL enhancement (Bement & Sluka, 2005).
- **Cardiometabolic adaptations** - Regular activity reduces the risk of cardiovascular and metabolic comorbidities, which are more prevalent in AS patients compared with the general population (Mathieu et al., 2011). Improved general health translates into greater social and occupational engagement and better QoL.

Overall, these mechanisms suggest that exercise interventions exert multidimensional benefits-simultaneously affecting pain, physical capacity, psychosocial functioning, and comorbidity management.

### 5.3. Study Limitations

Despite strong evidence supporting the benefits of exercise, several limitations must be acknowledged:

- **Sample size and representativeness** - Many clinical trials have small cohorts or select patients with specific characteristics (e.g., younger age, lower disease activity), limiting generalizability (Dagfinrud et al., 2005; Zhu et al., 2024).
- **Heterogeneity of interventions** - Variations in exercise type (endurance, strength, stretching, breathing), intensity, frequency, and supervision hinder direct comparisons and identification of optimal protocols (Liang et al., 2015; Ward et al., 2019b).
- **Subjective QoL measures** - QoL is often assessed via self-reported questionnaires, which are susceptible to expectancy effects, placebo effects, and socially desirable reporting (Durmuş et al., 2009).

• **Short observation periods** - Many studies evaluate interventions lasting only weeks to months; fewer assess long-term maintenance of effects. Adherence over extended periods remains under-researched (Ward et al., 2019b).

• **Inconsistent control of pharmacotherapy** - Changes in anti-inflammatory or biologic treatment during follow-up in some studies may confound exercise-related effects on QoL (Dagfinrud et al., 2005; Petersen & Pedersen, 2005).

Improved future research should involve protocol registration, standardized interventions, and validated outcome measures to strengthen evidence quality.

### 5.4. Practical Implications - Role of Physiotherapy, Physician, and Patient

Based on current evidence, the following practical recommendations are proposed:

• **Physiotherapy as a cornerstone of non-pharmacological treatment** - Supervised, individualized or group programs led by experienced physiotherapists should be standard in AS care. Physiotherapists can assess deficits, design tailored exercise plans, and ensure correct technique, improving safety and efficacy (Durmuş et al., 2009; Liang et al., 2015).

• **Multifaceted, personalized exercise programs** - Optimal regimens should combine strengthening, stretching, thoracic mobility, and aerobic-endurance components, adjusted for disease status, comorbidities, and patient preferences to enhance adherence (Dagfinrud et al., 2005; Ward et al., 2019b).

• **Role of the rheumatologist and multidisciplinary team** - Rheumatologists should actively promote exercise, monitor inflammatory activity, and adjust pharmacotherapy to enable safe participation. Collaboration with physiotherapists, psychologists, and specialized nurses supports holistic QoL improvement (Durmuş et al., 2009; Zhu et al., 2024).

• **Patient education and motivation** - Long-term benefits depend heavily on sustained activity; education about mechanisms, pain-management strategies, and exercise integration into daily routines is critical (Bement & Sluka, 2005).

• **Monitoring outcomes and safety** - Standardized functional and QoL assessment tools should be applied in clinical practice with periodic reviews to adjust programs in response to disease progression or flare-ups .

• **Program accessibility and health policy** - System-level solutions to improve access (e.g., funding, outpatient programs, telerehabilitation) can increase participation in effective interventions, improving population-level QoL (Mathieu et al., 2011).

## 6. Conclusions

This comprehensive review of current literature provides compelling evidence for the significant impact of physical activity on quality of life in patients with ankylosing spondylitis (AS). Based on the analysis of existing studies, several key conclusions emerge:

Primary Impact on Quality of Life: The reviewed literature demonstrates that physical activity interventions result in statistically significant improvements in health-related quality of life among AS patients, with the most pronounced benefits observed in the physical health domain (Dagfinrud et al., 2005; Millner et al., 2016). Multiple meta-analyses of randomized controlled trials consistently show that exercise programs lead to meaningful improvements in disease activity measures, functional capacity, and pain management compared to usual care (O'Dwyer et al., 2014; Regel et al., 2017).

Functional and Clinical Benefits: Regular participation in structured exercise programs yields multiple therapeutic benefits for AS patients. Supervised physiotherapy is more effective than usual care in improving disease activity, functional capacity, and pain in patients with ankylosing spondylitis (Ince et al., 2006). Evidence supports significant improvements in spinal mobility (BASMI), functional capacity (BASFI), and disease activity (BASDAI) scores (ABBOTT et al., 1994; Liang et al., 2015). Additionally, exercise interventions demonstrate moderate to high-level evidence for improving physical function, chest expansion, and cardiorespiratory function (Zochling et al., 2006).

Disease Progression and Long-term Outcomes: Physical activity plays a crucial role in limiting disease progression and maintaining functional independence. Exercise programs show potential to improve disease activity and body function in AS (Braun et al., 2011), with recent network meta-analyses indicating that various exercise modalities including running, Pilates, stretching, yoga, and tai chi provide significant symptom relief (Zhang et al., 2025). The evidence suggests that regular exercise interventions may help preserve spinal

mobility and prevent the functional deterioration commonly associated with AS progression (Hidding et al., 1993; Karapolat et al., 2008)

Clinical Implementation and Knowledge Translation: Despite the robust evidence base, there remains a significant gap between research findings and clinical practice. Many respondents also applied nonmedicinal treatment to their lifestyle, including stretching or strengthening exercises (66.1%), yet uptake remains suboptimal. Healthcare providers need enhanced education and resources to effectively prescribe and monitor exercise interventions for AS patients. The development of standardized exercise protocols and patient education materials is essential for translating research evidence into clinical practice (Dundar et al., 2014; Sveaas et al., 2014)

Future Directions and Research Priorities: While the evidence strongly supports the benefits of physical activity in AS, several areas require further investigation. Future research should focus on establishing optimal exercise dosage, duration, and intensity parameters for different AS phenotypes. Additionally, studies examining the cost-effectiveness of exercise interventions and their integration with pharmacological treatments are needed to support healthcare policy decisions (Kjeken et al., 2013; Niedermann et al., 2013).

In conclusion, the reviewed evidence strongly reinforces that physical activity represents a fundamental, evidence-based therapeutic intervention for AS patients that significantly enhances quality of life, improves functional outcomes, and may slow disease progression. The imperative now lies in effective knowledge translation to ensure that all AS patients have access to appropriate exercise interventions as part of their comprehensive care plan. Healthcare systems must prioritize the integration of structured physical activity programs into routine AS management to optimize patient outcomes and reduce the substantial burden of this chronic inflammatory condition.

**Disclosure**

**Author's contribution:** Aleksandra Sowa, Kacper Trząsalski ;
Conceptualisation: Patrycja Jędrzejewska-Rzezak, Katarzyna Oświeczyńska;
Methodology: Sebastian Kupisiak, Katarzyna Oświeczyńska;
Software: Patrycja Jędrzejewska-Rzezak, Sebastian Kupisiak;
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Project Administration: Kacper Trząsalski, Katarzyna Oświeczyńska

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In preparing this work, the authors used ChatGPT (chatGPT.com) as a tool for translation, improving language and readability. After using the tool, the authors have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

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