

Sleep Quality in Patients with Spondyloarthritis: A Literature Review

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ABSTRACT

Sleep quality has increasingly been recognized as an important component of health-related quality of life in patients with spondyloarthritis (SpA). Spondyloarthritis is a group of chronic inflammatory rheumatic diseases affecting the axial skeleton, peripheral joints, and entheses, often accompanied by extra-articular manifestations. The chronic and fluctuating nature of SpA is associated with persistent symptoms such as pain, stiffness, fatigue, and functional limitation. Evidence indicates that sleep disturbances are highly prevalent in patients with SpA and may occur across disease subtypes and stages. Impaired sleep quality has been associated with inflammatory activity, pain severity, psychological distress, and comorbid conditions, further contributing to overall disease burden. This literature review summarizes current evidence on sleep quality in spondyloarthritis, including fundamental aspects of sleep, the prevalence of sleep disturbance, commonly used assessment methods, and clinical factors related to impaired sleep. Recognition of sleep quality as a multidimensional patient-reported outcome may support a more comprehensive understanding of disease impact in patients with spondyloarthritis.

Keywords: spondyloarthritis; sleep quality; sleep disturbance; chronic inflammatory disease

INTRODUCTION

Spondyloarthritis (SpA) is a group of chronic inflammatory rheumatic diseases characterized by inflammation of the axial skeleton, peripheral joints, entheses, and extra-articular structures such as the skin, eye, and bowel [1]. The SpA spectrum includes axial spondyloarthritis (axSpA), psoriatic arthritis (PsA), reactive arthritis, arthritis associated with inflammatory bowel disease, and undifferentiated spondyloarthritis [1,2]. These conditions share common inflammatory and immunological mechanisms, although they differ in clinical presentation and disease course [2]. The chronic nature of SpA contributes substantially to long-term functional impairment and reduced quality of life [1].

SpA typically begins in early adulthood, a life period associated with high occupational, social, and economic productivity [1]. Axial spondyloarthritis, including ankylosing spondylitis, most commonly develops in the third decade of life [1,3]. Psoriatic

arthritis, in contrast, often occurs later, with the highest prevalence reported between 30 and 60 years of age and frequently in association with established psoriasis [2]. The early onset and progressive course of these diseases result in long-term physical disability and socioeconomic impact [4]

Beyond musculoskeletal symptoms, patients with SpA frequently experience systemic manifestations that significantly affect daily functioning, including fatigue and sleep-related complaints [5]. Sleep is a fundamental biological process essential for physical restoration, immune regulation, and cognitive performance [4]. Increasing evidence indicates that sleep disturbances are common in chronic inflammatory diseases, including inflammatory rheumatic conditions such as spondyloarthritis. Moreover, sleep problems are frequently underrecognized and not routinely assessed in clinical practice, despite their persistence and impact on patients [6].

This literature review aims to provide an overview of sleep quality in patients with spondyloarthritis. The review focuses on disease characteristics, sleep physiology, the concept of sleep quality, sleep disturbance and prevalence, assessment methods, associated factors, and clinical considerations. By summarizing available evidence, this review highlights the clinical relevance of sleep quality as an important patient-reported outcome in spondyloarthritis.

REVIEW CONTENT

(1) Spondyloarthritis

• *Definition and Epidemiology*

Spondyloarthritis is defined as a chronic inflammatory disease that predominantly affects either the axial skeleton, including the sacroiliac joints and spine (axial SpA), or the peripheral joints and entheses (peripheral SpA) [1]. Ankylosing spondylitis represents the radiographic form of axial SpA and is one of the most well-recognized subtypes within the SpA spectrum [3]. Axial SpA usually begins in the third decade of life and affects individuals during their most productive years [1]. Psoriatic arthritis is a heterogeneous inflammatory disease complicating psoriasis in up to 30% of affected patients and shows the highest prevalence among adults aged 30–60 years [2,7].

Psoriatic arthritis is recognized as a significant clinical entity within the spondyloarthritis spectrum, with epidemiological studies indicating its occurrence predominantly in adult populations [7]. In contrast, the global prevalence of axial spondyloarthritis is more difficult to quantify, although it is consistently identified as a major contributor to disability among young and middle-aged adults. The combination of early disease onset, chronic progression, and multisystem involvement contributes to a substantial individual and societal disease [1].

• *Clinical Manifestations*

The clinical features of spondyloarthritis include inflammatory back pain, prolonged morning stiffness, reduced spinal mobility, and peripheral arthritis [3]. Enthesitis, which clinically presents as localized pain and tenderness at sites of tendon or ligament insertion, is a characteristic feature observed across the spondyloarthritis spectrum [1,2]. Extra-articular manifestations such as uveitis, psoriasis, and inflammatory bowel disease are frequently observed and contribute to disease complexity [3].

Patients with psoriatic arthritis often present with asymmetric peripheral arthritis, dactylitis, nail involvement, and skin psoriasis [2]. These clinical manifestations are associated with pain, fatigue, functional limitation, and impaired health-related quality of life [2]. Sleep disruption may occur as a consequence of persistent pain and systemic inflammation, although it is not routinely evaluated in clinical practice [5].

• *Pathophysiology*

The pathophysiology of spondyloarthritis is characterized by chronic immune-mediated

inflammation involving the sacroiliac joints, peripheral joints, and entheses. In axial SpA, axial inflammation, bone destruction, and new bone formation are central pathological processes. Inflammatory activity may lead either to erosive bone damage or to aberrant bone formation, resulting in structural changes and reduced spinal mobility [1].

In psoriatic arthritis, inflammation is thought to originate at the entheses and is influenced by biomechanical stress, genetic susceptibility, and immune dysregulation. Enthesitis plays a key role in initiating and sustaining inflammatory responses in PsA [2]. Ongoing inflammation results in pain, stiffness, fatigue, and joint damage [4]. These inflammatory mechanisms form the biological basis for systemic symptoms frequently reported by patients, including fatigue and sleep-related complaints [6].

(2) Sleep

• *Definition and Mechanisms*

Sleep is an active physiological state essential for survival and overall health [8]. It occupies approximately one-third of human life and is regulated by sleep homeostasis and circadian rhythms. Circadian rhythms influence the timing of sleep and wakefulness, as well as hormonal secretion, immune responses, and metabolic processes [9].

Sleep is generated and maintained through intrinsic neural networks that coordinate sleep–wake cycles over 24 hours [10]. The initiation and maintenance of sleep require suppression of ascending arousal systems that promote wakefulness [9]. Disruption of circadian regulation or sleep homeostasis may lead to impaired sleep duration, continuity, and restorative function [8]. Consequently, sleep is not a passive state but a dynamic biological process critical for physical and mental recovery [11].

Chronic disruption of sleep regulation has been associated with immune dysregulation and increased inflammatory activity. Experimental studies indicate that insufficient or fragmented sleep may promote pro-inflammatory signaling pathways and alter immune responses [12]. These mechanisms highlight the role of sleep in maintaining physiological balance and immune homeostasis. Alterations in sleep regulation, therefore, have important implications for patients with chronic inflammatory diseases, including spondyloarthritis [13].

• *Sleep Architecture*

Normal sleep architecture consists of cyclic transitions between non-rapid eye movement (NREM) sleep and rapid eye movement (REM) sleep [9]. NREM sleep is primarily associated with physical restoration, tissue repair, and metabolic regulation, whereas REM sleep plays a central role in emotional processing and memory consolidation [8]. A healthy night's sleep is characterized by a rhythmic alternation between these stages [9].

Disruption of sleep architecture, even in the presence of adequate sleep duration, may result in non-restorative sleep and daytime dysfunction [9]. Alterations in REM sleep patterns have been proposed as potential contributors to perceived poor sleep quality [14]. Such disruptions are commonly observed in chronic inflammatory and immune-mediated diseases [6].

(3) Sleep Quality

• *Concept*

Sleep quality is a subjective and multidimensional construct reflecting an individual's perception of sleep adequacy and restoration. Unlike sleep duration, sleep quality encompasses multiple components, including sleep latency, sleep efficiency, sleep continuity, nocturnal disturbances, and daytime functioning [15]. Individuals may report poor sleep quality despite sufficient total sleep time, highlighting the importance of sleep architecture and fragmentation [14].

Sleep quality has been increasingly recognized as a meaningful patient-reported outcome in rheumatologic diseases [5]. In patients with chronic inflammatory conditions, poor sleep quality is associated with reduced quality of life, cognitive impairment, and increased symptom burden [6]. Patient-reported assessments of sleep quality have been shown to reflect the overall impact of disease beyond objective clinical measures. These findings support the clinical relevance of incorporating sleep quality assessment into the evaluation of patients with spondyloarthritis [5].

• *Sleep Disturbance*

Sleep disturbance refers to difficulties initiating or maintaining sleep, non-restorative sleep, or alterations in sleep timing and structure [10]. In chronic inflammatory diseases, sleep disturbance is influenced by immune activation, pain, psychological distress, and circadian dysregulation. Experimental and clinical evidence indicate that neural networks involved in sleep homeostasis interact with immune pathways, thereby influencing inflammatory responses [12].

In patients with spondyloarthritis, sleep disturbance represents a significant impairment in daily functioning and health-related quality of life [16]. Observational studies suggest that sleep problems are frequently underestimated and are often assessed only at the time of initial diagnosis [17]. Persistent sleep disturbance has been associated with increased fatigue and heightened pain perception in inflammatory rheumatic diseases [18]. Together, these factors contribute substantially to the overall disease burden experienced by patients with spondyloarthritis [6].

• *Prevalence of Sleep Disturbance in Spondyloarthritis*

Poor sleep quality has been consistently reported among patients with spondyloarthritis. Systematic reviews and observational studies indicate that sleep disturbances are common in ankylosing spondylitis

and other forms of axial SpA [17,19]. These findings highlight sleep impairment as a frequent clinical concern in this population. Reduced sleep efficiency and frequent nocturnal awakenings are commonly reported symptoms [17].

Patients with psoriatic arthritis also experience a high prevalence of sleep problems. Sleep disturbance has been reported across disease subtypes and stages of PsA [20]. Comparative studies indicate that altered sleep patterns are observed throughout the SpA spectrum, although contributing factors may differ between axial and peripheral forms [21]. Earlier studies have already identified sleep disorders as a longstanding clinical concern in psoriatic arthritis [22,23].

(4) Assessment of Sleep Quality

• *Subjective Measures*

Subjective assessment tools are the most commonly used methods for evaluating sleep quality in rheumatologic research because they capture the patient's personal perception of sleep experience. The Pittsburgh Sleep Quality Index (PSQI) is the most widely used self-report instrument for assessing sleep quality and has been extensively validated across both clinical and non-clinical populations. The PSQI evaluates multiple domains of sleep, including sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction [15].

Subjective measures are particularly valuable because patients' perceptions of sleep quality are strongly associated with daily functioning, fatigue, and overall quality of life. In rheumatologic diseases, patient-reported outcomes offer clinically meaningful information that may not be fully reflected by objective sleep parameters alone. Sleep quality has therefore been increasingly recognized as an important patient-reported outcome in inflammatory rheumatic conditions [5].

• *Objective Measures and Other Instruments*

Objective sleep assessment methods include polysomnography and actigraphy, which provide physiological and behavioral data on sleep patterns. Polysomnography is considered the gold standard for evaluating sleep architecture and diagnosing sleep disorders, as it records brain activity, eye movements, muscle tone, respiratory parameters, and oxygen saturation. However, its routine use in clinical practice is limited by high cost, limited availability, and patient burden associated with overnight laboratory monitoring [9].

Actigraphy represents a less invasive and more feasible alternative for assessing sleep-wake patterns in natural environments. By measuring movement over extended periods, actigraphy can estimate sleep duration, sleep efficiency, and circadian rhythm patterns, although it provides indirect rather than physiological measures of sleep [6]. Other tools, such as sleep diaries and disease-specific questionnaires, may complement both subjective and objective assessments.

These instruments allow longitudinal monitoring of sleep behavior and may be particularly useful in patients with chronic inflammatory diseases, including spondyloarthritis [15].

(5) Impaired Sleep in Spondyloarthritis

• Pain, Stiffness, and Fatigue

Pain and inflammatory stiffness are consistently identified as major contributors to impaired sleep in patients with spondyloarthritis. Clinical studies demonstrate that nocturnal pain and prolonged morning stiffness interfere with sleep initiation and sleep maintenance, leading to frequent nocturnal awakenings and reduced sleep continuity, even in patients with early or moderate disease activity [16]. Fatigue is a core symptom of spondyloarthritis and represents an additional factor contributing to impaired sleep, particularly in axial disease. Reduced sleep quality has been associated with diminished physical function and lower cardiorespiratory fitness in patients with axial spondyloarthritis, indicating that sleep disturbance has measurable functional consequences beyond subjective discomfort [17].

Sleep disturbance and chronic pain exhibit a bidirectional relationship, whereby poor sleep increases pain sensitivity and lowers pain thresholds. Experimental and clinical evidence shows that sleep deficiency can exacerbate both peripheral and central pain sensitization, thereby perpetuating a cycle of pain and sleep disruption [18]. Persistent fatigue further amplifies this cycle by reducing physical activity and functional capacity, which may indirectly worsen sleep quality [24].

• Psychological Factors

Psychological distress, including anxiety and depressive symptoms, is common among patients with spondyloarthritis and has been independently associated with impaired sleep quality. Observational studies in axial spondyloarthritis demonstrate significant correlations between emotional state, sleep disturbance, and overall health-related quality of life, indicating that psychological factors contribute meaningfully to sleep impairment. Patients with active disease tend to report higher levels of anxiety, depressive symptoms, and sleep disturbance compared with those in remission, suggesting that psychological burden varies with disease activity [25].

Evidence further suggests that sleep disturbance may act as a mediator between psychological symptoms and reduced health-related quality of life in this population. Anxiety and depression may increase nocturnal arousal, thereby contributing to difficulties initiating and maintaining sleep, which in turn worsens perceived disease burden [6]. As a patient-reported outcome, sleep quality captures the combined impact of physical symptoms and emotional distress in spondyloarthritis, providing clinically meaningful information beyond objective disease measures [5].

• Comorbidities

Comorbid conditions play an important role in sleep

impairment among patients with spondyloarthritis [26]. Obesity is common in axial SpA and has been associated with higher disease activity, increased stiffness, and a greater number of comorbidities [27]. Obesity also increases the risk of sleep-disordered breathing, including obstructive sleep apnea. Inflammatory and metabolic mechanisms related to obesity may adversely affect sleep regulation and sleep quality, further contributing to sleep disturbance [28].

Several studies report a higher prevalence of obstructive sleep apnea in patients with ankylosing spondylitis compared with the general population, suggesting an additional contributor to fragmented and non-restorative sleep [29]. International consensus statements emphasize that obstructive sleep apnea is frequently underdiagnosed in patients with chronic inflammatory diseases and may significantly worsen fatigue and daytime dysfunction [30]. Beyond obesity, cardiometabolic and other comorbidities are common in spondyloarthritis and may further compromise sleep quality. Large multinational cohort studies demonstrate that comorbidities exert differential effects across sexes and disease subtypes, influencing symptom perception, functional outcomes, and sleep-related complaints [26].

(6) Clinical Considerations

Sleep quality represents a patient-centered outcome that captures aspects of disease burden not fully reflected by musculoskeletal manifestations alone. In rheumatologic diseases, impaired sleep has been shown to correlate with reduced quality of life, increased fatigue, and diminished daily functioning, underscoring its clinical relevance [5]. Studies in chronic inflammatory conditions indicate that sleep disturbance is common, persistent, and frequently underrecognized in routine clinical care, particularly beyond the initial diagnostic phase [6]. These findings support the inclusion of sleep quality as a relevant clinical domain in spondyloarthritis management.

Recognition of impaired sleep as an integral component of spondyloarthritis has important implications for comprehensive disease assessment. Sleep disturbance reflects the cumulative impact of pain, fatigue, emotional distress, and comorbidities, which may not be adequately captured by traditional disease activity indices alone [12]. Incorporating routine evaluation of sleep quality may facilitate a more holistic approach to disease management and improve the interpretation of patient-reported outcomes [10]. Considering sleep alongside physical symptoms and psychosocial factors may therefore enhance overall disease evaluation and patient-centered care in spondyloarthritis [13].

CONCLUSIONS

Sleep impairment is highly prevalent in patients with spondyloarthritis and is influenced by inflammatory mechanisms, pain, fatigue, psychological factors, and comorbid conditions.

Sleep quality represents a multidimensional construct that reflects both physiological and subjective aspects of health and is increasingly recognized as a meaningful patient-reported outcome. Subjective assessment tools remain central to evaluating sleep in this population. A comprehensive understanding of sleep quality may support more holistic disease assessment and contribute to improved quality of life in patients with spondyloarthritis.

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