

Correlation of Sleep Quality in Spondyloarthritis Patients and its Association with Disease Activity Parameters

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ABSTRACT

Background: Patients with chronic medical disorders are substantially more likely to have sleep related issues. Previously, various authors have reported sleep disruptions to be common in rheumatic diseases, although such sleep related issues in the spondyloarthropathies have not received much attention.

Aim: The present study was aimed to assess the effect of spondyloarthropathies on sleep quality and to see whether this effect is associated with disease activity.

Material and Methods: This cross-sectional study was conducted in the rheumatology clinic, King Khalid University Hospital, during the duration of two months. A total of 85 diagnosed cases of spondyloarthritis were included. All participants were interviewed regarding their Demographic details, disease duration, medications, treatment regimens and physical examination. Sleep disturbance was measured using Pittsburgh Sleep Quality Index (PSQI), the Insomnia Severity Index, and the Ankylosing Spondylitis Quality of Life scale. The intensity of disease activity was evaluated using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), and patient's functional status was evaluated using the Bath Ankylosing Spondylitis Functional Index (BASFI). Blood inflammatory markers like ESR levels and CRP levels were also calculated for each patient.

Results: Among the total 79 cases included, mean age of patients was 41.06±11.78 years, 40 (50.6%) were females, mean disease duration was 5 years. Diagnoses included Ankylosing spondylitis (48.10%), Psoriatic arthritis (43.04%), Undifferentiated spondyloarthropathy (6.33%) and IBD-related arthropathy (2.53%). Spondyloarthritis was observed to be associated with considerable impaired sleep quality on (PSQI) questionnaire. Six out of seven studied components came out to be worse and the only component which remained unaffected was "use of sleep Medication". A significant correlation was observed between disease severity and patients ESR and CRP levels, and a significant correlation was observed between BASDAI score and all seven sleep quality parameters and overall PSQI scores. Both BASDAI score and BASFI scores correlated significantly with each other and a significant correlation was observed between the functional status (BASFI score) and Six sleep quality parameters except for use of sleep medication.

Conclusion: We conclude that the sleep related problems were significantly higher in patients with spondyloarthritis and patients during active phase of disease had decreased sleep quality.

Keywords: spondyloarthropathies, sleep quality, disease activity, PSQI scores.

INTRODUCTION

Sleep related issues like difficulty falling asleep, staying asleep, and/or waking up early in the morning; are quiet prevalent, and it has been reported in 24–27% of the general population^{1,2}. Patients with chronic medical disorders are substantially more likely to have sleep related issues. Previously, various authors have reported sleep disruptions to be common in rheumatic diseases, although such sleep related issues in the spondyloarthropathies have not received much attention^{2,3}.

Spondyloarthritis is a broad term that describes different types of arthritis and comprises of a group of diseases which are characterized by inflammation in the spine ("spondylitis") and joints ("arthritis"). It includes a spectrum of disease such as Ankylosing spondylitis, Axial spondyloarthritis, Enteropathic spondyloarthritis, Peripheral spondyloarthritis, Psoriatic arthritis and Reactive arthritis. Both genetic and environmental factors are known to play an important role in its etiopathogenesis. The most common symptom is lower back pain, however it can also cause inflammation of the peripheral joints along with peri-articular inflammation, fatigue, eye related problems such as uveitis, and inflammatory bowel disease.

Spondyloarthropathies disease impact can lead to both structural and functional impairment in patients which consequently affects their quality of life⁵. Apart from the above mentioned problems, various sleep related issues such as decreased sleep quality, insomnia, difficulty waking up and obstructive sleep apnea syndrome may also be associated^{6,7}.

Inadequate sleep is affected by numerous factors, which includes the present disease status, and various behavioural and psychosocial factors. It's been claimed that sleep disturbances are linked to the active phase of the disease, which is marked by pain and a reduced physical activity⁸⁻¹⁰. Thus, sleep disturbances not only have a significant influence on a person's quality of life, but at the same time it can also lead to decreased concentration, inability to focus, decreased neurobehavioral functioning, and may lead to depression and anxiety¹¹⁻¹³. Presently, the pathophysiological mechanism behind such sleep disturbances in spondyloarthritis patients is still ill-defined and underreported. It could be partially explained by the ongoing inflammation of the lower back which leads to axial pain and stiffness during nocturnal hours, especially in the second half of the night.

However, our knowledge is still limited regarding the prevalence of sleep disturbances in spondyloarthritis patients and whether or not sleep disturbances are associated with disease severity. Hence, focusing on the significant adverse effects observed due to sleep disturbances on the clinical outcomes of patients, recognizing the associated factors related to poor sleep is a vital goal. Therefore, the present study was aimed to assess the effect of spondyloarthropathies on quality of sleep and to see whether this effect is associated with disease activity.

MATERIAL AND METHODS

In this cross-sectional study design we hypothesized that this study may indicate that spondyloarthropathies are associated with the sleep disturbances and poor quality of sleep, using standard methods in assessment of quality of sleep. This study was conducted in the rheumatology clinic, King Khalid University Hospital, during a two months duration. Ethical clearance from the concerned institutional committee was obtained prior to the commencement of the study. A total of 85 diagnosed cases of spondyloarthritis who were willing to participate were included in the present study. We excluded all those patients who refused to participate and those who has already been diagnosed with a co-existing sleep-related disease or were undertaking any kind of medication that might interfere with their sleep quality and pattern.

All the participants were interviewed regarding their Demographic details, disease duration, medications, treatment regimens and physical examination. All the collected data was documented for further reference. An informed consent was obtained from all the study subjects after explaining to them the study objectives.

Measurement Tools:

1. Sleep disturbance:

Pittsburgh Sleep Quality Index (PSQI): All subjects were asked to complete the Pittsburgh Sleep Quality Index (PSQI) questionnaire for the assessment of sleep quality. This includes 19 questions which helps in evaluation of sleep quality of the patient himself during the month preceding the evaluation. Seven components are thus obtained: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of hypnotics, and daytime dysfunction. All the seven components were scored from 0 (no difficulty) to 3 (severe difficulty). The obtained scores were summed up and an overall score was obtained. Overall, a total PSQI score ≥ 5 was considered as poor sleep quality score¹⁴.

The Insomnia Severity Index: The Insomnia Severity Index comprises of seven questions. The seven answers are added up to get a total score and a score between 8–14 were diagnosed with sub threshold insomnia, score between 15–21 as clinical insomnia (moderate severity) and score between 22–28 were diagnosed as clinical insomnia (severe)¹⁵.

The Ankylosing Spondylitis Quality of Life (ASQOL) Scale: this scale was used to assess the impact of ankylosing spondylitis (AS) on the quality of life of individuals. It comprises of 18 items and questions associated with factors like impact of pain on sleep, mood,

motivation, ability to cope, activities of daily living, independence, relationships and social life.

2. Disease activity: The intensity of disease activity was evaluated using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI). In this self-rated questionnaire patients had to answer 6 questions related to parameters like fatigue, spinal pain, joint pain/swelling, enthesitis, the duration of morning stiffness and the severity of morning stiffness.^{15,16}

3. Functional status: The patient’s functional status was evaluated using the Bath Ankylosing Spondylitis Functional Index (BASFI). In this self-administered index patients had to answer 10 questions, out of which first 8 questions assessed the functional limitations associated with the anatomical limitations, while the rest 2 questions evaluated patients’ ability to perform day to day activities^{17,18}.

4. Laboratory investigations included Routine blood examination, ESR levels and CRP levels for each patient.

Statistical analysis: The relevant data was collected for each patient and descriptive statistics were applied for assessing various parameters associated with the disease. Data are expressed as frequency, mean, Median and Interquartile Range. Statistical analysis was performed using SPSS version 21.0 and $P < 0.05$ was the accepted level of significance. The correlation between sleep and the other disease activity parameters were examined with Spearman rank correlation analysis.

RESULTS

A total of 85 spondyloarthritis patients, who consented to be part of the study were included and out of those 79 (92.9%) patients completed the questionnaires, while 6 patients were no longer interested in the study. Demographic/General characteristics of all patients are detailed in Table 1.

Table 1: Demographics And General Characteristics Of Study Participants

Characteristics	Frequency	Percent
Age (in years)		
≤ 30	15	19.0
31-40	25	31.6
41-50	19	24.1
> 50	20	25.3
Mean Age \pm SD	41.06 \pm 11.78	
Gender		
F	40	50.6
M	39	49.4
Mean duration of illness	5 years	
Type		
Ankylosing spondylitis	38	48.10
Psoriatic arthritis	34	43.04
Undifferentiated spondyloarthropathy	5	6.33
IBD-related arthropathy	2	2.53
Total	79	100

Among the total 79 patients included, mean age was 41.06 \pm 11.78 years, with a majority of patients in the age range of 31-40 years (31.6%) and lower percentage observed below 30 years of age (19%). Among the study population 40 (50.6%) were females while 39 (49.4%)

patients were males. Mean disease duration was 5 years. Clinically, 79 spondyloarthritis diagnoses varied, majority were diagnosed as Ankylosing spondylitis (48.10%) followed by Psoriatic arthritis (43.04%), Undifferentiated spondyloarthropathy (6.33%) and least cases of IBD-related arthropathy (2.53%). The collected clinical characteristics are described in table 2.

Table 2: Clinical Characteristics Of Study Participants

Parameters	Frequency	Median	IQR	Minimum	Maximum
Height	79	165	(158.00 - 172.00)	149	183
Weight	79	72	(63.00-84.00)	47	155
ESR level	76	25.5	(13.00-43.75)	2	115
CRP level	76	2	(1.00-4.00)	0	142

Data expressed as Median and Interquartile Range

Sleep Disturbance Parameters: An overall score of 10 (with a minimum score of 5 and a maximum score of 13) was observed on Pittsburgh Sleep Quality Index (PSQI) questionnaire for the assessment of sleep quality. Therefore, Spondyloarthritis was observed to be associated with considerable impaired sleep quality as a total score above 5 is associated with a poor sleep quality. Furthermore, as we assessed seven different components of sleep, we observed that in our patients six out of seven studied components came out to be worse. Among those components sleep latency, sleep efficiency and sleep disturbances were quiet affected with a median score of 2 for each component on PSQI, while subjective sleep quality, sleep duration and daytime dysfunction scored a median score of 1 on PSQI. The only component which remained unaffected according to our data was “use of sleep Medication”. (Table 3)

Table 3: Sleeping Pattern, Basdia Score, Basfi Score And Insomnia Severity Index Among Study Participants

Parameters	Frequency	Median	IQR	Minimum	Maximum
BASDAI score	79	5	(3.00-6.00)	0	8
BASFI score	79	3	(1.00-5.00)	0	8
Subjective Sleep Quality	79	1	(1.00-1.00)	0	3
Sleep Latency	79	2	(1.00-3.00)	0	6
Sleep Duration	79	1	(1.00-2.00)	0	3
Sleep Efficiency	79	2	(0.00-3.00)	0	3
Sleep Disturbance	79	2	(1.00-2.00)	0	3
Use of Sleep Medication	79	0	(0.00-0.00)	0	3
Daytime Dysfunction	79	1	(1.00-2.00)	0	4
OVERALL	79	10	(5.00-13.00)	0	19
Insomnia Severity Index	79	13	(7.00-17.00)	0	22

Data are expressed as Median and Interquartile Range

Disease activity and functional status: The median Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) score observed in the present study was 5 (Interquartile Range-IQR of 3.00-6.00; minimum score 0 and maximum of score 8) which suggested an active disease (any score ≥ 4) in the patients studied. On detailed Spearman rank correlation analysis, we observed that BASDAI scores revealed no statistically significant correlation with age, height, weight and disease duration. Although a significant correlation was observed between disease severity and patients ESR and CRP levels ($p < 0.05$). Furthermore, a significant correlation was observed between BASDAI score and all seven sleep quality parameters; “subjective sleep quality” ($r = 0.550, p < 0.01$), “sleep latency” ($r = 0.399, p < 0.001$), “sleep duration” ($r = 0.482, p < 0.001$), “sleep efficiency” ($r = 0.496, p < 0.001$), “sleep disturbances” ($r = 0.425, p < 0.001$), “use of sleep medication” ($r = 0.361, p = 0.001$) and “daytime dysfunction” ($r = 0.328, p = 0.003$), and overall PSQI scores ($r = 0.685, p < 0.001$).

The median Bath Ankylosing Spondylitis Functional Index (BASFI) score observed was 3 (IQR of 1.00-5.00; minimum score 0 and maximum of score 8) and the median Insomnia Severity Index was 13, with Interquartile Range (IQR) of 7.00-17.00. On Spearman rank correlation analysis, we observed that BASFI scores revealed no statistically significant correlation with age, height, weight, disease duration, ESR and CRP levels. Both BASDAI score and BASFI scores correlated significantly with each

other ($r = 0.736, p < 0.001$). Additionally, a significant correlation was observed between the functional status (BASFI score) and Six sleep quality parameters; “subjective sleep quality” ($r = 0.499, p < 0.01$), “sleep latency” ($r = 0.485, p < 0.001$), “sleep duration” ($r = 0.438, p < 0.001$), “sleep efficiency” ($r = 0.382, p < 0.001$), “sleep disturbances” ($r = 0.411, p < 0.001$), and “daytime dysfunction” ($r = 0.260, p = 0.001$), and overall PSQI scores ($r = 0.685, p < 0.001$) while statistically non significant correlation was observed for “use of sleep medication” ($r = 0.149, p = 0.190$).

DISCUSSION

The present prospective, cross-sectional study was aimed to assess the effect of spondyloarthropathies on quality of sleep and to see whether this effect is associated with disease activity. From our result we demonstrated that the diagnoses of spondyloarthropathies were significantly associated with sleep disturbances. Not only this, we also addressed the individual components of PSQI (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of sleep medications, daytime dysfunction) and which components of sleep quality have been affected in such patients. A significant association of sleep disturbances was also observed with disease activity and inflammatory state as well. The overall PSQI scores observed in our study population were

observed to be significantly correlated with both increasing BASDAI scores and BASFI scores.

The association of physical, demographic and psychological factors correlating with poor sleep was explored, and the effectiveness of interventions assessed by Leverment S et al in their review. They suggested that disturbed sleep is a significant aspect of disease burden on patients and relates with the severity of disease activity, along with other clinical parameters such as pain, fatigue and functional disability. Nevertheless, the relationship is still undetermined. They observed 35–90% of patients presented with disturbed sleep associated with axial spondyloarthritis and is more prevalent within this clinical population. Associations with age, gender, years spent in education, quality of life and depression have also been demonstrated¹⁹.

Various other authors like Aydin E et al²⁰, Hakkou J et al.²¹, Ward MM et al.²² and Gunaydin R et al²³ reported an incidence of altered sleep pattern of 58.1%, 64.5%, 54% and 54.8% respectively in ankylosing spondylitis patients. Da Costa et al. in their attempt to characterize sleep complaints and identify bio-psychosocial factors associated with sleep problems in patients with spondyloarthropathies (SpA), reported an incidence of 69% sleep problems in such patients²⁴. Li Y et al also reported similar findings suggesting that sleep quality of Ankylosing Spondylitis patients is closely related to disease activity²⁵.

We observed that in our patients six out of seven studied components naming “subjective sleep quality”, “sleep latency”, “sleep duration”, “sleep efficiency”, “sleep disturbances” and “daytime dysfunction” were worse on PSQI and the only component which remained unaffected according to our data was use of Sleep Medication. In addition, a significant correlation was observed between BASDAI score and all seven sleep quality parameters and overall PSQI scores. While a significant correlation was observed between the functional status (BASFI score) and six out of seven sleep quality parameters except with “use of sleep medication” which suggests a positive correlation between the disease activity and sleep disturbances. In similarity, Da Costa et al. also reported poor functional status in association with poorer sleep quality, longer sleep latency, shorter sleep duration and poorer sleep efficiency. In addition, greater depressed mood scores demonstrated to be a significant determinant of poorer sleep quality, shorter sleep duration and poorer sleep efficiency in their study²⁴.

Added to all these findings, we observed that BASDAI scores revealed a significant correlation between disease severity and patients ESR and CRP levels. These findings suggest that disease activity and inflammation are closely related which affect both the sleep quality and functional ability of the patient. A number of substantiation from literature suggests that poor sleep quality is associated with inflammatory responses which are depicted as increased CRP level in such patients²⁶⁻²⁸. Okun et al. in their study reported that high CRP levels related directly with the poor sleep continuity and quality. Similarly, Lee et al. in their study on rheumatoid arthritis patients, observed that CRP levels were strongly correlated with the pain threshold²⁹. Hence, we can suppose that CRP levels might affect the sleep quality by means of decreased pain threshold.

Regardless of such remarkable association of the inflammatory blood markers (CRP/ESR) this association still remains questionable in literature chiefly due to uncertain nature of ESR/CRP to precisely reveal the disease activity within the study population³⁰.

We observed that both BASFI scores depicting the functional ability correlated significantly with overall PSQI sleep scores. Similarly, Abdulaziez O et al also found a similar relationship between decreased sleep and patient mobility³¹. Yet on the contrary, Batmaz et al. observed no correlation between total sleep scores and BASFI³².

The objective of treatment protocols includes control of symptoms and inflammation, to prevent deformities and impairment and enhance the quality of life. Nonsteroidal anti-inflammatory drugs are the first-line treatment in patients with axial involvement, whereas Tumor Necrosis Factors inhibitors agents are preferred in patients with persistently high disease activity despite conventional treatment.

CONCLUSION

From our observations we conclude that sleep related problems were significantly higher in patients with spondyloarthritis and those with active disease had decreased sleep quality. Additionally, a significant correlation was observed with disease activity and various parameters of PSQI. Hence, appropriate management techniques and routine assessments of the disease can help in improving sleep and the overall quality of life.

Conflict of Interest: None

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