



Sleep quality among patients with chronic musculoskeletal disorders at Nghe An Provincial Friendship General Hospital

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ABSTRACT

Objective: To describe the sleep quality and identify selected factors associated with sleep quality among patients with chronic musculoskeletal disorders at Nghe An Provincial Friendship General Hospital in 2025. **Methods:** A cross-sectional descriptive study was conducted among 298 inpatients aged ≥ 18 years who were diagnosed with chronic musculoskeletal diseases (osteoarthritis, rheumatoid arthritis, gout, osteoporosis, ankylosing spondylitis, and systemic lupus erythematosus). Data were collected from March to August 2025 using a structured questionnaire covering general characteristics, the Pittsburgh Sleep Quality Index (PSQI), and the Visual Analog Scale (VAS) for pain. Multiple linear regression analysis was performed to determine factors associated with sleep quality. **Results:** The mean PSQI score was 10.88 ± 3.96 (range: 2–20), and 82.2% of patients had poor sleep quality. Mean sleep duration was 5.43 ± 1.07 hours, and habitual sleep efficiency was $68.98 \pm 16.83\%$. The mean pain score on the VAS was 5.99 ± 2.18 , with 55.0% of patients reporting severe pain. Regression analysis showed that pain intensity within the previous 24 hours ($\beta = 0.292$; $p < 0.05$) and income ($\beta = -0.366$; $p < 0.05$) were statistically significant predictors of sleep quality; the model explained 43.5% of the variance in PSQI scores (adjusted $R^2 = 0.435$). **Conclusion:** Sleep quality among patients with chronic musculoskeletal disorders was markedly poor and was primarily influenced by pain and socioeconomic conditions. Multimodal pain management, strengthened rehabilitation, and psychological support are recommended, with particular attention to low-income patients. Integrating routine sleep screening using the PSQI into clinical practice is necessary for early detection and timely intervention, thereby contributing to improved patient quality of life.

Keywords: Sleep quality; Chronic musculoskeletal disorders; Pain; PSQI; VAS

INTRODUCTION

Sleep is an essential physiological need and plays a critical role in maintaining health, restoring energy, and supporting bodily functional recovery. Poor sleep

quality not only impairs physical well-being but also adversely affects mental health and treatment outcomes. In particular, sleep disturbances among individuals with chronic diseases may exacerbate persistent fatigue,

contribute to psychological disturbances, and reduce recovery capacity ¹.

Assessing sleep quality provides an important basis for early detection of related problems and for implementing appropriate interventions. Whale and Gooberman-Hill (2022) emphasized that high-quality sleep supports comprehensive care, improves symptom control, and strengthens patients' relationships with both family members and healthcare providers ² Similarly, Dos Santos et al ³ (2023) reported a close association between sleep quality and central nervous system stability in patients with chronic musculoskeletal disorders, indicating that good sleep not only facilitates physical recovery but also improves psychological status, thereby enhancing treatment effectiveness, increasing satisfaction, and reducing caregiving burden.

Nevertheless, existing evidence suggests that sleep quality among patients with musculoskeletal disorders remains a noteworthy concern, with high rates of sleep disturbance reported across various settings. In India, a study of 176 patients with rheumatoid arthritis found that 74.0% experienced poor sleep; the prevalence of moderate and severe insomnia was 42.0% and 27.3%, respectively ⁴. In Viet Nam, Nguyen Thi Hoa et.al ⁵ reported that 76.7% of patients with knee osteoarthritis had sleep disturbances; the two most common manifestations were insomnia and middle-of-the-night sleep disruption, with rates of 94.4% and 83.1%, respectively.

As a tertiary referral hospital for the North Central region, Nghe An Provincial Friendship General Hospital receives and treats a large number of patients with chronic musculoskeletal disorders. However, institutional evidence on sleep quality in

this patient group remains limited and is insufficient to systematically characterize the current situation and associated factors within the local clinical context. Therefore, investigating sleep quality and its related factors at the hospital is of both scientific and practical significance: it contributes to the evidence base and provides a foundation for designing comprehensive interventions/care programs to optimize treatment outcomes and reduce burdens for both patients and healthcare staff. Accordingly, this study aimed to describe sleep quality and to identify selected factors associated with sleep quality among patients with chronic musculoskeletal disorders at Nghe An Provincial Friendship General Hospital in 2025.

SUBJECTS AND METHODS

Study participants: The study population comprised inpatients diagnosed with chronic musculoskeletal disorders who were receiving treatment at Nghe An Provincial Friendship General Hospital.

Inclusion criteria: Participants were aged ≥ 18 years, had sufficient cognitive capacity to participate, and provided informed consent.

Exclusion criteria: Patients with severe comorbid conditions (neurological, cardiovascular, or psychiatric disorders), those with substance dependence, or those using substances that may affect sleep were excluded.

Study setting and period: The study was conducted at the Department of Musculoskeletal Disorders, Nghe An Provincial Friendship General Hospital, from March 2025 to August 2025.

Study design: A cross-sectional descriptive study design was employed.

Sample size: The sample size was calculated using the standard formula for estimating a single proportion:

$$n = Z_{1-\alpha/2}^2 \frac{p \cdot q}{d^2}$$

where: n is the number of research subjects.

$Z_{(1-\alpha/2)} = 1.96$ ($\alpha = 0.05$, 95% confidence level).

p: Estimated proportion of patients with good sleep quality, $p = 0.233$ (According to the study by Nguyen Thi Hoa et al ⁵, 2024).

$d = 0.05$ (this is the desired error)

The calculated minimum sample size was 271. In practice, 298 participants were recruited to allow for an additional 10% non-response/refusal rate.

Sampling method: Convenient sampling was used.

Data collection procedure: Eligible participants were recruited from patients hospitalized in the Department of Musculoskeletal Disorders during the study period, meeting the predefined inclusion and exclusion criteria. Prior to data collection, the study objectives were explained to participants, and detailed instructions were provided on completing the PSQI questionnaire and the VAS pain scale to ensure accurate understanding and responses.

Data collection instruments:

A structured instrument consisting of three sections was used:

Section A: Demographic and clinical information. This section collected data on age, sex, educational level, occupation, income, living arrangement, clinical diagnosis of musculoskeletal disease,

disease severity (e.g., stage and seriousness), current treatment modalities (medications, surgery, physiotherapy/rehabilitation), current psychological status (anxiety, depression), and lifestyle-related factors (habits, diet, and work patterns).

Section B: Pittsburgh Sleep Quality Index (PSQI). The PSQI, developed by Buysse et al ⁶ (1989), is widely used to assess sleep quality over the preceding month. The tool includes 19 self-reported items capturing major sleep domains such as sleep latency and duration, difficulty initiating sleep, nocturnal awakenings, daytime dysfunction, use of sedative/sleep medications, and sleep-related disturbances. In the original study, the PSQI demonstrated good internal consistency (Cronbach's $\alpha = 0.83$). The global PSQI score is computed by summing seven component scores (total range 0–21), with higher scores indicating worse sleep quality. In this study, PSQI was categorized as: good sleep (0–5), moderate sleep (6–10), and poor sleep (≥ 11).

Section C: Visual Analog Scale (VAS) for pain. The VAS was used to assess current pain intensity via a single self-report item on a 0–10 scale, where 0 indicates “no pain” and 10 indicates “worst pain imaginable/tolerable.” The VAS is simple, clinically feasible, and has demonstrated high reliability (Cronbach's $\alpha = 0.95$ in the original study). Pain intensity was classified as mild (0–3), moderate (4–6), and severe (7–10).

Data analysis:

Collected data were checked for completeness, cleaned, coded, entered, and analyzed using SPSS to ensure accuracy. Descriptive statistics were reported as frequencies, percentages,

means, and standard deviations. Between-group comparisons were conducted using appropriate tests depending on distributional assumptions and variable types, including the t-test, ANOVA, Mann–Whitney U test, and Kruskal–Wallis test. Associations between continuous variables were examined using Pearson or Spearman correlation as appropriate. Finally, linear regression analysis was applied to identify factors associated with sleep quality (PSQI score).

RESULT

Table 1. Demographic characteristics of the study participants (n = 298)

Characteristic		n	%
Age	18-59	86	28.86
	≥ 60	212	71.14
	Mean ± SD: 64.06 ± 11.75		
Gender	Male	133	44.6
	Female	165	55.4
Educational level	Primary school	25	8.4
	secondary school	151	50.7
	High school	99	33.2
	Vocational/college or higher	23	7.7
Occupation	Worker	24	8.1
	Civil servant	6	2
	Farmer	194	65.1
	Self-employed/business	26	8.7
	Other (housewife, small trading, etc.)	48	16.1
Income	Under 5 million VND	59	19.8
	5 million - 10 million VND	81	27.2
	Over 10 million VND	47	15.8
	No stable income	111	37.2
Living arrangement	alone	8	2.7
	Living with family	277	93
	Living with friends	13	4.4

Ethical considerations: Participants were fully informed about the study objectives and procedures. Participation was entirely voluntary, and all personal information was kept strictly confidential in accordance with regulations approved by the Ethics Committee (Approval No. 587/GCN–HDDD). Throughout participation, patients received timely support and counseling when needed, and were assured of no harm in physical, psychological, or social domains.

The mean age was 64.06 ± 11.75 years; participants aged ≥ 60 accounted for the majority (71.14%). Females outnumbered males (55.4% vs. 44.6%). Most participants had lower/upper secondary education (83.9%). In terms of occupation and economic status, farmers constituted the largest group (65.1%); nearly 40% reported having no stable income, and most lived with family members (93.0%).

Table 2. Mean sleep quality scores of the study participants (n = 298)

	Mean \pm SD	Min-Max
Global PSQI score	10.88 \pm 3.96	2-20
Subjective sleep quality	1.34 \pm 0.96	0-3
Sleep latency (time to fall asleep)	3.08 \pm 1.26	0-5
Sleep duration (hours)	5.43 \pm 1.07	3-7.58
Component scores		
The effectiveness of sleep habits	68.98 \pm 16.83	31.85-98.78
Sleep disturbances	1.7 \pm 1.01	0-3
Use of sleep medication	0.61 \pm 0.95	0-3
Daytime dysfunction	1.86 \pm 1.07	0-3

The mean global PSQI score was 10.88 ± 3.96 (range: 2–20). Component-level results indicated a mean sleep duration of 5.43 ± 1.07 hours and a habitual sleep efficiency of $68.98 \pm 16.83\%$, whereas sleep disturbances, use of sleep medication, and daytime dysfunction were generally in the low-to-moderate range.

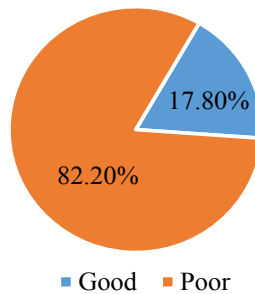


Figure 1. Classification of sleep quality (n = 298)

Most participants were classified as having poor sleep quality (82.2%), while 17.8% were rated as having good sleep quality.

Table 3. Pain intensity according to the VAS (n = 298)

	Pain level	n	%
Within 24 hours	Mild pain (0-3 points)	49	16.4
	Moderate pain (4-6 points)	85	28.5
	Severe pain (7-10 points)	164	55

Among 298 participants, more than half (55.0%) self-reported severe pain, whereas only 16.4% reported mild pain on the VAS

Table 4. Model fit indices and ANOVA test for the linear regression model (n = 298)

Model	R	R ²	Adjusted R ²	F (df1, df2)	p
	0.617	0.45	0.435	29,544 (8, 289)*	< 0.05

Note: Df1 = 8 (8 independent variables); Df2 = 289 (residual degrees of freedom).

The multiple linear regression model showed a moderate fit (R = 0.617; R² = 0.450; adjusted R² = 0.435), indicating that the predictors explained approximately 43.5% of the variance in PSQI scores. The F-test confirmed that the model was statistically significant (F(8,289) = 29.544; p < 0.05), supporting its adequacy for examining factors associated with sleep quality.

Table 5. Regression coefficients of the model (n = 298)

Model	B (unstandardized)	β (standardized)	p
Constant	15.159		
Age	-0.632	-0.073	> 0.05
Occupation	-0.335	-0.038	> 0.05
Income	-3.967	-0.366	<0.05
Stage of the disease	0.217	0.606	> 0.05
Treatment modality	-0.265	-0.662	> 0.05
Participation in physical exercise/sports	-0.666	-0.083	> 0.05
Heavy workload	0.495	-0.53	> 0.05
Pain intensity (past 24 h)	1.53	0.292	<0.05

Multiple linear regression identified two statistically significant factors associated with PSQI scores (p < 0.05): income and pain intensity within the past 24 hours. Specifically, income had a negative regression coefficient (B = -3.967; β = -0.366), suggesting that higher income (as coded) was associated with lower PSQI scores (i.e., better sleep quality). In contrast, pain intensity over the past 24 hours had a positive coefficient (B = 1.53; β = 0.292), indicating that for each 1-point increase in VAS pain score, the PSQI score increased by an average of 1.53 points, reflecting poorer sleep quality. The regression equation was: PSQI Score (sleep quality) = 15.159 - 3.967 x (Income) + 1.53 x (Pain intensity in the past 24 h).

DISCUSSION

The findings of this study indicate that sleep quality among patients with chronic musculoskeletal disorders remains a matter of considerable concern. The mean global PSQI score was 10.88 ± 3.96 , and 82.2% of patients were classified as having poor sleep quality, whereas only 17.8% were categorized as having good sleep. These results suggest that sleep disturbances are prevalent and clinically meaningful in this patient group, potentially exerting detrimental effects on recovery processes, daytime functioning, and overall treatment effectiveness.

Our findings are consistent with both national and international evidence. Specifically, Nguyen Thi Hong et al ⁵ (2021) reported that most patients with ankylosing spondylitis had poor sleep quality, which was closely associated with pain intensity and occupational characteristics. Similarly, a study conducted in Hai Duong among hospitalized cancer patients documented a high prevalence of sleep disturbances, implying that poor sleep may be common across multiple chronic disease populations ⁷. Internationally, recent studies by Gouda et al ⁸ (2023), Abeler et al ⁹ (2021), Juárez-Rojop et al ¹⁰ (2023), and Kozłowska et al ¹¹ (2025) have consistently shown that the prevalence of poor sleep quality exceeds 60% among musculoskeletal patient populations, reinforcing the view that sleep disturbances are a widespread issue and should be prioritized in comprehensive care.

The high prevalence of poor sleep quality in patients with chronic musculoskeletal disorders may be explained by a multifactorial mechanism, in which the interaction among chronic pain, mobility limitations, and psychological problems

is particularly prominent. Persistent pain especially nocturnal pain, can increase awakenings, shorten total sleep time, and reduce sleep efficiency. Conversely, fragmented or poor-quality sleep may heighten pain sensitivity and diminish physical recovery capacity, creating a detrimental “pain–insomnia” vicious cycle. Beyond biological factors, limited access to supportive interventions (e.g., rehabilitation/physiotherapy, psychological counseling, and sleep hygiene guidance) may contribute to the persistence of sleep problems and reduce the effectiveness of interventions. This interpretation is consistent with previous evidence: Grabovac et al ¹² (2018) and Szady et al ¹³ (2017) both emphasized pain and disease activity as key predictors of sleep quality in patients with arthritis.

In addition, the present study found that poor sleep quality was significantly associated with pain intensity and income level, with markedly higher rates of poor sleep among patients experiencing more severe pain and those with lower income. This is consistent with evidence indicating that pain and disease activity are key determinants of sleep quality, and that patients with higher pain levels often exhibit worse PSQI scores and more severe fatigue; moreover, the association among disease activity, pain, and sleep appears to be linear. Regarding socioeconomic factors, multiple studies across diverse contexts have also identified low income as an important predictor of poor sleep, relatively independent of disease stage or geographic differences. Therefore, interventions to improve sleep should adopt a comprehensive approach, integrating pain/disease activity control while addressing socioeconomic barriers.

The study findings indicate that poor sleep quality among patients with chronic musculoskeletal disorders is significantly associated with pain intensity and income, with markedly higher rates of poor sleep observed among those experiencing more severe pain and those with lower income. This finding is consistent with evidence showing that pain and disease activity are key determinants of sleep quality¹²; patients with greater pain severity tend to have poorer PSQI scores and more pronounced fatigue¹³; and the relationship among disease activity, pain, and sleep is linear¹⁴. From a socioeconomic perspective, multiple studies conducted in different contexts have also identified low income as an important predictor of poor sleep, relatively independent of disease stage or geographic differences.^[10,15] Therefore, interventions to improve sleep should adopt a comprehensive approach that integrates pain/disease activity control while also addressing socioeconomic barriers.

The associations observed in this study may be explained by the “pain–sleep” vicious cycle, whereby chronic pain disrupts sleep initiation and maintenance, while poor sleep, in turn, increases pain sensitivity, resulting in functional decline and persistent fatigue. In parallel, socioeconomic disadvantage constrains access to comprehensive interventions (rehabilitation/physiotherapy, psychological counseling, and disease-management programs) and heightens stress, thereby exacerbating sleep disturbances. The interplay between biological and social determinants thus poses a substantial challenge to improving sleep among patients with chronic musculoskeletal disorders.

Accordingly, efforts to enhance sleep should adopt a multimodal approach, prioritizing pain management through

a combination of pharmacotherapy, rehabilitation/physiotherapy, and psychological interventions such as cognitive behavioral therapy, while also strengthening socioeconomic support for low-income patients and integrating routine screening for fatigue, depression, and anxiety. Future research should develop predictive models based on pain severity, disease activity, and socioeconomic conditions to facilitate flexible and individualized intervention design.

LIMITATIONS: Because of its cross-sectional design, this study can only identify associations and cannot establish causality. Convenience sampling, self-reported measures, and implementation at a single hospital may introduce selection and information bias and limit the generalizability of findings to other institutions or regions.

CONCLUSION

This study demonstrates that sleep quality among patients with chronic musculoskeletal disorders at Nghe An Provincial Friendship General Hospital is at a concerning level, with a large proportion of patients exhibiting PSQI scores indicative of poor sleep. Regression analysis identified pain intensity within the past 24 hours and income as two statistically significant factors associated with sleep quality: higher pain levels worsened sleep, whereas higher income tended to be associated with improved sleep. These findings underscore the central role of pain symptom control and socioeconomic factors in sleep management for patients with chronic musculoskeletal disorders.

RECOMMENDATIONS: Based on the study findings, we recommend: (1) multimodal pain management (medication

+ rehabilitation/physiotherapy + relaxation techniques), with particular emphasis on controlling nocturnal pain, to improve sleep; (2) integrating routine screening using the PSQI together with VAS pain assessment into standard care to enable early detection and timely intervention for sleep disturbances; (3) health counseling and education on sleep hygiene and self-management of pain/fatigue for patients with chronic musculoskeletal disorders; and (4) prioritizing support for low-income patients (linkage to social work services/insurance/hospital resources) to reduce barriers to accessing treatment and rehabilitation.

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