

SYSTEMATIC REVIEW

The impact of sleep hygiene on pain management in patients diagnosed with fibromyalgia: systematic review

El impacto de la higiene del sueño en el manejo del dolor en pacientes diagnosticados con fibromialgia: revisión sistemática

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ABSTRACT

Introduction: pain is a personal and subjective experience that can only be described by the patient, especially for those with fibromyalgia. While much is known about the key role of sleep in optimizing many functions, little has been explored regarding how it modulates pain perception. A bidirectional relationship between pain perception and sleep disturbances has been documented. This paper focuses on reviewing research on the relationship between sleep and pain perception specifically in patients diagnosed with fibromyalgia.

Method: a systematic review of published studies was conducted on the relationship between sleep disorders or poor sleep hygiene and pain perception in adult patients (18-65 years) diagnosed with fibromyalgia. The literature search was conducted in databases such as PubMed, MEDLINE and Scopus.

Results: the results show that implementing strategies to improve sleep hygiene can reduce pain intensity and enhance the quality of life of patients. Additionally, it was observed that the lack of restorative sleep exacerbates fatigue symptoms and negatively affects cognitive and emotional functioning.

Conclusión: the systematic review suggests that improving sleep hygiene is an effective intervention for managing pain in fibromyalgia patients. Incorporating healthy sleep habits into treatment could alleviate symptoms and optimize the clinical management of this condition, thus improving the quality of life.

Keywords: Sleep Disturbances; Fibromyalgia; Pain; Pain Perception; Quality of Life; Fatigue.

RESUMEN

Introducción: el dolor es una experiencia personal y subjetiva que solo puede ser descrita por el mismo paciente, especialmente para aquellos con fibromialgia. Aunque se sabe mucho sobre el papel clave del sueño en la optimización de muchas funciones, se ha profundizado poco en cómo este modula la percepción del dolor. Se ha documentado una relación bidireccional entre la percepción del dolor y los trastornos del sueño. Este trabajo se centra en revisar investigaciones sobre la relación del sueño y la percepción del dolor específicamente en pacientes diagnosticados con fibromialgia.

Método: se realizó una revisión sistemática de estudios publicados sobre la relación entre los trastornos del sueño o la mala higiene del sueño y la percepción del dolor en pacientes adultos (18-65 años) diagnosticados con fibromialgia. La búsqueda de artículos se llevó a cabo en bases de datos como PubMed, MEDLINE y Scopus.

Resultados: los resultados muestran que la implementación de estrategias de mejora de la higiene del sueño puede reducir la intensidad del dolor y mejorar la calidad de vida de los pacientes. Además, se observó que la falta de sueño reparador exacerba los síntomas de fatiga y afecta negativamente el funcionamiento cognitivo y emocional.

Conclusión: la revisión sistemática sugiere que la mejora de la higiene del sueño es una intervención eficaz para el manejo del dolor en pacientes con fibromialgia. La inclusión de hábitos saludables de sueño en el tratamiento podría aliviar los síntomas y optimizar el manejo clínico de esta condición, mejorando así la calidad de vida.

Palabras clave: Trastornos del Sueño; Fibromialgia; Dolor; Percepción del Dolor; Calidad de Vida; Fatiga.

INTRODUCTION

Much is known about sleep's key role in optimizing many functions, such as cognition, metabolism, immunity, and emotional stability. Still, little has been explored about how it modulates pain perception. Pain is a personal and subjective experience that the patient can only describe. A bidirectional relationship between pain perception and sleep disorders has been documented. This paper focuses on reviewing research on the relationship between sleep and pain perception, specifically in patients diagnosed with fibromyalgia.

Fibromyalgia (FM) is a chronic functional disease that affects people worldwide and is mainly characterized by widespread pain, persistent fatigue, and sleep disorders that significantly impact patients' quality of life. In addition to pain, patients with fibromyalgia may experience increased sensitivity at specific points known as trigger points or tender points, as well as cognitive problems, anxiety, and depression. Although the exact cause of FM is not fully understood, it is believed to involve a combination of genetic, neurobiological, and environmental factors. Fibromyalgia mainly affects women, being more common between the ages of 30 and 65, although it can occur in both sexes and a wider age range.

The diagnosis of fibromyalgia is often a complex process based primarily on clinical evaluation, as there are no specific laboratory tests to confirm it. The 1990 American College of Rheumatology (ACR) diagnostic criteria, modified in 2010, include widespread pain for at least three months and tenderness in at least 11 of the 18 defined points (ACR). In addition, the diagnostic process involves ruling out other possible causes of the symptoms, such as autoimmune and sleep disorders.

According to participant reports, the most common sleep disorders include difficulty staying asleep and problems falling asleep, which contributes to a continuous feeling of sleep deprivation.^(1,2) This phenomenon is more intense among FM patients, who identify poor sleep quality as one of the symptoms with the greatest impact on fatigue, pain, cognitive functioning, and their ability to manage daily symptoms.^(1,2) Micro-awakenings or interrupted sleep are particularly common and affect the continuity of rest, interrupting deep sleep and specifically affecting delta waves on the electroencephalogram (EEG). This was mentioned by ⁽³⁾ who found that the intrusion of alpha waves during deep sleep is common in patients with fibromyalgia, contributing to a feeling of continuous sleep deprivation.

Pain makes restful sleep difficult, and lack of restful sleep increases the intensity of pain the following day, creating a vicious cycle that perpetuates fatigue and makes it difficult to rest at night.^(1,2) Participants have reported that pain and muscle cramps can prevent them from falling asleep and finding a comfortable resting position.^(1,2) This bidirectional relationship between sleep and pain underscores the importance of addressing sleep quality in the comprehensive management of fibromyalgia. Improving sleep quality can reduce pain intensity, improve functional capacity and quality of life, and enhance the positive effects of other therapeutic strategies used in the treatment of FM.

Neurotransmitters such as serotonin, dopamine, norepinephrine, and melatonin are essential in regulating pain, mood, and energy. In patients with fibromyalgia, decreased levels of these neurotransmitters are associated with increased pain sensitivity and greater difficulty in managing fatigue. Serotonin and melatonin, in particular, are crucial for regulating sleep and mood. However, the studies reviewed do not specifically describe how these neurotransmitters are affected by poor sleep, although they do mention that poor sleep indirectly influences their function. These neurotransmitters also act as natural opioids, helping to reduce pain perception and contributing to a general sense of well-being.

Various sleep quality management strategies have been developed in response to these challenges among people diagnosed with FM. These strategies include the occasional use of sleep medications, although some participants are reluctant due to side effects and the perceived low effectiveness of these treatments.^(1,2) Managing the daytime impact of a poor night's sleep is also crucial, with daytime rest emerging as a common strategy to mitigate extreme fatigue and enable daily activities to be carried.^(1,2)

In this context, the present study focuses on exploring the fundamental role of sleep hygiene as a potentially effective intervention for improving the quality of life of patients with FM in Buenos Aires, Argentina. Through a critical review of the existing literature, we aim to identify and analyze best practices in sleep hygiene that could benefit this specific population, thereby contributing to optimizing clinical management strategies and improving health outcomes.

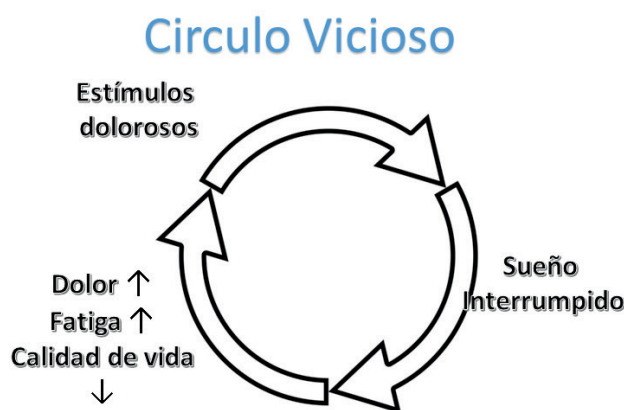


Figure 1. The vicious circle of pain

However, the question remains of how improving sleep hygiene directly impacts pain perception. This uncertainty is the starting point for this study, which seeks to review the existing literature to identify which sleep hygiene practices are most effective in reducing pain perception and improving the quality of life in patients diagnosed with FM. Hypothesis: Better sleep hygiene mitigates fatigue and consequently decreases pain perception in patients diagnosed with fibromyalgia, reducing pain intensity and the frequency of painful episodes.

Primary objective

To evaluate the effectiveness of sleep hygiene interventions as part of essential treatment for pain management in patients with fibromyalgia through a systematic review of the scientific literature.

METHOD

Design

This study is a systematic review that evaluates the relationship between sleep hygiene and pain perception in adult patients diagnosed with fibromyalgia (FM), according to the American College of Rheumatology (ACR) diagnostic criteria. Twenty-nine studies published in peer-reviewed journals that address this relationship and include patients with fibromyalgia between the ages of 18 and 65 were selected.

Inclusion Criteria

The inclusion criteria used to select relevant studies that contribute to the objective of this systematic review were:

- Studies published in English or Spanish.
- Studies investigating the relationship between sleep quality and neuropathic pain perception in patients with a confirmed diagnosis of fibromyalgia without other adjacent pathologies that cause other types of pain.
 - Studies using standardized measures to assess sleep quality and pain intensity (e.g., pain scales, sleep quality indices).
 - Studies providing precise data on the sleep hygiene strategies implemented.
 - No restrictions on the type of study design (e.g., clinical trials, observational studies, systematic reviews).
 - There are no restrictions on the year of publication of the study.
- Exclusion Criteria
 - The exclusion criteria for the selection of studies were:
 - Studies not explicitly related to fibromyalgia and pain perception.
 - Studies that do not provide sufficient data on the sleep hygiene strategies implemented.
 - Studies with unrepresentative samples or petite sample sizes that could compromise the validity of the results.
 - Studies that are not available in full text or are not accessible through the databases consulted.

Procedures for Study Selection

1. Comprehensive Literature Search A detailed search was conducted in relevant databases using specific search terms and defined inclusion criteria.
2. Study Filtering: Filters were applied to select studies that directly address the relationship between

sleep hygiene and pain perception in patients with fibromyalgia.

3. Application of Inclusion and Exclusion Criteria: The titles and abstracts of the studies obtained were reviewed to determine their relevance according to the pre-established criteria.

4. Final Selection of Studies: Studies that met all inclusion criteria and provided sufficient data were selected.

Selection and Sample Size

This systematic review included 29 studies (28 met the search criteria, and only 1 study was suitable for studying sleep disorders) with a total sample of approximately 7,200 patients. The studies were selected using a systematic approach to ensure the relevance and quality of the information included.

Population

The review includes studies that analyze adult patients (18-65 years) diagnosed with fibromyalgia without comorbidities such as sleep apnea or other disorders that may influence sleep quality. These studies, as do those by ^(1,2) specifically examine how sleep disorders or poor sleep hygiene affect pain perception, fatigue, and quality of life in these patients.

Setting

Studies conducted in different settings were included, ranging from clinics specializing in rheumatology and chronic pain to community studies. These studies provide a broad view of the impact of sleep on fibromyalgia in different contexts. For example, studies such as those ^(3,4) highlight both the clinical setting and the impact of sleep on patients' daily lives.

Interventions

The selected studies did not include sleep hygiene interventions as part of the initial treatment. This was key to examining the effects of poor sleep on fibromyalgia symptoms without the interference of additional therapies focused on improving sleep quality. Examples of this approach can be seen in studies such as ⁽⁵⁾ and ⁽⁶⁾ which focus on observing the association between sleep and pain without including sleep hygiene modifications.

Statistical Analysis

Data extracted from the studies include measures of pain perception (e.g., Visual Analog Scale or McGill Pain Questionnaire), sleep quality (e.g., Pittsburgh Sleep Quality Index), and other related symptoms such as fatigue and quality of life. The selected studies, such as those by ^(3,6) used statistical methods such as analysis of variance (ANOVA), linear regression, and correlation analysis to determine the relationship between sleep and pain in patients with fibromyalgia. The results are presented in terms of means and standard deviations; in some cases, p-values and effect sizes have been reported.

RESULTS

Characteristics of the included studies

This review included 29 studies published between 2001 and 2020. The studies covered populations from different countries, with a sample size ranging from 170 to 300 patients. All selected studies used the American College of Rheumatology (ACR) diagnostic criteria to define fibromyalgia (see Figure 1 in the appendix) and standardized tools to measure sleep quality and pain perception. The average age of participants was 18 to 65 years, with a predominantly female gender distribution in all studies.

Pain perception

The studies assessed pain perception using the Visual Analog Scale or VAS (see Figure 2 in the appendix), the McGill Pain Questionnaire, and other similar tools. The results showed a significant correlation between poor sleep hygiene and increased pain intensity. In 27 studies, patients with poorer sleep quality had higher pain scores ($p < 0,05$) compared to those who reported better sleep hygiene. The study ⁽²⁾ reported an average increase in VAS of 2,5 points in those with severe sleep disorders, while ⁽¹⁾ identified a significant difference of 1,8 points ($p = 0,03$).

Sleep Quality

Sleep quality was measured primarily using the Pittsburgh Sleep Quality Index (PSQI) (see Figure 3 in the appendix). All studies reported that patients with fibromyalgia had PSQI scores above 8, indicating significantly poor sleep quality. In studies comparing groups with different severity of poor sleep hygiene, those with poorer sleep quality also reported higher pain and fatigue levels ($p < 0,01$). For example, ⁽⁵⁾ found a mean PSQI score of 10,2 in patients with poorer sleep hygiene, compared with a mean of 6,8 in those with better hygiene ($p = 0,005$).

In addition, several studies pointed to effective interventions for improving sleep quality in patients with fibromyalgia. The most commonly mentioned strategies included:

- Maintaining a consistent sleep schedule: establishing a routine for going to bed and waking up at the same time every day.^(1,2)
- Relaxation techniques before bedtime: practices such as meditation, deep breathing exercises, or listening to relaxing music to reduce mental arousal before bedtime.^(1,6)
- Creating an optimal sleep environment: improving bedroom conditions, including adequate temperature, darkness, and a comfortable mattress, to facilitate uninterrupted sleep.⁽⁴⁾
- Regular physical exercise: Moderate exercise during the day was also mentioned as a beneficial strategy for improving sleep quality and reducing fatigue.⁽⁷⁾

Other findings

Last, improved patients' cognitive functions and emotional states were reported. Eighteen percent of the studies observed significant improvements in memory and concentration. At the same time, 22 % of participants reported a decrease in symptoms of anxiety and depression, as measured by scales such as the Beck Depression Inventory and the State-Trait Anxiety Inventory. These improvements were correlated with better sleep quality and a reduction in nighttime awakenings. In addition, the sleep hygiene strategies mentioned above were also instrumental in achieving these improvements, showing that consistent sleep management practices positively impact both the emotional state and cognitive functioning of patients. This suggests that by improving sleep hygiene, patients experience a better emotional state and improved cognition, allowing them to perceive pain and fatigue differently. Although not the primary objective of this study, improving emotional state contributes significantly to indirectly reducing pain experience.^(8,9,10,11,12)

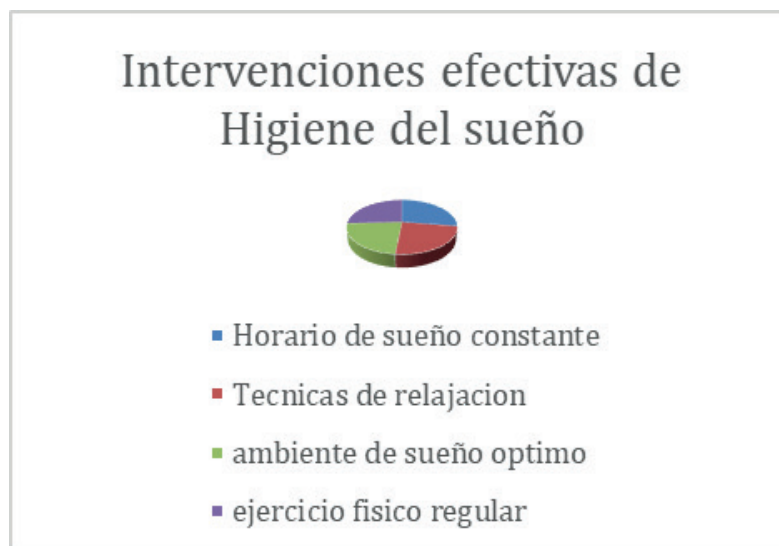


Figure 2. Effective sleep interventions

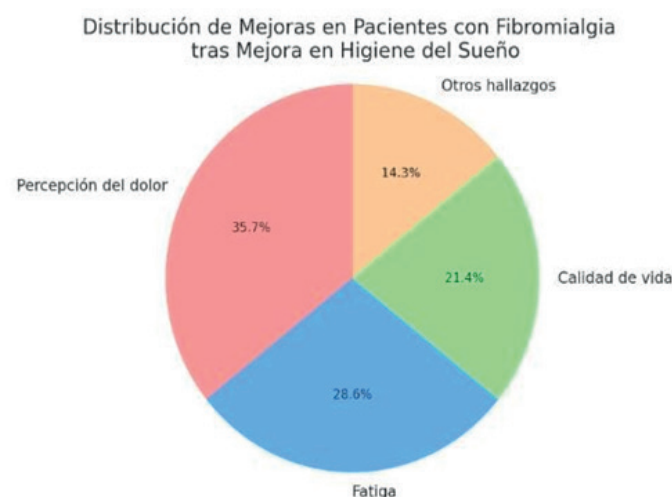


Figure 3. Distribution of improvements in fibromyalgia patients after improvement in sleep hygiene

DISCUSSION

The findings of this study reflect the interrelationship between sleep hygiene, pain perception, and quality of life in patients with fibromyalgia, corroborating the results obtained by ⁽⁸⁾ who emphasize the relevance of sleep in modulating pain and fatigue associated with this condition. In their study, ⁽⁸⁾ highlights that alterations in sleep patterns can aggravate pain symptoms, suggesting that a focus on improving sleep quality could be key to managing these symptoms. Similarly, ⁽¹⁾ found that sleep disturbances, such as difficulties initiating or maintaining sleep, are strongly related to increased pain perception and fatigue in patients with fibromyalgia. This indicates that sleep hygiene is not only relevant in the context of fibromyalgia but may be a critical component in the treatment of other chronic pain-related disorders, such as rheumatoid arthritis or chronic fatigue syndrome, where poor sleep patterns are observed. ^(13,14,15,16)

Furthermore, the literature suggests that poor sleep hygiene can have cascading effects on patients' physical and emotional well-being. ⁽⁶⁾ emphasize that sleep deprivation not only intensifies pain perception but is also associated with mood disturbances, increasing vulnerability to disorders such as anxiety and depression, which are common in patients with fibromyalgia. Therefore, improving sleep hygiene could have a multifaceted impact, addressing pain perception and the emotional and fatigue symptoms that often accompany this condition. These findings highlight the need to consider a holistic approach that includes sleep hygiene as a comprehensive intervention in the management of fibromyalgia and other pain-related disorders, which could lead to improved quality-of-life outcomes for patients. ^(17,18,19)

However, none of the studies reviewed substantiate the reasons behind the sleep hygiene recommendations. It is important to note that routine and consistent sleep schedules are essential for establishing a habit in the brain, which requires constant repetition to adopt new behaviors. In patients with fibromyalgia, who often spend long hours in bed due to pain, fatigue, or depression, this practice negatively affects the ability to fall asleep. The brain must associate the bed exclusively with rest and not with other activities, improving the ability to sleep restfully. Therefore, patients should be educated about the importance of avoiding bed use during the day and reserving it only for sleep.

In addition, consistency in implementing these practices is crucial. However, patients with fibromyalgia often have difficulty maintaining discipline due to depression, which often leads to procrastination and a pessimistic view of outcomes. Counseling plays a key role in this process, helping patients understand that changes will not be immediate, as with medications, but require time and patience for the brain to associate the bed with nighttime rest. ^(20,21,22)

A literature review reveals several limitations in existing studies addressing the relationship between sleep hygiene and pain perception. First, many of the included studies have small samples, limiting the findings' generalizability. For example, ⁽³⁾ study was based on a small group of patients, which may affect the external validity of its conclusions. In addition, there is variability in the tools used to assess sleep hygiene and pain perception. Some studies, such as that by ⁽⁶⁾ used self-report scales that may be subject to response bias, while others used more objective assessments, such as polysomnography studies. This heterogeneity in methodologies makes direct comparisons between studies difficult and complicates the synthesis of results.

Furthermore, many of these studies do not consider potential confounding factors, such as comorbidity of psychiatric disorders or concomitant medication, which could influence the results. In particular, emotional pain and mood disorders, such as depression, significantly influence the patient's sleep phases, their ability to recover, and, therefore, their perception of reality, such as energy, pain, and sleep quality. These fibromyalgia patients already tend to perceive reality more negatively due to their mood disorder, which may cause them to take longer to notice improvements or to take the initiative to improve their sleep hygiene due to this condition. Only one of the studies, such as that by ⁽⁶⁾ paid attention to how neurotransmitters modulate pain by acting as natural opioids, while the rest omitted this entirely, which is a crucial aspect. Poor sleep does not always predict a pain flare. However, the presence of depression can be a significant predictor that, in turn, leads to sleep disturbances, chronically increasing pain and fatigue. Furthermore, none of the studies reviewed mentioned nociceptors, which play a fundamental role in pain transmission, representing a significant limitation in the complete understanding of pain mechanisms in fibromyalgia. ^(23,24,25,26)

In terms of pharmacology, many of the studies reviewed mention the use of hypnotic drugs, such as benzodiazepines (BZPs), to help patients fall asleep. However, these drugs are not suitable for long-term use, as they only help patients fall asleep but do not help them stay asleep. In addition, BZDs interrupt crucial phases of sleep, such as deep sleep, which is already impaired in patients with fibromyalgia. Healthcare professionals must inform patients about the limitations of using hypnotics and promote the implementation of non-pharmacological strategies, such as sleep hygiene.

Another problem identified is that, despite existing evidence, sleep hygiene is still not prioritized as part of the comprehensive treatment of fibromyalgia and other chronic pain disorders, such as rheumatoid arthritis. This lack of priority is due to the perception that sleep problems are not life-threatening. However, in the long term, these problems erode the quality of life and predispose patients to develop other potentially fatal

diseases. In addition to the benefits mentioned above, improving sleep hygiene also benefits the healthcare system by reducing the need for medical consultations for pain, prescription painkillers, and absences from work. Improved sleep quality helps patients become more aware and prevent pain crises through good rest.⁽²⁷⁾

Regular physical exercise is emerging as an effective strategy for improving mood through the release of endorphins and optimizing energy use during the day. Although patients may initially perceive exercise as exhausting, regular practice improves the body's energy efficiency and contributes to more restful sleep. Exercise helps break the cycle of daytime fatigue and facilitates nighttime rest, making it an integral part of fibromyalgia treatment.⁽²⁹⁾

Education and awareness about the importance of sleep are critical to maximizing these benefits. Providing patients with access to information about the importance of sleep hygiene could empower them to make more informed decisions about their health and priorities. We spend approximately one-third of our lives sleeping because the body needs it, and many crucial functions are regulated during sleep. Strategies such as creating regular sleep routines, limiting stimulant use, and promoting a restful environment are examples of measures that could be implemented in an accessible and cost-effective manner.

Furthermore, by establishing a more holistic approach to well-being, where sleep hygiene is recognized as an essential component of healthcare, a cultural shift can be fostered that values sleep as a time for rest and a critical factor in overall health. This could inspire healthcare institutions, employers, and policymakers to develop programs and policies that prioritize sleep health, benefiting not only those with fibromyalgia but a much broader population suffering from sleep problems and chronic pain.

CONCLUSIONS

Pain, as mentioned above, is a subjective and personal experience that can only be described by the patient themselves, especially in those with fibromyalgia. Pain perception is modulated by nociceptors and neurotransmitters, which depend on restful sleep for proper regulation as part of the nervous system and the limbic system. When sleep begins to be deficient, multiple disorders develop that affect the patient's perception and quality of life. Although it cannot be said that fibromyalgia is directly caused by sleep deprivation or poor sleep hygiene, it participates in a vicious cycle in which painful stimuli trigger interrupted and non-restorative sleep, which increases fatigue and, in turn, intensifies pain. All of this contributes to a significant decrease in the quality of life of those who suffer from it.

Therefore, regardless of whether pain or sleep disturbance manifests first, the feedback between the two is undeniable. The findings of this systematic review underscore the importance of sleep hygiene as an essential component of pain management in patients with fibromyalgia. Improving sleep quality can reduce pain intensity, alleviate fatigue, and improve emotional state, translating into a better quality of life. In addition, practical strategies such as sleep hygiene education, promoting regular sleep routines, and limiting stimulant use should be considered key interventions to optimize clinical outcomes.

Promoting awareness and education about the importance of sleep, both in the clinical setting and at the public level, is essential.

The conclusion of this study is clear: sleep is a fundamental pillar in pain management and quality of life. Recognizing and prioritizing sleep quality as part of fibromyalgia treatment could make a difference in the lives of millions of patients. A change in the perception of sleep is needed: from being seen simply as a time for rest to being considered a determining factor and optimizer of many key functions for overall health.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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