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SYSTEMATIC REVIEW

Non-Pharmacological Interventions to Improve Sleep Quality: Research Protocol

Intervenciones No Farmacológicas para Mejorar la Calidad del Sueño: Protocolo de Investigación

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ABSTRACT

Introduction: sleep quality is a key factor for overall health and well-being. Non-pharmacological interventions, such as sleep hygiene and cognitive-behavioral therapy (CBT), have shown promise in improving sleep quality without the side effects associated with pharmacological treatments. However, there is a need for a detailed systematic review of the evidence regarding the effectiveness of these interventions and the methods used to assess sleep quality.
Method: a systematic review of the literature was conducted following PRISMA guidelines. Studies were retrieved from PubMed and Cochrane databases, focusing on randomized controlled trials published in the last 20 years. The included studies evaluated sleep hygiene protocols and used standardized methods to assess sleep quality, such as the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS).
Results: the findings indicate that non-pharmacological interventions, particularly CBT and sleep hygiene, lead to significant improvements in sleep quality compared to control groups. The reviewed studies reported better PSQI scores and a reduction in daytime sleepiness levels.
Conclusion: this systematic review concludes that non-pharmacological interventions are effective in improving sleep quality, with CBT being one of the most recommended due to its sustained effects over time and the absence of serious side effects.

Keywords: Sleep Quality; Sleep Hygiene; Behavioural Sleep Medicine; Non-Pharmacological Interventions; Randomised Clinical Trials.

RESUMEN

Introducción: la calidad del sueño es esencial para la salud general y el bienestar. Las intervenciones no farmacológicas, como la higiene del sueño y la terapia cognitivo-conductual (TCC), han demostrado ser prometedoras para mejorar el sueño sin los efectos secundarios asociados a los tratamientos farmacológicos. Sin embargo, aún es necesario revisar con mayor profundidad la evidencia existente sobre su efectividad y los métodos empleados para evaluar la calidad del sueño.
Método: se llevó a cabo una revisión sistemática de la literatura siguiendo las directrices PRISMA. Se consultaron las bases de datos PubMed y Cochrane, enfocándonos en ensayos controlados y aleatorizados publicados en los últimos 20 años. Los estudios incluidos evaluaron protocolos de higiene del sueño y emplearon métodos estandarizados para medir la calidad del sueño, tales como el Índice de Calidad del Sueño de Pittsburgh (PSQI) y la Escala de Somnolencia de Epworth (ESS).
Resultados: los hallazgos muestran que las intervenciones no farmacológicas, en particular la TCC y la higiene del sueño, resultan en una mejora significativa de la calidad del sueño cuando se comparan con los grupos de control. Los estudios revisados reportaron mejoras notables en las puntuaciones del PSQI y una

reducción en los niveles de somnolencia durante el día.
Conclusión: esta revisión sistemática confirma que las intervenciones no farmacológicas son efectivas para mejorar la calidad del sueño. La TCC se destaca como una de las más recomendadas, debido a sus beneficios sostenidos a largo plazo y la ausencia de efectos secundarios importantes.

Palabras clave: Calidad del Sueño; Higiene del Sueño; Medicina Conductual del Sueño; Intervenciones no Farmacológicas; Ensayos Clínicos Aleatorizados.

INTRODUCTION

Sleep quality is a key element of overall well-being, impacting physical and mental health. Numerous studies have investigated how sleep problems affect public health. In particular, chronic sleep deprivation and related disorders, such as insomnia, have been shown to have significant negative repercussions in areas such as academic performance, cardiovascular health, immunity, and emotional state.[1,2]

The impact of insufficient sleep is not limited to physical aspects but also extends to emotional and cognitive well-being. Research shows that in adolescents, sleep deprivation is associated with an increased risk of depressive symptoms, a higher likelihood of traffic accidents, and lower academic performance. These findings highlight the importance of addressing sleep disorders as a public health priority.[3]

In this scenario, non-pharmacological approaches have gained attention, mainly due to their ability to improve sleep quality without the side effects often accompanying pharmacological treatments. Cognitive behavioral therapy (CBT), mindfulness-based stress reduction (MBSR), and sleep hygiene have been extensively researched as effective strategies for improving sleep latency and efficiency and reducing daytime sleepiness. These interventions have shown efficacy in specific groups, such as cancer survivors and adults working day shifts.[3]

For example, while CBT is effective in the long term for treating chronic insomnia,[3] other interventions, such as exercise combined with bright light exposure, have also shown improvements in sleep quality. However, debate remains about which interventions are most effective for different patient subgroups and settings.[4]

The objective of this study was to conduct a systematic review to compare the effectiveness of various non-pharmacological interventions aimed at improving sleep quality. This review is expected to provide solid evidence to guide clinical decision-making when selecting interventions for managing sleep disorders.[1,2,5]

METHOD

Study design

This systematic review evaluated the effectiveness of non-pharmacological interventions in improving sleep quality in adults. The review included randomized controlled trials (RCTs), systematic reviews, and meta-analyses that investigated the application of sleep hygiene protocols and other behavioral interventions in populations with sleep disorders. Data search and extraction were performed manually.

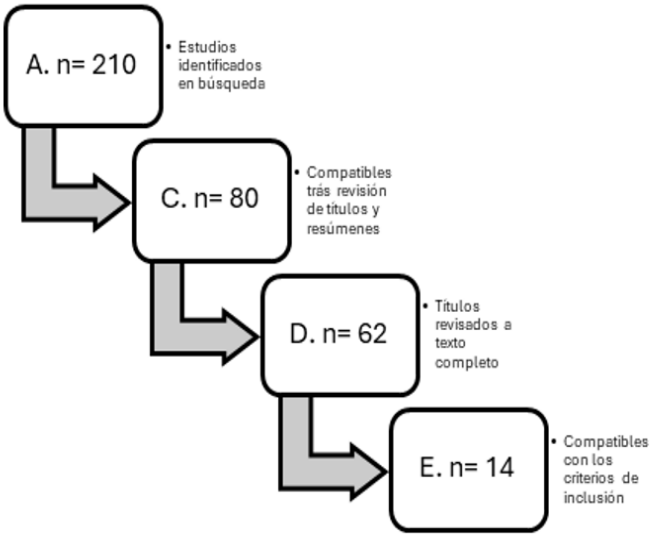

Figure 1. Selection of studies

Population and Sample

The selected studies included adults aged 18 years or older with sleep disorders. Studies that used standardized methods to assess sleep quality, such as the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS), were included. Studies published in peer-reviewed journals in the last 20 years were prioritized, with no language restrictions.

Inclusion Criteria:

- Randomized controlled trials (RCTs), systematic reviews, and meta-analyses.
- Studies that evaluated sleep hygiene protocols as the primary intervention.
- Studies that used standardized methods to assess sleep quality, including the PSQI and ESS.
- Articles published in peer-reviewed journals in the last 20 years with no language restrictions.

Exclusion Criteria:

- Non-randomized or non-controlled studies.
- Research conducted on animals or pediatric populations.
- Studies that did not report standardized measures of sleep quality.

Data Sources and Extraction Process

The literature search was conducted manually in the PubMed and Cochrane databases. Articles were selected through a thorough review of titles and abstracts, followed by evaluating the full text of studies that met the inclusion criteria. Data was extracted manually, and key information on study design, population, interventions, measurement methods, and outcomes was collected.

Variables Analyzed:

- Sleep Quality: Assessed using the PSQI, which measures sleep quality in seven key components.
- Daytime Sleepiness: Assessed using the ESS, which evaluates the likelihood of falling asleep in various daytime situations.
- Sleep Latency and Duration: Documented in studies that used sleep diaries or actigraphy to record sleep time and latency.
- Sleep Efficiency: Calculated as the proportion of total sleep time spent sleeping when data were available.

Data Analysis

The data were organized into an extraction table, categorizing studies according to the intervention and the results obtained. Trends in the selected studies were analyzed to compare the effectiveness of different non-pharmacological interventions in improving sleep quality.

Scope of the study

The study was conducted in the Interamerican Open University setting.

RESULTS

This analysis included ten studies investigating various non-pharmacological interventions to improve sleep quality in adults with sleep disorders. The results are presented below, grouped according to the variables analyzed: sleep quality, daytime sleepiness, sleep latency and duration, and sleep efficiency.

Sleep Quality

Four studies used the Pittsburgh Sleep Quality Index (PSQI) to assess changes in sleep quality:

A program that combined sleep hygiene education with personalized behavioral therapy showed a 1,8-point improvement in the PSQI compared to 0,8 points in the control group.[2]

In cancer survivors, a mindfulness program (MBSR) improved PSQI scores by 2,1 points in the intervention group, while the control group showed no significant changes.[5]

In studies on chronic insomnia, CBT resulted in an average improvement of 3,0 points on the PSQI, indicating a considerable improvement in sleep quality.[7]

In a combined sleep hygiene and CBT intervention, participants improved their PSQI score by 1,8 points, compared to only 0,8 points in the control group.[10]

Daytime Sleepiness

In four studies, daytime sleepiness was measured in most studies using the Epworth Sleepiness Scale (ESS). Participants who combined exercise with exposure to bright light reduced their ESS scores by 1,6 points.[9]

College students who improved their sleep habits reduced their ESS scores by 1,5 points.[6]

Delaying the start of school classes reduced daytime sleepiness levels by 1,4 points, improving alertness and daily performance.[4]

In adolescents who improved their sleep quality, a 2,0-point decrease in the ESS was observed, reflecting a notable improvement in daytime sleepiness.[3]

Sleep Latency and Duration

Some studies evaluated the time needed to fall asleep (latency) and total sleep duration:

The intervention that combined exercise and bright light showed a significant reduction in sleep latency and an increase in total sleep duration, although exact figures were not reported. [9]

Delaying the start of classes allowed adolescents to increase their sleep duration by 45 minutes per night.[3]

Sleep Efficiency

Although sleep efficiency was not the primary focus in all studies, some did report results in this area: Krystal & Edinger, in their review of sleep measurement tools, highlighted the importance of assessing sleep efficiency using methods such as actigraphy. However, no specific improvements were reported in their study.[1]

Studies that applied CBT documented improvements in sleep efficiency as part of an overall improvement in sleep quality, although quantification was inconsistent across studies.[7]

DISCUSSION

In this systematic review, we evaluated the impact of several non-pharmacological interventions, primarily focusing on cognitive behavioral therapy for insomnia (CBT-I), sleep hygiene education, and mindfulness. The findings suggest that in both face-to-face and digital formats, CBT-I is highly effective in improving sleep quality in diverse populations, including adults with chronic insomnia, college students, and athletes. These interventions not only improve sleep quality but also significantly impact emotional comorbidities, such as depression and anxiety.

We found that CBT-I consistently outperforms other forms of treatment, such as drug therapies and isolated educational interventions.[3,13,16] However, some of the studies reviewed have methodological limitations, such as small sample sizes and a lack of long-term follow-up, which makes it difficult to generalize the results to larger populations.[2,14] These limitations underscore the importance of further research to address these challenges and evaluate the lasting effects of these non-pharmacological interventions.

One of the most promising findings of this review is the use of digital CBT-I (dCBT-I), which has shown to be a viable option for patients who do not have access to in-person care. Studies indicate that dCBT-I not only improves insomnia symptoms but may also reduce the risk of developing major depression in patients with chronic insomnia.[15,17] This digital approach offers an accessible and effective solution that could be integrated into primary care systems for insomnia management and emotional disorder prevention.

Mindfulness has also been shown to be a valuable intervention for improving sleep quality, particularly in populations with physical and emotional comorbidities, such as breast cancer survivors. Mindfulness-Based Stress Reduction (MBSR) has been shown to reduce anxiety and fear of cancer recurrence, improving quality of life and sleep.[5,6] However, more research is needed to explore its effectiveness in other populations and how these interventions can be combined with other behavioral therapies for optimal benefit.

In addition to the methodological limitations mentioned above, one area that deserves attention is the individualization of behavioral therapies. Some studies indicate that circadian patterns may influence the effectiveness of CBT-I, suggesting a need to tailor interventions to individual patient characteristics to maximize outcomes.[16] Future research should focus on personalizing behavioral therapies better to fit each patient's specific needs, which could increase efficacy and adherence.

CONCLUSIONS

In summary, this systematic review supports non-pharmacological interventions, such as CBT-I and its digital variants, as effective treatments for improving sleep quality and managing insomnia. However, due to limitations in the studies reviewed, caution should be exercised when generalizing these findings. As digital therapies evolve, their wider implementation is expected to improve access to these treatments significantly. In particular, tailoring these interventions to individual patient characteristics could represent the next significant step in optimizing the management of insomnia and its associated comorbidities.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTION

Conceptualization: Caren Cristinne Nogueira Mariano, Roberto Rosler.
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