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How to improve your sleep quality? Review of non-pharmacological methods

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Abstract
Sleep disorders are a common problem for a large part of society, affecting people of all ages. Sleep is an essential element of the circadian rhythm, and its deprivation has an impact on many aspects of health. Long-term deprivation translates into reduced efficiency, concentration, increased anxiety, lowers the quality of life, and worsens academic and professional outcomes. The objective of this article is to expand knowledge on non-pharmacological methods of improving sleep quality. Article was based on 24 selected articles, related to the topic of sleep and non-pharmacological methods of improving its quality, searched through the PubMed database. Selected methods such as: Aromatherapy, Physical exercises, Mindfulness Meditation, Music and Relaxing sounds, and Cognitive-Behavioral Therapy (CBT) are known for treating/relieving sleep problems. They show a varied effect on sleep parameters such as the number of awakenings, total sleep duration, subjective sleep quality, and ease of falling asleep. The research found that non-pharmacological methods of improving sleep quality present varying effectiveness depending on the parameter studied. They are an effective element of relieving these disorders, but in the case of more complex or severe cases they may not be sufficient. More studies conducted on different groups of people and their comparison with pharmacological methods are needed to determine their exact effectiveness.

Keywords: Sleep quality, non-pharmacological, insomnia, aromatherapy, physical exercises, mindfulness meditation, relaxing music, cognitive-behavioral therapy.

Introduction

Sleep-related problems are an important social problem, currently it is believed that about one third of adults experience sleep problems (difficulty falling asleep, waking up early, reduced sleep quality). Sleep is an essential element of the circadian rhythm, it is believed to have regenerative functions. Poor sleep quality and its deprivation have a major impact on human health, both physical and mental. It can be linked to a negative impact on well-being, increased anxiety and intensification of depressive symptoms, decreased concentration and attention, and worse academic results. In a study conducted on medical students, correlations were observed between the intensity of sleep deprivation and the subjective feeling of anxiety, which directly affected the perceived quality of life (Perotta et al., 2021). Even a 39-minute reduction in average sleep time (in the group of children aged 8 to 12) significantly reduced physical well-being, coping at school and increased daytime sleepiness (Taylor et al., 2023). Sleep is also essential for proper functioning at school and work. And its deprivation can negatively affect safety and professional performance. In the group of employees who received interventions aimed at improving sleep quality, a reduction in the number of accidents and injuries and increased safety were observed (Brossoit et al., 2023). Sleep has a significant impact on our body, too little of it negatively affects the cardiovascular system, and the impact on the development of insulin resistance is also being studied. In the group of women who had their sleep duration reduced by 1.5 hours per day over a 6-week period, higher fasting insulin values and increased insulin resistance indicators (HOMA-IR) were observed (Zuraikat et al., 2024). The information presented above clearly suggests how important sleep is for our health and the consequences of worsening its quality or shortening its duration. In this work, we decided to present non-pharmacological methods that can positively affect the quality of our sleep.

Objective of the article

Objective of this article is to collect data and expand knowledge on non-pharmacological methods of improving sleep quality, their impact on sleep-related factors such as: speed of falling asleep, sleep duration, number of awakenings at night, subjective perception of sleep quality. To determine their effectiveness and possibilities of their application.

Methodology

In order to prepare the review, a search of peer-reviewed publications published in the years 2019-2025 was conducted using the PubMed database. The search was based on terms related to the topic of sleep and non-pharmacological methods of improving its quality. The following words were used to create combinations of searched terms: "insomnia" "sleep deprivation" „non-pharmacological methods" "sleep quality" "sleep improvement" "physical exercises" "meditation" "mindfulness" "sound" "music" "aromatherapy", "cognitive behavioral therapy" and others. An effort was made to select the most up-to-date studies that met the criteria of this review. Only articles published in English were included. Initially, based on the title and abstract. Articles containing incomplete data, assessing the effect of the described methods in combination with pharmacological treatment, not directly related to sleep and its disturbances did not meet the inclusion criteria and were excluded. Among the articles that met the criteria, 24 papers were selected on which the review was based. The search covered February and March 2025.

Results

We define non-pharmacological methods of improving sleep as those that do not rely on the administration of drugs. Of the many methods described, we decided to include in our review those that are easy to implement, without the help of other people. Among the methods that meet the above criteria were: Aromatherapy, Physical exercise, Mindfulness meditation, Music and Cognitive-Behavioral Therapy.

Aromatherapy

Described as a method based on natural essential oils, the main effect of which is stimulating the sense of smell. It is primarily believed to have a relaxing effect. It can be used in the form of inhalation, massage, bath additive or by diffusing oils in the air. Of the many oils available for purchase, not all of them will have an effect that improves the quality of sleep, below are a few selected oils described by research and their effect on sleep.

Lavender oil is one of the most widely available and most frequently described oils in terms of its beneficial effect on sleep. It reduces WASO - wakefulness after sleep onset, the time a person remains conscious after falling asleep, for example when waking up in the middle of the night (Dos Reis Lucena et al., 2021). It improves sleep quality in a group

of oncology patients who inhaled lavender essential oil for 7 days (Hamzeh et al., 2020). Its beneficial effects can be observed in a group of people suffering from serious health problems and hospitalized patients. In a study conducted on patients after coronary artery bypass grafting (CABG), who inhaled lavender essential oil, an improvement in sleep quality was observed, but it did not affect the physiological parameters of patients such as blood pressure, heart rate and saturation (Davari et al., 2021).

Bergamot essential oil, popular in the cosmetics industry, is characterized by a refreshing citrus scent. Used in the form of a spray before bed, it had a stress-relieving effect, improved sleep quality and morning alertness (Wakui et al., 2023).

Bitter Orange oil administered in the form of inhalation to pregnant women struggling with sleep disorders, has shown a positive effect on the quality of sleep (Mohammadi et al., 2022).

Peppermint oil as aromatherapy has a relaxing and sleep-improving effect similar to the widely described lavender oil (Hamzeh et al., 2020).

The advantages of this method are its low cost and easy availability. We can attribute it to the effect of positively influencing the quality of sleep.

Exercise/Physical Activity

Physical exercise is a proven factor that has a positive impact on our health. It is recommended as a support for therapy for hypertension, diabetes and obesity. It has a positive effect on our mood and emotional state.

One of the types of exercise often recommended to patients is aerobic training. It focuses mainly on improving the efficiency of the heart and respiratory system, and involves engaging large muscle groups in longer-lasting exercise, for example 60 minutes. It includes: swimming, jogging, cycling, brisk walking or long walks. When performed for 12 weeks, it reduced insomnia in a group of middle-aged women (Baron et al., 2023) and improved the quality of sleep in a group of middle-aged and older adults (Tseng et al., 2020).

Many benefits are brought by the use of resistance training, which involves strengthening muscles through weight-bearing exercises. If performed correctly, with the appropriate load for an individual, it can contribute to increasing bone mass, which will be particularly beneficial for older people. The study examined its effects on mental health and sleep quality in combination with the Mediterranean diet. The combination of these two interventions has shown benefits by improving mental health and sleep quality in adults over 65 years of age (Carcelén-Fraile et al., 2024).

Tai Chi, based on a Chinese martial art, combines physical activity aimed at improving balance and strength with breathing exercises. Often practiced as a form of relaxation and general improvement of physical health. Practiced over a period of 12 weeks in a group of adults over 60 years of age, it improves sleep efficiency, reduces the number of awakenings, and its effectiveness in the described parameters is similar to standard exercises (Siu et al., 2021).

Physical exercises in various forms - those requiring greater energy input, those involving slow movements or those of moderate, constant intensity - are factors that have a positive impact on sleep. In addition to their positive impact on sleep quality, they can be attributed to many other beneficial effects, which is why they are widely recommended for people of all ages. To achieve the best results, it is necessary to perform them regularly for a longer period of time, for example 12 weeks.

Mindfulness Meditation

It is a practice that involves quieting the mind and directing attention to the current moment. It is based on concentration on breathing, flowing thoughts, and emotions that accompany us at a given moment. It contributes to stress reduction (Cavalcante et al., 2023) and improves concentration. When performed systematically, it reduces the negative impact of sleep deprivation on functioning the next day (Barrett et al., 2020). People whose problems with falling asleep are largely based on excessive thinking before sleep, for example about the past day, stressful situations and the future, will particularly benefit from its calming properties.

Phone applications that guide through the process of mindfulness meditation are becoming increasingly popular. A study conducted on a group of students showed that this form of support in meditation is effective and causes significant improvement in the scope of sleep disorders (Smith et al., 2021).

Mindfulness meditation is a method of supporting the quality of our sleep, which we can successfully practice in the comfort of our home (and effectively combine it with aromatherapy, for example), more and more new tools are emerging, such as phone applications, which can help us better understand the course of this process. This method allows us to focus on the current moment, which in the current times, when our thoughts are focused on future stressful events, can allow us to slow down and calm down for a moment.

Music and relaxing sounds.
Listening to music accompanies a large part of society during the day, and surrounds us in many places, although few wonder how it affects us. Listening to our favorite music genre often helps us cut ourselves off from the surrounding world and focus on our inner thoughts, or quite the opposite: calm down and stop thinking for a while. Can our preferred music relax us? Yamasato et al., (2020) showed that listening to it before going to sleep improves the subjective quality of sleep, reduces the number of disruptions and may contribute to better functioning during the day. While the group listening to prescribed music (music with relaxing, sedative properties) benefited in subjective sleep quality, shortened the time it takes to fall asleep and better functioning during the day.

Listening to relaxing music also improves the quality of naps. In a study conducted on young healthy women who listened to music before taking a nap, showed improvements in both subjective and objective sleep parameters during a 90-minute nap (Cordi et al., 2019).

Problems with insomnia and insufficient sleep duration largely affect students. Listening to ambient music (relaxing music based on the sounds of nature and instruments, often used during relaxation exercises such as yoga) for 4 weeks improved the quality of sleep and shortened the time to fall asleep in a group of students, with a better effect in the group of women than men subjected to this intervention (Hu et al., 2023).

The sounds of nature - the rustle of leaves and the singing of birds that we hear while walking in the forest or in the park are a natural source of relaxing sounds. Studies show that they bring benefits even when played on headphones. In a group of hospitalized patients with heart failure, listening to these sounds for 30 minutes before going to sleep improved the quality of sleep and functioning during the day (Hosseini et al., 2024). This simple and easy-to-implement method can be successfully used in hospitals or nursing homes.

Music, especially that which can be attributed to relaxing properties, improves the quality of sleep in both sick and healthy people. This intervention is easy to incorporate into your daily life and can be a great addition to other methods to improve your sleep.

Cognitive-behavioral therapy
It is one of the most frequently used methods of psychotherapy, which is based on trying to understand negative thought patterns, correcting them, and working on behaviors and habits developed as a reaction to them. It has been used as a method of treating depression, anxiety disorders, personality disorders, post-traumatic stress disorder - PTSD and sleep disorders.

A study conducted on a group of pregnant women in the 28th or earlier week of pregnancy showed that even 20-minute sessions held at weekly intervals improve sleep-related parameters such as sleep efficiency and quality (Felder et al., 2019). Improvement was also noted in the scope of felt anxiety and the severity of depression symptoms, 6 sessions were enough to obtain these results.

Problems with insomnia in teenagers are becoming an increasing problem. Research on effective non-pharmacological methods of alleviating insomnia seems to be particularly important because in the group of people under 18 years of age, the possibilities of pharmacotherapy are limited. Cognitive-behavioral therapy has shown a beneficial effect on sleep and sleep-related parameters in this age group, improving sleep onset time, total sleep time, and efficiency (Mei et al., 2024). Due to its high safety, it can be an important element of treatment in people with multimorbidity, adolescents, and pregnant women.

Total sleep time (TST) is another important parameter considered in the assessment of sleep. In a study conducted on adults over 30 years of age reporting symptoms of insomnia, a gradual increase in sleep duration by more than 30 minutes was observed 24 months after therapy (with the highest percentage of respondents reporting an increase in sleep by at least 30 minutes observed after 12 months) (Scott et al., 2022). A later analysis showed that greater

improvements in TST were observed in people with greater sleep difficulties occurring before the introduction of cognitive-behavioral therapy (Scott et al., 2023).

Cognitive-behavioral therapy seems to be an effective method of treating sleep disorders. Its safe form means that it can be successfully introduced in most patients.

The methods presented may help improve the quality of sleep, but more research is needed to determine their exact effectiveness. Studies combining pharmacological and non-pharmacological interventions, or comparing the effectiveness of specific non-pharmacological interventions with medications used to treat insomnia, may be particularly useful.

Discussion

The presented non-pharmacological methods for improving sleep quality: aromatherapy, physical exercise, mindfulness meditation, music therapy, and cognitive-behavioral therapy demonstrate promising effects in enhancing sleep parameters. However, their effectiveness varies among individuals and is influenced by factors such as the severity of sleep disturbances and the consistency of their application.

Aromatherapy, particularly the use of lavender oil, has shown beneficial effects in reducing wakefulness after sleep onset (WASO) (Dos Reis Lucena et al., 2021) and improving overall sleep quality in a group of people with serious health problems (Hamzeh et al., 2020; Davari et al., 2021). Furthermore, while studies indicate that essential oils like bergamot (Wakui et al., 2023) and bitter orange (Mohammadi et al., 2022) may improve sleep, the heterogeneity of intervention groups and administration methods limit the generalizability of results. Future research should aim to establish standardized protocols for aromatherapy application in sleep improvement.

Physical exercise, including aerobic training (Baron et al., 2023; Tseng et al., 2020), resistance exercises (Carcelén-Fraile et al., 2024), and Tai Chi (Siu et al., 2021), has demonstrated a consistent positive impact on sleep quality. The observed improvements in sleep efficiency and reduction in insomnia symptoms suggest that physical activity may be an effective long-term strategy for managing sleep disturbances. However, the duration, and intensity of exercise required to achieve optimal results remain areas of interest for further investigation.

Mindfulness meditation has been recognized for its ability to reduce stress (Cavalcante et al., 2023) and improve sleep quality. Mobile applications that facilitate guided meditation have gained popularity, offering accessible and structured approaches to practicing mindfulness (Smith et al., 2021). It can alleviate the impact of sleep deprivation (Barrett et al., 2020). The potential for combining mindfulness techniques with other interventions, such as aromatherapy or music therapy, presents an avenue for future research on approaches to sleep improvement.

Music therapy, particularly the use of relaxing or ambient music, has been associated with improvements in subjective sleep quality and sleep efficiency (Yamasato et al., 2020; Hu et al., 2023), it is connected with better quality of naps (Cordi et al., 2019). The effectiveness of listening to nature sounds further supports the role of auditory stimuli in sleep regulation (Hosseini et al., 2024). Given its simplicity, music therapy represents an accessible tool for individuals seeking non-invasive sleep improvement strategies. Further research should answer which type of music and the duration of listening have the most beneficial effect on sleep.

Cognitive-behavioral therapy (CBT) remains one of the most well-established non-pharmacological treatments for sleep disturbances. Studies indicate that CBT can significantly improve sleep efficiency and reduce insomnia symptoms in diverse populations, including pregnant women (Felder et al., 2019), adolescents (Mei et al., 2024), and adults with chronic sleep issues (Scott et al., 2022). Despite its effectiveness, accessibility to trained therapists and adherence to therapy protocols remain challenges that warrant further exploration.

Overall, while these non-pharmacological methods provide effective alternatives to pharmacological treatments for sleep disturbances, further research is needed to optimize their application. Comparative studies assessing their efficacy against standard pharmacological treatments, as well as investigations into combined intervention strategies, could offer valuable insights into developing comprehensive sleep management protocols. Additionally, future research should

explore the long-term effects of these interventions and identify the most effective combinations for different populations.

Conclusions

Sleep problems are common in our population. They particularly affect the elderly and those with serious health problems. However, many young and healthy people also struggle with them. Sleep disorders include: difficulty falling asleep, frequent waking up or reduced sleep quality. They have a serious impact on physical and mental health, negatively affecting the quality of life, work efficiency, and increased anxiety. Too little or reduced quality of sleep also affects the cardiovascular system and may contribute to the development of insulin resistance.

Aromatherapy with essential oils, especially lavender, bergamot, bitter orange and peppermint, can help improve sleep quality through relaxation and stress reduction. Aromatherapy can be used in seriously ill patients as a support for the treatment of sleep problems.

Regularly performing aerobic and resistance exercises over a long period of time improves sleep quality, reduces the symptoms of insomnia and has a positive effect on mental and physical health. Given its additional advantages for physical and mental health, exercise should be encouraged as part of a holistic approach to improving sleep.

Mindfulness meditation has been shown to reduce stress and improve sleep quality, particularly in individuals who struggle with excessive pre-sleep rumination. Practicing mindfulness meditation can contribute to improving your emotional state.

Listening to music before going to sleep, especially relaxing and ambient music, has a positive effect on the quality of sleep, both in healthy and sick people. Preferred music has also been shown to have a positive effect on sleep-related parameters. Music can improve the subjective quality of sleep, shorten the time it takes to fall asleep, and improve functioning during the day. It is an easy-to-implement intervention that can be used in everyday life as a support for other methods of improving sleep.

Cognitive Behavioral Therapy is an effective method of treating insomnia, which has a positive effect on the quality of sleep. Studies show that it improves the time it takes to fall asleep, the efficiency of sleep, and reduces problems related to waking up at night. It may turn out to be a good form of treatment for people who additionally struggle with depression or anxiety problems, as it is successfully used in their treatment.

Although the presented methods show a positive effect on sleep, their exact effectiveness requires further research, especially studies comparing non-pharmacological interventions with pharmacological methods of treating insomnia. Such studies could help determine which methods are most effective, what their limitations are, and in which situations they are worth using.

Disclosure

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