

## **THE EFFECT OF NON-PHARMACOLOGICAL THERAPY IMPROVING SLEEP QUALITY IN ADOLESCENTS: A SCOPING REVIEW**

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### **ABSTRACT**

This study aims to comprehensively discuss the effect of non-pharmacological therapy on sleep disorders in adolescents, to improve sleep quality in this population. The method used in this study is a scoping review. Article searches were carried out systematically by the 2020 PRISMA Flow guidelines, with the databases used in the article search, namely Google Scholar, Science Direct, and PubMed. The articles obtained were sorted based on inclusion and exclusion criteria. The results of the study show that 10 articles were worthy of being reviewed regarding non-pharmacological interventions that can overcome sleep disorders, so that adolescent sleep quality can be improved. The conclusion is that several non-pharmacological therapies can improve sleep quality in adolescents, including exercise, relaxation, the use of herbs, and sleep hygiene.

Keywords: Adolescents, Sleep Disorders, Sleep Quality

### **INTRODUCTION**

Junior high school students are people who are currently undergoing junior high school education and are between the ages of 12 and 16 years (Permenkes RI, 2014). This teenage period is a transition period from childhood to adulthood (Diananda, 2019). This period is a difficult period faced by teenagers because there is a process of physiological and psychological changes in their bodies. Teenagers still have unstable emotions, so they cannot distinguish between good and bad behavior, including in terms of habits, before going to bed (Oktavia & Pratama, 2024; Safitri, 2021). Therefore, in teenagers, there are often deviations that cause their sleep quality to be poor, including staying up late at night, playing with gadgets, playing games, watching television, and doing homework until late at night, so that their sleep needs are not met properly (Bruce et al., 2017; Diananda, 2019; Purnama, 2019).

Based on data obtained from the CDC (2017), the prevalence of sleep disorders in adolescents in America is around 68.8% (CDC, 2017). In Indonesia, the prevalence of sleep disorders in adolescents aged 12 to 15 years was found to be 62.9% (Amelia & Annisa, 2022). Sleep disorders in several junior high schools in Indonesia have a prevalence of 39.7%. Meanwhile, the results of a study conducted by Auliyanti (2015) revealed that as many as 47.6% of junior high school students in Indonesia experience sleep disorders (Auliyanti et al., 2015). Meanwhile, a study conducted by Ponidjan (2022) on junior high school students in Minahasa found that 38.82% of students had poor sleep quality (Ponidjan et al., 2022).

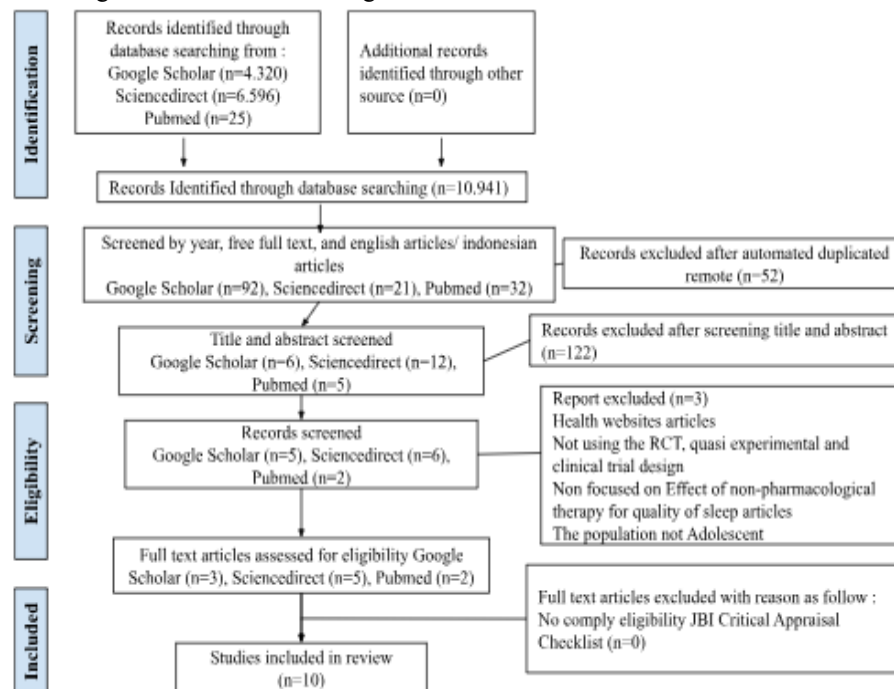
Likewise, the results of research conducted by Qiu (2022) showed that sleep disorders in adolescents aged 13-14 years have an impact on adolescent mental health. Hyperactivity or lack of concentration is a dimension associated with higher sleep problems due to longer initial sleep latency and later bedtimes. In addition, longer initial sleep latency is also associated with emotional symptoms and overall mental health difficulties (Qiu & Morales-

Muñoz, 2022). In addition to mental health problems, it was found that the impact of sleep disorders can increase the risk of obesity in adolescents (Annisa & Setiarini, 2022). Poor sleep quality in adolescents resulting from a lack of sleep can contribute to decreased concentration when attending school, resulting in decreased academic success, negative emotional problems, and decreased health status (Andini et al., 2023; Purnama, 2019; Yilmaz et al., 2017). Because of the importance of maintaining good sleep quality in adolescents, interventions are needed that can improve or repair sleep quality in adolescents. This article aims to comprehensively discuss the effects of non-pharmacological therapy on sleep disorders in adolescents, to improve sleep quality in this population.

## RESEARCH METHODS

The research method used is a scoping review. Article searches are carried out systematically by the 2020 PRISMA Flow guidelines. The databases used in the article search are Google Scholar, ScienceDirect, and PubMed. The search is carried out by first identifying keywords using the PICO format (Population, Intervention, Comparison, Outcome). The keywords used for P (Population) are "Remaja", "Adolescent OR Adolescents OR Young Adult OR Teenagers". The keywords used for I (Intervention) are "Non-pharmacological therapy", "Non-pharmacological therapy OR non-pharmacological treatment". The keywords used for O (Outcome) are "Sleep quality", "Quality of sleep OR Sleep quality". There is no comparison in this study. The inclusion criteria for articles in the last 5 years (2020-2025), can be accessed in full-text, in Indonesian and English, and the type of research in the selected articles is direct research. The exclusion criteria used are articles in the form of systematic reviews or literature reviews. The search results based on keywords and adjusted to the inclusion and exclusion criteria found 10 articles to be analyzed and used in this literature review.

Figure 1. PRISMA Flow Diagram



## RESULTS

Table 1.  
Articles Resulting from Review

Author, Title, Research Method	Year	Research Objectives	Findings
(Permata et al., 2024) Pengaruh Aerobic Exercise untuk Meningkatkan Kualitas Tidur pada Remaja dengan Kondisi Gangguan Tidur Chronic Insomnia: Case Report Case report	2024	To determine the benefits and effects of providing Aerobic Exercise to improve sleep quality in conditions of sleep disorders (Chronic Insomnia).	The results of the PSQI Score examination on the sample showed a PSQI Score value before = 15 (poor sleep quality) and a PSQI Score after = 6 (poor sleep quality).
(Abidin et al., 2024) The Effect of Buteyko Breathing Intervention on the Sleep Quality of Nursing Students Pra eksperimental	2024	To analyze the effect of the Buteyko breathing technique on the sleep quality of college students.	The results showed that the average score of sleep quality before the intervention was 13.07 (poor category), which decreased to 8.47 after the intervention ( $p = 0.000$ ). The most significant increase occurred in the sleep duration component with an average reduction of 0.9 points.
(Mulyani et al., 2022) Pengaruh Wudhu Menjelang Tidur Terhadap Peningkatan Kualitas Tidur Pada Mahasiswa Quasi experimental	2022	To determine the effect of ablution before bed on improving sleep quality in students.	The results of the study showed that the average PSQI value before and after the intervention of ablution before bedtime was 8.54 and 6.73. The results of the Wilcoxon signed ranks test obtained a $p$ value = 0.000 ( $p$ value $< 0.05$ ), which indicated that there was a significant increase in sleep quality after performing ablution before bedtime.
(Murtiningsih et al., 2022) The Effectiveness of Yoga and Chamomile Tea on Sleep Quality in Adolescents Experiencing Dysmenorrhea Quasi experimental	2022	To determine the effect of yoga and drinking chamomile tea on the sleep quality of adolescents with dysmenorrhea.	The results of the study showed that there was a significant difference in the average sleep quality of adolescents before and after doing yoga and drinking chamomile tea compared to the control group.
(Abbasi et al., 2023) Effects of Binaural Beat and Lavender Scent Inhalation on Mood and Sleep Quality of Female Student Athletes with Sleep Disorders Quasi experimental	2023	To evaluate the effects of binaural beats and lavender scent on mood and sleep quality in female student athletes.	The results showed that the average sleep quality of the BB and BL groups experienced a significant increase compared to the control group. In addition, the mood status of the BB, BL, and BP groups experienced a significant increase compared to the control group.

(Hidayat et al., 2022) The Potential of Cinnamon Extract (Cinnamomum burmanii) as Anti-insomnia Medication through Hypothalamus Pituitary Adrenal Axis Improvement in Rats Experimental study	2022	To explore the efficacy of cinnamon extract as an anti-insomnia drug in experimental animals by evaluating the levels of hormones and neurotransmitters associated with insomnia.	There was a decrease in the adrenal coefficient in the cinnamon extract group compared to the PCPA group (0.011+0.001, $P<0.05$ ). In addition, there was a decrease in the levels of corticotropin-releasing hormone, adrenocorticotrophic hormone, and corticosterone in the serum of animals receiving cinnamon extract. Our study found that a dose of cinnamon extract of 50 mg/kg BW was the best dose to balance neurotransmitter levels in insomnia mice.
(Samadi et al., 2019) The effect of aromatherapy with lavender essential oil on sleep quality in patients with major depression Single-blinded randomized clinical trial	2021	To determine the effect of aromatherapy with lavender essential oil on the sleep quality of patients with major depression.	The intervention and control groups were homogeneous in terms of demographic characteristics and mean sleep quality scores before the intervention ( $P > 0.05$ ). Patients in the intervention group had better sleep quality compared to the control group, and the difference was statistically significant ( $P = 0.001$ ).
(Oktavia & Pratama, 2024) Efektifitas Sleep Hygiene Terhadap Kualitas Tidur Remaja Kuasi eksperimental	2024	To determine the effectiveness of sleep hygiene on sleep quality in adolescents.	There is an effectiveness of sleep hygiene on the quality of sleep of adolescents based on the hypothesis test, Paired sample t-Test, obtained a sig value (2-tailed) of 0.00. So $0.00 < 0.05$ means that the results obtained are the effectiveness of sleep hygiene on the quality of sleep of adolescents.
(Haylı et al., 2025) Impact of sleep hygiene education on sleep and nutrition in children aged 10-18 years Quasi experimental	2025	To determine the impact of sleep hygiene education on sleep and nutrition management in children aged 10-18 years.	In the study sample, the proportion of male and female participants (training group) was 60.0% and 40.0%, respectively. There was a statistically significant difference between the pre-test and post-test scores in the Children's Sleep Habits Questionnaire and the Three-Factor Eating Questionnaire ( $P < .01$ ) and a significant difference in the changes in sleep and eating habit scores between groups between the pre- and post-sleep hygiene training time points ( $P < .01$ ). Based on the results of the study, sleep hygiene training given to children aged 10-18 years had a positive impact on sleep and eating patterns, and there was a relationship between the scores of the Three-Factor Eating Questionnaire and the Children's Sleep Habits Questionnaire.
(Chehri et al., 2023) Sleep hygiene and sleep	2023	To evaluate the amount of sleep	The mean sleep quality score of the participants was $7.14 \pm 2.47$ , indicating

quality adolescents during the COVID-19 pandemic Cross sectional	in Iranian adolescents and their relationship during the COVID-19 pandemic.	hygiene and sleep quality in Iranian adolescents and their relationship during the COVID-19 pandemic.	a high frequency of sleep problems affecting the participants. There was a significant correlation between all components of sleep hygiene and sleep quality. There was also a significant correlation ( $r = -0.46$ between sleep hygiene and sleep quality ( $p < 0.001$ ). There was no significant difference in sleep hygiene and sleep quality between male and female adolescents. The results showed that the sleep hygiene subscale could predict sleep quality ( $R$ $= 0.53$ , $F = 39.20$ , $p < 0.01$ ).
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Based on the results of the literature review, there are several non-pharmacological therapies to overcome sleep disorders in adolescents, namely exercise, relaxation, herbal plants, and sleep hygiene.

## DISCUSSION

Poor sleep quality in adolescents requires interventions. Many methods have been previously studied that can be used to overcome sleep disorders, both pharmacologically and non-pharmacologically. In adolescents, it is important to carry out non-pharmacological therapy due to the limited use of medical drugs.

### Exercise

A study conducted by Albinsaleh (2023) stated that exercise is one of the factors that influences a person's sleep quality (Albinsaleh et al., 2023). Other research also states that one way to improve sleep quality is to exercise (Rosa et al., 2021). Regular exercise can improve overall sleep quality. Moderate-intensity exercise is most effective, while high-intensity exercise, especially in the evening or close to bedtime, can make it difficult to fall asleep (Alnawwar et al., 2023). Aerobic exercise is a muscle movement that uses oxygen to burn carbohydrates and fats to produce energy. Examples of aerobic exercise that can be done are jogging, swimming, cycling, and aerobic gymnastics, which can increase heart rate and breathing, so that it can build endurance. Aerobic exercise is useful for improving sleep quality by helping to reduce stress and anxiety levels that can interfere with sleep (Permata et al., 2024).

In addition to aerobic exercise, based on the results of a review of research conducted by Murtiningsih (2022), it was stated that yoga can help improve sleep quality in adolescents, especially adolescent girls who are experiencing dysmenorrhea. Yoga can improve sleep disorders by increasing melatonin levels, reducing hyperarousal, and treating heart and respiratory disorders related to stress (Murtiningsih et al., 2022). Likewise, the results of research conducted by Indrayani (2020) stated that yoga can improve sleep quality (Indrayani & Muhyah, 2020).

### Relaxation

Based on the review results, it was found that the intervention that can be carried out to improve sleep quality in adolescents is the butokyo breathing relaxation technique (Abidin et al., 2024). This breathing technique can increase relaxation, reduce anxiety, improve breathing patterns, and reduce sleep disturbances (Acharya et al., 2024). The Buteyko breathing technique teaches slow breathing through the nose, intending to maintain optimal

CO<sub>2</sub> levels, thereby increasing the efficiency of oxygen delivery to the brain and other organs, improving the efficiency of body oxygenation, stabilizing breathing patterns, and supporting physiological functions during sleep (Courtney, 2020). In addition, the Buteyko breathing technique has the potential to influence the release of melatonin, a hormone that regulates the sleep cycle. By creating an optimal physiological environment through relaxation, Buteyko can support a healthy circadian rhythm (Abidin et al., 2024).

In addition, based on the results of a review of research conducted by Abbasi (2023), it was stated that binaural beats are a relaxation method that can be used to improve sleep quality (Abbasi et al., 2023). Binaural beats can train neural activity to synchronize with the beat frequency and induce behavioral states associated with the neural activity (Jirakittayakorn & Wongsawat, 2018). The results of research conducted by Abbasi (2023) showed that a 21-day binaural beat period improved the sleep quality of female student athletes (Abbasi et al., 2023). These results are consistent with previous studies showing the beneficial effects of binaural beats on sleep behavior (250 Hz Beta waves delivered to the right ear and 256 Hz to the left ear) (Jirakittayakorn & Wongsawat, 2018).

### **Herbal Plants**

Herbal ingredients that can be used to improve sleep quality are chamomile, lavender, and cinnamon (Abbasi et al., 2023; Hidayat et al., 2022; Murtiningsih et al., 2022). Chamomile acts as a mild sedative and nerve relaxant that reduces stress, relaxes the nervous system, and encourages the body to rest. The flavonoids in chamomile cause a calming effect, so that the body becomes calmer and more relaxed, and can make a person sleepy (Chang & Chen, 2016). This herb acts as a nervine and mild sedative that reduces stress, relaxes the nervous system, and encourages the body to rest. It is very useful when women experience menstrual cramps due to anxiety and irritability (Mulyani et al., 2022; Ohayon et al., 2017).

Based on the research results of Abbasi (2023), it was stated that lavender can also improve the quality of sleep in adolescents (Abbasi et al., 2023). Lavender has active ingredients that can affect several neurotransmitters involved when someone experiences depression (Farshbaf-Khalili et al., 2018). In various studies, it has been shown that this plant has an effect on Gamma-aminobutyric acid (GABA), which improves mood problems. On the other hand, there are flavonoid compounds that affect benzodiazepine receptors. The presence of several other active substances, such as Linalool and linalyl, can contribute to affecting parts of the central nervous system (Abbasi et al., 2023).

Cinnamon (*Cinnamomum burmanii*) is a plant including helps overcome insomnia (Ribeiro-Santos et al., 2017). Cinnamaldehyde is the main compound believed to play a role in improving sleep quality in insomnia. Cinnamon is also believed to be able to increase neurotransmitter activity in cases of insomnia. Based on the results of his research, it was concluded that cinnamon extract has the potential as an anti-insomnia drug through improving the HPA axis and regulating brain neurotransmitters in animal models of insomnia (Hidayat et al., 2022).

### **Sleep Hygiene**

Sleep hygiene is an action to form behavior carried out by someone who aims to create a comfortable environment around the bed. This aims so that someone can improve the quality of their sleep to be better (Amelia & Annisa, 2022). Sleep hygiene is also defined as a behavioral recommendation and changing the environment aimed at creating healthy sleep. Initially, sleep hygiene was used for the treatment of mild to moderate insomnia (Irish et al., 2015). Sleep hygiene includes educating a person about modifying their lifestyle, such as

limiting nap time, avoiding eating dinner too late at night, limiting the use of gadgets/smartphones during sleep, and avoiding alcohol, caffeine, or smoking (Kliegman et al., 2016).

Good sleep hygiene means having a bedroom environment and daily habits that promote consistent, uninterrupted sleep. Maintaining a consistent sleep schedule, making your bedroom comfortable and free of distractions, implementing a relaxing bedtime routine, and establishing healthy daytime behaviors can all contribute to ideal sleep hygiene (Sun & Vyas, 2023; Samadi et al., 2019). Sleep hygiene can create a conducive sleeping atmosphere so that someone can fall asleep comfortably. In addition, sleep hygiene can improve sleep quality to be better so that the fulfillment of a person's sleep hours can be met according to their needs (Amelia & Annisa, 2022).

## CONCLUSION

Sleep quality is directly related to a person's health status and quality of life. Teenagers who have poor sleep quality will have an impact on their mental status and health. Based on the results of the review, several non-pharmacological therapies were obtained that are effective in improving sleep quality in adolescents, including exercise, relaxation, herbal plants, and sleep hygiene. With this literature review, it is hoped that it can help adolescents in overcoming sleep disorders so that they can improve their sleep quality non-pharmacologically.

## SUGGESTION

Based on the results of the literature review, the author suggests that this non-pharmacological therapy can be carried out to overcome sleep disorders in adolescents.

## REFERENCES

- Abbasi, F., Irandoust, K., & Taheri, M. (2023). Effects of Binaural Beat and Lavender Scent Inhalation on mood and Sleep Quality of Female Student-Athletes with Sleep Disorders. *International Journal of Motor Control and Learning*, 5(3), 30–35. <https://doi.org/10.61186/ijmcl.5.3.30>
- Abidin, I., Nurlianawati, L., & Puspitasari, S. (2024). The Effect of Buteyko Breathing Intervention on the Sleep Quality of Nursing Students. *Jurnal Keperawatan Florence Nightingale*, 7(2), 428–433. <https://doi.org/10.52774/jkfn.v7i2.326>
- Acharya, R., Blackwell, S., Simoes, J., Harris, B., Booth, L., Bhangu, A., & Glasbey, J. (2024). Non-Pharmacological Interventions to Improve Sleep Quality and Quantity for Hospitalized Adult Patients-Co-Produced Study with Surgical Patient Partners: Systematic Review. *BJS Open*, 8(2), 1–14. <https://doi.org/10.1093/bjsopen/zrae018>
- Albinsaleh, A. A., Al Wael, W. M., Nouri, M. M., Alfayez, A. M., Alnasser, M. H., & Alramadan, M. J. (2023). Prevalence and Factors Associated With Poor Sleep Quality Among Visitors of Primary Healthcare Centers in Al-Ahsa, Kingdom of Saudi Arabia: An Analytical Cross-Sectional Study. *Cureus*, 15(7), 1–14. <https://doi.org/10.7759/cureus.42653>
- Alnawwar, M. A., Alraddadi, M. I., Algethmi, R. A., Salem, G. A., Salem, M. A., & Alharbi, A. A. (2023). The Effect of Physical Activity on Sleep Quality and Sleep Disorder: A Systematic Review. *Cureus*, 15(8). <https://doi.org/10.7759/cureus.43595>
- Amelia, B., & Annisa, F. (2022). Gambaran Sleep Hygiene pada Usia Remaja. *Jurnal Ilmiah Kesehatan Keris Husada*, 6(2), 211–213. <https://doi.org/10.1201/9781315380810-27>

- Andini, A., Novitri, D. N., & Lestari, D. (2023). Dampak Penggunaan Handphone terhadap Aktivitas Belajar Siswa Siswi Sekolah Menengah Pertama di Kota Medan. *Jurnal Ilmu Komputer, Ekonomi Dan Manajemen (JIKEM)*, 3(3), 3890-3896
- Annisa, F., & Setiarini, T. (2022). Dampak Gangguan Tidur terhadap Status Gizi pada Remaja. *Jkep*, 7(2), 191–200. <https://doi.org/10.32668/jkep.v7i2.1030>
- Auliyanti, F., Sekartini, R., & Mangunatmadja, I. (2015). Academic Achievement of Junior High School Students with Sleep Disorders. *Paediatrica Indonesiana*, 55(1), 50. <https://doi.org/10.14238/pi55.1.2015.50-8>
- Bruce, E. S., Lunt, L., & McDonagh, J. E. (2017). Sleep in Adolescents and Young Adults. *Clinical Medicine, Journal of the Royal College of Physicians of London*, 17(5), 424–4228. <https://doi.org/10.7861/clinmedicine.17-5-424>
- Chang, S. M., & Chen, C. H. (2016). Effects of an Intervention with Drinking Chamomile Tea on Sleep Quality and Depression in Sleep Disturbed Postnatal Women: A Randomized Controlled Trial. *Journal of Advanced Nursing*, 72(2), 306–315. <https://doi.org/10.1111/jan.12836>
- Courtney, R. (2020). Breathing Retraining in Sleep Apnoea: A Review of Approaches and Potential Mechanisms. *Sleep and Breathing*, 24(4), 1315–1325. <https://doi.org/10.1007/s11325-020-02013-4>
- Diananda, A. (2019). Psikologi Remaja dan Permasalahannya. *Journal Istighna*, 1(1), 116–133. <https://doi.org/10.33853/istighna.v1i1.20>
- Farshbaf-Khalili, A., Kamalifard, M., & Namadian, M. (2018). Comparison of the Effect of Lavender and Bitter Orange on Anxiety in Postmenopausal Women: A Triple-Blind, Randomized, Controlled Clinical Trial. *Complementary Therapies in Clinical Practice*, 31, 132–138. <https://doi.org/10.1016/j.ctcp.2018.02.004>
- Hidayat, R., Wulandari, P., & Reagan, M. (2022). The Potential of Cinnamon Extract (*Cinnamomum burmanii*) as Anti-insomnia Medication through Hypothalamus Pituitary Adrenal Axis Improvement in Rats. *Acta Medica Academica*, 51(2), 79–84. <https://doi.org/10.5644/ama2006-124.375>
- Indrayani, T., & Muhayah, A. (2020). Pengaruh Prenatal Gentle Yoga dengan Peningkatan Kualitas Tidur Ibu Hamil Trimester III di Klinik Pratama Ratna Komala Bekasi Tahun 2019. *Jurnal Ilmiah Kesehatan Delima*, 2(2), 128–136. <https://doi.org/10.60010/jikd.v2i2.33>
- Irish, L. A., Kline, C. E., Gunn, H. E., Buysse, D. J., & Hall, M. H. (2015). The Role of Sleep Hygiene in Promoting Public Health: A Review of Empirical Evidence. *Sleep Medicine Reviews*, 22, 23–36. <https://doi.org/10.1016/j.smrv.2014.10.001>
- Jirakittayakorn, N., & Wongsawat, Y. (2018). A Novel Insight of Effects of a 3-Hz Binaural Beat on Sleep Stages During Sleep. *Frontiers in Human Neuroscience*, 12(September), 1–15. <https://doi.org/10.3389/fnhum.2018.00387>
- Kliegman, R. M., Stanton, B. F., III, J. W. S. G., Schor, N. F., & Behrman, R. E. (2016). Nelson Textbook of Pediatrics 20th Edition. In *Elsevier*. [https://doi.org/10.7326/0003-4819-99-5-744\\_3](https://doi.org/10.7326/0003-4819-99-5-744_3)
- Mulyani, E. D., Wahyu, S., Rachman, M. E., Az, D., Susanto, H. F., & Maharto, R. J. (2022). Pengaruh Wudhu Menjelang Tidur terhadap Peningkatan Kualitas Tidur pada Mahasiswa. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, 2(4), 272–279. <https://doi.org/10.33096/fmj.v2i4.30>
- Murtiningsih, M., . O., Nurbayanti, S., & Suryati, Y. (2022). The Effectiveness of Yoga and Chamomile Tea on Sleep Quality in Adolescents Experiencing Dysmenorrhea. *KnE Medicine*, 2022, 198–206. <https://doi.org/10.18502/kme.v2i2.11082>



- Ohayon, M., Wickwire, E. M., Hirshkowitz, M., Albert, S. M., Avidan, A., Daly, F. J., Dauvilliers, Y., Ferri, R., Fung, C., Gozal, D., Hazen, N., Krystal, A., Lichstein, K., Mallampalli, M., Plazzi, G., Rawding, R., Scheer, F. A., Somers, V., & Vitiello, M. V. (2017). National Sleep Foundation's Sleep Quality Recommendations: First Report. *Sleep Health*, 3(1), 6–19. <https://doi.org/10.1016/j.sleh.2016.11.006>
- Oktavia, I., & Pratama, M. (2024). Efektifitas Sleep Hygiene Terhadap Kualitas Tidur Remaja. *Jurnal Pendidikan Tambusai*, 8(2), 29661–29666. <https://jptam.org/index.php/jptam/article/view/19128>
- Permata, A., Zein, R. H., Muawanah, S., & Maharani, D. (2024). Pengaruh Aerobic Exercise untuk Meningkatkan Kualitas Tidur pada Remaja dengan Kondisi Gangguan Tidur Chronic Insomnia: Case Report. *PhysioHS*, 7(2), 109–114. <https://ejournal.umm.ac.id/index.php/physiohs/article/view/38577/15877>
- Permenkes RI. (2014). *Peraturan Menteri Kesehatan Nomor 25 Tahun 2014 tentang Upaya Kesehatan Anak*. <https://peraturan.bpk.go.id/Details/117562/permenkes-no-25-tahun-2014>
- Ponidjan, T. S., Rondonuwu, E., Ransun, D., Warouw, H. J., & Raule, J. H. (2022). Kualitas Tidur Sebagai Faktor yang Berimplikasi pada Konsentrasi dan Motivasi Belajar Anak Remaja. *E-Prosiding Semnas Dies Natalis 21 Poltekkes Kemenkes Manado*, 49–58. <https://ejurnal.poltekkes-manado.ac.id/index.php/eprosiding2022/article/view/1681/1031>
- Purnama, N. L. A. (2019). Sleep Hygiene dengan Gangguan Tidur Remaja. *Jurnal Keperawatan*, 8(1), 30–36. <https://doi.org/10.47560/kep.v8i1.80>
- Qiu, J., & Morales-Muñoz, I. (2022). Associations between Sleep and Mental Health in Adolescents: Results from the UK Millennium Cohort Study. *International Journal of Environmental Research and Public Health*, 19(3). <https://doi.org/10.3390/ijerph19031868>
- Ribeiro-Santos, R., Andrade, M., Madella, D., Martinazzo, A. P., de Aquino Garcia Moura, L., de Melo, N. R., & Sanches-Silva, A. (2017). Revisiting an Ancient Spice with Medicinal Purposes: Cinnamon. *Trends in Food Science and Technology*, 62, 154–169. <https://doi.org/10.1016/j.tifs.2017.02.011>
- Rosa, C. C., Tebar, W. R., Oliveira, C. B. S., Farah, B. Q., Casonatto, J., Saraiva, B. T. C., & Christofaro, D. G. D. (2021). Effect of Different Sports Practice on Sleep Quality and Quality of Life in Children and Adolescents: Randomized Clinical Trial. *Sports Medicine - Open*, 7(1). <https://doi.org/10.1186/s40798-021-00376-w>
- Safitri, M. (2021). Pengaruh Masa Transisi Remaja Menuju Pendewasaan Terhadap Kesehatan Mental Serta Bagaimana Mengatasinya. *Jurnal Pendidikan Ilmu Sosial*, 30(1), 21–26. <https://ejournal.upi.edu/index.php/jpis/article/view/29495>
- Samadi, Z., Jannati, Y., Hamidia, A., Mohammadpour, R. A., & Hesamzadeh, A. (2019). The Effect of Aromatherapy with Lavender Essential Oil on Sleep Quality in Patients with Major Depression. *Journal of Nursing and Midwifery Sciences*, 6(3), 149–155. <https://doi.org/10.4103/JNMS.JNMS>
- Suni, E., & Vyas, N. (2023). *Mastering Sleep Hygiene: Your Path to Quality Sleep*. Sleep Foundation. <https://www.sleepfoundation.org/sleep-hygiene#:~:text=Keeping a stable sleep schedule,practices to suit their needs>
- Yilmaz, D., Tanrikulu, F., & Dikmen, Y. (2017). Research on Sleep Quality and the Factors Affecting the Sleep Quality of the Nursing Students. *Current Health Sciences*, 43(1), 20–24. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6286721/>