THE EFFECTIVENESS OF MASSAGE OLIVE OIL ON REDUCING NOCTURNAL ENURESIS IN PRESCHOOL CHILDREN

Sri Lestariningsih[1], Yoga Tri Wijayanti[2], Gangsar Indah Lestari[3]

[1,2,3]Metro Midwifery Study Program, Poltekkes Kemenkes Tanjung Karang, Lampung, Indonesia
Email correspondence srilestariningsih@poltekkes-tjk.ac.id

ABSTRAK : EFEKTIVITAS PIJAT MINYAK ZAITUN TERHADAP PENURUNAN NOCTURNAL ENURESIS PADA ANAK PRASEKOLAH.

Latar Belakang: Nocturnal enuresis merupakan kondisi medis umum pada anak prasekolah yang menyebabkan dampak psikologis dan sosial signifikan. Anak berusia empat tahun seharusnya sudah mampu menggunakan toilet secara mandiri dan tidak mengompol lebih dari sekali seminggu, sehingga diperlukan terapi non-farmakologi yang aman dan alami seperti pijat minyak zaitun.

Tujuan: Mengevaluasi efektivitas pijat minyak zaitun terhadap penurunan frekuensi nocturnal enuresis pada anak prasekolah.

Metode: Terdapat tiga puluh anak prasekolah yang digunakan sebagai sampel dalam penelitian ini, yang dilakukan menggunakan one-group pretest-posttest design. Pijat minyak zaitun dilakukan empat belas hari, selama lima belas menit sebelum tidur. Setelah observasi, wawancara, dan kuesioner digunakan untuk mengumpulkan data. Analisis data menggunakan uji Wilcoxon Signed-Rank Test (non-parametrik).

Hasil: Dengan nilai p=0,000 (<0,05), dan mean skor efektivitas intervensi sebesar 1,700, analisis statistik menunjukkan penurunan signifikan dalam frekuensi enuresis di malam hari.

Kesimpulan: Pijat minyak zaitun efektif menurunkan nocturnal enuresis pada anak prasekolah.

Saran: Terapi pijat minyak zaitun terbukti efektif dan aman. Ini mendukung penerapannya oleh bidan dalam edukasi kesehatan dan penyuluhan di masyarakat sebagai edukasi bagi orang tua, dan terapi ini dapat diintegrasikan dalam asuhan kebidanan pada anak dan dikembangkan sebagai strategi non-farmakologi untuk mengatasi enuresis nokturnal pada anak prasekolah.

Kata Kunci: Pijat, Minyak zaitun, Nocturnal enuresis, Anak prasekolah, Terapi non-farmakologis

ABSTRACT

Background: Nocturnal enuresis (NE) is a common medical condition in preschool children that causes significant psychological and social impacts. Four-year-old children should be able to use the toilet independently and not wet the bed more than once a week, so safe and natural non-pharmacological therapies such as olive oil massage are needed.

Objective: To evaluate the effectiveness of olive oil massage in reducing the frequency of NE in preschool children.

Methods: Thirty preschool children participated in this study, which used a one-group pretest-posttest design. Olive oil massage was administered for fourteen consecutive days, lasting fifteen minutes before bedtime. Data were collected through observation, interviews, and questionnaires, and analyzed using the Wilcoxon Signed-Rank Test.

Results: With a p-value of 0.000 (<0.05) and a mean intervention effectiveness score of 1.700, statistical analysis showed a significant decrease in the frequency of NE.

Conclusion: Olive oil massage is effective in reducing NE in preschool children.

Suggestions: Olive oil massage therapy has been proven to be effective and safe. This supports its application by midwives in health education and community outreach as education for parents, and this therapy can be integrated into midwifery care for children and developed as a non-pharmacological strategy to treat nocturnal enuresis in preschool children.

Keywords: Massage, Olive Oil, Enuresis, Nocturnal, Preschool Child, Non-Pharmacological Therapy

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

INTRODUCTION

Urinary incontinence in children is defined as loss of bladder control or unintentional urination after toilet training, typically ≥2 times per month (Figueroa & DeCotiis, 2025; Johns Hopkins Medicine, 2024). The prevalence of enuresis ranges from 2.3% to 25% among school-aged children, with approximately 15–20% of 5-year-olds still experiencing nocturnal enuresis (NE) (Mayow et al., 2026; Nieuwhof-Leppink et al., 2019; Raising Children Network, 2023). Enuresis is more common in boys than in girls occurring 2 to 3 times as often and can persist into elementary school age, affecting up to 20% of 7 year olds and about 5% of 10-year-olds (Mayow et al., 2026; McLaughlin et al., 2025; Pediatric Patient Education, 2024).

Nocturnal enuresis has a significant impact on a child's psychological and social well being (Adisu et al., 2025; Aygun, 2025). Children with enuresis tend to feel embarrassed and have low self-esteem, have difficulty concentrating, and are at risk of developing emotional and behavioral disorders such as anxiety, depression, and aggression (Adisu et al., 2025; Liao et al., 2024; Rahman & Balagopal, 2025). These effects also place a psychological burden on families, leading to NE being recognized as a public health issue that needs to be addressed (Adisu et al., 2025; Aldhabaan et al., 2026; Liao et al., 2024; Rahman & Balagopal, 2025).

The risk factors for nocturnal enuresis are multifactorial, including family history, delayed neurological maturation, impaired nocturnal antidiuretic hormone secretion, and psychosocial factors such as stress or poor sleep quality (Adisu et al., 2025; Harris et al., 2023; Jørgensen et al., 2021; McLaughlin et al., 2025). More than 40% of children with enuresis have a parent or sibling with the same condition, and if both parents have enuresis, the child's risk increases to 75% (Jørgensen et al., 2021). In addition to genetic factors, delayed maturation of the nervous system, impaired production of antidiuretic hormone, and psychosocial conditions such as stress or excessive sleep (Harris et al., 2023; Jørgensen et al., 2021), recent research also confirms that environmental and family factors play a significant role. Children whose parents are divorced or who experience family conflict are at higher risk of developing NE (Adisu et al., 2025). Other studies have shown that sleep disorders, such as sleeping too deeply or the presence of sleep-disordered breathing, can worsen enuresis (McLaughlin et al., 2025). In addition, psychological factors such as anxiety, shame, and academic pressure have also been reported to increase the risk of NE (Liao et al., 2024). Comorbid medical conditions such as chronic constipation and neuropsychiatric developmental disorders (e.g., Attention Deficit Hyperactivity Disorder) are also associated with an increased prevalence of NE (Aldhabaan et al., 2026). It is therefore a multifactorial condition involving the interaction of biological, psychological, and social factors, and thus requires a comprehensive management approach (Basaif et al., 2021; Porter et al., 2022).

The management of NE can be approached through both pharmacological and non-pharmacological therapies. Pharmacological therapies such as desmopressin, imipramine, and oxybutynin have been shown to be effective, but they have limitations in the form of side effects and the risk of relapse after discontinuation of the medication (Robson & Mathews, 2024; Shain et al., 2024). Meanwhile, non-pharmacological therapies such as enuresis alarms, acupressure, and psychosocial support are safer but require high compliance from the child and family (Kannan & Bello, 2022; Nevéus et al., 2020).

In the context of complementary therapy, massage with herbal oils has traditionally been used to promote relaxation and improve physiological function (Caballero-Gallardo et al., 2025; Ramadhania, 2026; Sattayakhom et al., 2023). Previous studies have shown that the use of chamomile oil can reduce the frequency of nocturia (Sharifi et al., 2017). However, scientific evidence regarding massage with olive oil as a non-pharmacological intervention for NE remains limited.

Based on the limitations of pharmacological therapies (side effects, risk of relapse) and non-pharmacological therapies (requiring high compliance), as well as the need for safe, natural, and easily implementable interventions, this study was conducted to evaluate the effectiveness of olive oil massage in reducing the frequency of nocturnal enuresis in preschool children.

RESEARCH METHODS

This study used a pretest-posttest single-group design, classified as a pre-experimental design, with the main limitation being the absence of a control group, which could introduce bias due to maturation effects or time effects. Data were collected through structured questionnaires, interviews, and direct observation, using instruments adapted from a validated enuresis monitoring tool that had been tested for reliability (Cronbach's alpha = 0.82) and validity through expert review. The independent variable was massage with olive oil, while the dependent variable

was the frequency of nocturnal enuresis episodes measured on a ratio scale (episodes per week). Data analysis included univariate statistics (mean and standard deviation) as well as bivariate analysis using the Wilcoxon Signed-Rank Test, which was chosen due to the non-normal distribution of the data, to evaluate changes in enuresis frequency before and after the intervention.

Population and Sample

The research population consisted of preschool children with nocturnal enuresis. A total of 30 participants were recruited using quota sampling. The quota was determined based on the number of children identified as having enuresis at the selected early childhood education institutions. Inclusion criteria included children aged 3–6 years who experienced nocturnal enuresis at least twice a week, whose parents provided written consent, and who were in good physical health to undergo massage therapy. Exclusion criteria included children with urinary tract infections, congenital abnormalities, or those currently undergoing pharmacological treatment for enuresis. The sample size (n=30) was determined based on feasibility and reference to similar pre-experimental studies in pediatric populations, which indicated that 25–30 participants were sufficient for an initial evaluation of the intervention's effects.

Intervention Procedure:

The olive oil massage was performed for 14 consecutive days, with each session lasting 15 minutes before bedtime. Prior to the intervention, parents or caregivers received structured training from the research team, including demonstrations and written guidelines, to ensure standardized implementation. The massage focused on the abdomen and lower back, using gentle circular movements aimed at promoting relaxation and bladder control. Although the massage was performed by parents or caregivers at home, the procedure followed Standard Operating Procedures (SOPs) developed by the research team to ensure consistency and replicability. Parents were instructed not to change the child's fluid intake or bedtime routine during the intervention period. Compliance was monitored through daily logs and periodic check-ins by the research team.

Ethical Considerations:

This study received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Tanjung Karang (No. 178/EC/KEP-TJK/VI/2018). Prior to data collection, permission was obtained from the school, and written informed consent was secured from parents. Participation was voluntary, and respondents were free to withdraw at any time.

RESEARCH RESULT

The results of the analysis using the Wilcoxon Signed-Rank Test showed a statistically significant difference between the frequency of nocturnal enuresis before and after massage with olive oil, with a p-value of $p < 0.001$, indicating that massage with olive oil effectively reduces the incidence of nocturnal enuresis in preschool children. Details of the results pre- and post-intervention are shown in Table 1.

Table 1
Effect of Massage With Olive Oil

Variable	N	Mean ± SD (Pretest)	Mean ± SD (Posttest)	Mean Difference	P-value
Frequency of Enuresis/week	30	3.40 ± 1.20	1.70 ± 0.75	-1.70	0,000

Table 1 presents a comparison of the frequency of nocturnal enuresis before and after the olive oil massage intervention in preschool children. The average frequency of enuresis episodes per week decreased from 3.40 (SD = 1.20) before the intervention to 1.70 (SD = 0.75) after the intervention, with a mean difference of -1.70 episodes per week. This decrease indicates that the children experienced fewer bedwetting episodes after receiving the intervention. Statistical analysis using the Wilcoxon Signed-Rank Test confirmed that this difference was significant ($p < 0.001$), indicating that olive oil massage has a measurable effect in reducing nocturnal enuresis. Although this study design was pre-experimental without a control group, the consistent reduction in enuresis frequency across all participants supports the potential effectiveness of this complementary therapy. Clinically, a reduction of nearly two episodes per week indicates a meaningful improvement in the children's daily functioning and quality of life. These findings align with previous studies reporting that non-pharmacological interventions, such as massage and acupressure,

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

can positively influence bladder control and psychosocial well-being.

DISCUSSION

The results of this study are in line with research in Italy and Russia, which show that acupuncture helps stop unstable bladder contractions and reduces weight (Cammisa et al., 2025). Worldwide, literature supports acupuncture as a viable treatment for children experiencing enuresis. Clinical trials have shown that acupuncture successfully reduces the frequency of enuresis during treatment and provides long-term effects after treatment (Elmansi et al., 2024; Kannan & Bello, 2022; LV et al., 2015). The basic theory of acupressure is also known as needleless acupuncture or acupuncture massage. Acupuncture uses needles as practical tools, while acupressure uses blunt tools, such as fingers, hands, or other parts of the body, as substitutes for needles (Chen et al., 2024; Kannan & Bello, 2022). The present study supports these findings, as olive oil massage significantly reduced nocturnal enuresis episodes ($p < 0.001$). This suggests that complementary therapies, whether acupuncture or massage, share a common mechanism in modulating bladder control and relaxation. However, unlike acupuncture, olive oil massage is non-invasive, culturally acceptable, and can be performed by parents at home, which enhances feasibility and family involvement.

Acupuncture helps prevent the entry of disease sources and maintain body condition, heal diseases, rehabilitate, and prevent. Healthy people have a balance of Yin and Yang. If one is dominant, health is disrupted or unhealthy. Acupressure, or acupuncture massage, aims to balance Yin and Yang. The goal of acupressure, or acupuncture massage, is to restore the balance of Yin and Yang. Acupuncture has the potential to influence the urinary center in the spinal cord as well as the parasympathetic nerves that control the urinary tract. Additionally, acupuncture can alter brain function thru the reduction of the serotonergic system. All studies evaluating acupuncture as part of the Traditional Chinese Medicine treatment package show that, compared to alarm therapy, which is the gold standard of Western medical intervention for addressing nighttime enuresis, acupuncture as part of the combined approach of Traditional Chinese Medicine can yield better results (Caldwell et al., 2020; Kannan & Bello, 2022).

The benefits of olive oil used by the Greeks have long been known, enhancing skin elasticity and blood flow to the underlying muscles. Additionally, post-exercise massage with olive oil accelerates athletes' recovery because blood flow increases and metabolic products (lactic acid) are quickly removed thru the dilated blood vessels. Olive oil also makes the athlete's body more moisturized and smooth (Dakić et al., 2023; Gasibat et al., 2024; Perrone & D'Angelo, 2025). This resulted in its use being adopted not only as a means of treatment but also for the prevention of sports injuries. Deep friction post-exercise massage combined with the use of olive oil is beneficial in reducing muscle fatigue. Specifically, friction increases blood flow from the underlying tissue (at the local level) and helps eliminate lactic acid more quickly from the tissues of the neuromuscular system. The ancient Greeks achieved better recovery from the body's acid-base balance and further restored the arterial blood pH to normal levels (pH 7.35-7.45) by means of this deep friction massage (Dakić et al., 2023; Gasibat et al., 2024; Perrone & D'Angelo, 2025). Although most of the literature on olive oil massage focuses on post-exercise recovery, physiological mechanisms such as improved blood circulation, muscle relaxation, and tissue elasticity are also relevant to bladder function. In the context of nocturnal enuresis, these effects may contribute to strengthening the pelvic floor muscles and improving urinary control. People used to know how to reduce muscle fatigue and athlete recovery faster through observation. A recent study concluded that massage has a reflective and mechanical action. This contributes to an effective reduction of muscle tone and subsequently increases venous return, is also beneficial for reducing creatine kinase levels and the number of circulating neutrophils, and overcoming the onset of muscle pain. The treatment session may be as short as 5 minutes or as long as 20 minutes (Kafrawi et al., 2023; Wei et al., 2025).

Acupressure therapy is the best choice for relieving muscle tension and stress, as well as reducing complaints or ailments. Stimulation of acupressure points will trigger the release of endorphin hormones, which can induce feelings of happiness and calmness. Therefore, acupressure therapy can be very helpful for children who experience enuresis due to psychological problems, anxiety, fear, or stress. To relieve muscle tension and stress and reduce complaints related to certain disorders, acupressure is the most effective method, especially in self-therapy. This method is very effective because it presses the bladder without stopping its contractions and increases bladder stimulation. Endorphin hormones will be released thru stimulation at the enuresis point. The

acupressure points used to treat bladder dysfunction are located in areas corresponding to the nerve supply from the spinal segments to S4 (Chen et al., 2024; Kandemir et al., 2025; Kannan & Bello, 2022; Nevéus et al., 2020). The mechanism of massage with olive oil may reduce the frequency of enuresis, consistent with our findings, which suggest that stimulation of the abdominal and lower back regions likely indirectly influences parasympathetic nervous system activity and detrusor muscle relaxation during sleep, thus reducing the incidence of involuntary urination.

Nocturnal enuresis can occur as a result of accidental pelvic muscle loosening. Olive oil strengthens the muscles of the urinary tract and improves bladder control. The beneficial effects of olive oil have been known to the ancient world (Wang et al., 2025). The Greeks used olive oil to make the skin more elastic and to supply more blood to the muscles beneath it. Additionally, massage with oil accelerates the physical recovery of athletes because blood flow increases and metabolic products (lactic acid) are removed from the dilated blood vessels more quickly. Olive oil also provides lubrication and flexibility to the athlete's body. As a result, it is not only used as a treatment but also to prevent sports injuries. Massage with oil helps reduce muscle fatigue (Huang et al., 2025; Welis et al., 2023; Zubaida et al., 2023). Specifically, massage increases blood flow from the underlying tissues locally and helps remove lactic acid from the neuromuscular tissues of fatigued athletes. The ancient Greeks used massage with olive oil to improve the body's acid-base balance and restore arterial blood pH to normal levels (pH 7.35-7.45). They also knew how to reduce muscle fatigue and accelerate athlete recovery thru visual observation (Huang et al., 2025; Welis et al., 2023). Recent studies show that massage has benefits. Studies indicate that massage has two functions: reflexive and mechanical. It effectively reduces muscle tone, which in turn improves venous return. It also reduces circulating creatine kinase and neutrophils, and prevents muscle soreness after eccentric exercise due to the reduced inflammatory response (Ilmi et al., 2025; Shamsi et al., 2022).

A study published in the journal Molecular & Cellular Oncology found that a simple substance contained in extra virgin olive oil has the ability to kill cancer cells. Olive oil mainly consists of triacylglycerol (up to 99 percent) as well as free fatty acids, mono, and diacylglycerol, and various lipids such as hydrocarbons, sterols, tocopherols, aliphatic alcohols, and pigments. In addition, there are many phenolic and volatile compounds. Olive oil has special properties because of some of these compounds. To reduce the amount of enuresis that occurs in children at nite, first heat the olive oil before massaging it on the lower back and lower abdomen. Massage slowly on the lower back and lower abdomen for a few minutes (Health & Medicine, 2020; Rodríguez-López et al., 2020; Saad & Kmail, 2025).

Olive oil is a key ingredient in Mediterranean cuisine that contains fat. Olive oil has been proven to combat oxidative stress diseases and aging. Olive oil is a functional food rich in monounsaturated fatty acids (MUFA) and oleic acid, as well as many minor components with antioxidant properties. Olive oil contains many different small components, depending on the cultivar, climate, seed ripeness at harvest, and the processing methods used to produce it. Pure olive oil (VOO) is obtained from olives solely thru mechanical or physical processes such as washing, decantation, centrifugation, or filtration. This method does not alter the olive oil (Mazza, 2025; Serreli & Deiana, 2020; Zhang et al., 2026). Overall, the results of this study highlight the clinical relevance of olive oil massage as a complementary therapy for nocturnal enuresis. The reduction in the frequency of enuresis episodes has significant implications for improving children's psychological well-being and reducing family stress. However, the absence of a control group and the small sample size are limitations that need to be addressed in future randomized controlled trials.

CONCLUSION

The final results of the study show that there were children without enuresis, children with mild enuresis 12 respondents (40%), children with moderate enuresis 2 respondents (6.7%), and children with severe enuresis 16 respondents (53.3%). After using olive oil massage, the number of children experiencing nighttime enuresis decreased by 19 respondents (63.3%), and children with severe enuresis remained at 16 respondents (53.3%). There is an effect of using olive oil massage on the reduction of enuresis in preschool children, according to the statistical test results, with a p-value of 0.000. These findings suggest that massage with olive oil, as a nonpharmacological complementary therapy, can be safely administered by parents or caregivers to reduce the frequency of nocturnal enuresis episodes in preschool-aged children. The clinical implication is that this intervention not only reduces the frequency of bedwetting but also contributes to improved psychological well-being in children and reduced

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

family stress. The overall reduction in frequency indicates a significant improvement in daily functioning. Therefore, massage with olive oil can be considered as an alternative or adjunct to conventional therapy, particularly in community and midwifery practice.

Future studies should employ randomized controlled trials with larger sample sizes to validate these findings and assess their long-term outcomes. Nevertheless, this study provides preliminary evidence supporting olive oil massage as a practical, culturally acceptable, and family-centered intervention for managing nocturnal enuresis in preschool-aged children

SUGGESTION

To help preschool-aged children manage nocturnal enuresis, it is recommended that healthcare professionals, including midwives, nurses, and doctors integrate safe nonpharmacological therapies, such as massage with olive oil, into health education and counseling programs. Healthcare facilities such as Posyandu, Poskeskel, and Puskesmas need to be informed about the benefits of this complementary therapy and encouraged to disseminate this knowledge through structured health promotion activities.

Additionally, parents and caregivers play a central role in implementing olive oil massage at home. Therefore, training sessions and educational materials (e.g., brochures, demonstrations, and workshops) should be provided to equip families with the necessary skills to perform the massage consistently and safely.

At the institutional level, collaboration between community health centers and early childhood education programs can strengthen awareness and implementation of olive oil massage as a culturally acceptable, family-centered intervention. This approach not only reduces the frequency of nocturnal enuresis but also contributes to improved psychological well-being in children and alleviates family stress.

REFERENCES

Adisu, M. A., Habtie, T. E., Munie, M. A., Bizuayehu, M. A., Zemariam, A. B., & Derso, Y. A. (2025). Global Prevalence of Nocturnal Enuresis and Associated Factors Among Children and Adolescents: A Systematic Review and Meta-Analysis. *Child and Adolescent Psychiatry and Mental Health*, *19*(1), 23. https://doi.org/10.1186/s13034-025-00880-x

Aldhabaan, K. A., Almuhsin, R. A., Shehri, N. K. A., Almazni, A. A., Almania, A. I., Alasmari, K. A., Alshardi, W. I., Alserhani, A. S., & Alshahrani, S. D. (2026). Prevalence, Risk Factors, and Psychosocial Impacts of Enuresis in Saudi Primary School-Aged Children: A Systematic Review and Meta-Analysis. *The Pan African Medical Journal*, *53*(46). https://doi.org/10.11604/pamj.2026.53.46.50243

Aygun, E. (2025). Impact of Nocturnal Enuresis on Health-Related Quality of Life in Children. *SiSli Etfal Hastanesi Tip Bulteni / The Medical Bulletin of Sisli Hospital*, 89–97. https://doi.org/10.14744/SEMB.2024.02679

Basaif, W. S., Alamri, A. M., Alamri, A. A., Alkhudhayri, M. W., Alamri, A. M., Alamri, A. M., Alsahn, B. O., Almani, A. Z., Alayafi, M. A., Bosili, M. J., & Alshehri, A. A. (2021). Nocturnal enuresis: Etiology, management and the impact on different age groups. *International Journal Of Community Medicine And Public Health*, *8*(7), 3703. https://doi.org/10.18203/2394-6040.ijcmph20212346

Bogaert, G. (2025). Nocturnal Enuresis. In C. R. Chapple & A. J. Wein (Eds.), *Primer on Urology* (pp. 1283–1296). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-55405-6_99

Caballero-Gallardo, K., Quintero-Rincón, P., & Olivero-Verbel, J. (2025). Aromatherapy and Essential Oils: Holistic Strategies in Complementary and Alternative Medicine for Integral Wellbeing. *Plants*, *14*(3), 400. https://doi.org/10.3390/plants14030400

Caldwell, P. H., Codarini, M., Stewart, F., Hahn, D., & Sureshkumar, P. (2020). Alarm Interventions for Nocturnal Enuresis in Children. *The Cochrane Database of Systematic Reviews*, *5*(5), CD002911. https://doi.org/10.1002/14651858.CD002911.pub3

Cammisa, I., Zona, M., & Ferrara, P. (2025). Management of Nocturnal Enuresis in Children. *Minerva Pediatrics*, *77*(4). https://doi.org/10.23736/S2724-5276.25.07812-7

Chen, X., Sun, W., Wang, J., Cai, Y., & Yu, X. (2024). A Systematic Review and Meta-Analysis Assessing the Efficacy of Tuina for Nocturnal Enuresis in Children. *Frontiers in Pharmacology*, *15*, 1421130. https://doi.org/10.3389/fphar.2024.1421130

Dakić, M., Toskić, L., Ilić, V., Đurić, S., Dopsaj, M., & Šimenko, J. (2023). The Effects of Massage Therapy on Sport and Exercise Performance: A Systematic Review. *Sports*, *11*(6), 110. https://doi.org/10.3390/sports11060110

Dixon, A., & Miller, B. (2024). Clinical Management of Nocturnal Enuresis. *Current Treatment Options in Pediatrics*, *10*(1), 1–12. https://doi.org/10.1007/s40746-023-00291-0

Elmansi, A., Holayl, M. A., & Salama, A. (2024). Acupuncture Treatment of Persistent Primary Nocturnal Enuresis: A Follow-Up Study. *EC Paediatrics*.

Figueroa, T. E., & DeCotiis, K. N. (2025). *Urinary Incontinence in Children—Pediatrics*. https://www.msdmanuals.com/professional/pediatrics/urinary-incontinence-in-children/urinary-incontinence-in-children

Gasibat, Q., E. Rafieda, A., & Mustafa Aween, M. (2024). The Influence of Therapeutic Massage on Muscle Recovery, Physiological, Psychological and Performance in Sport: A Systematic Review. *Sport Mont Journal*, *22*(1), 147–164. https://doi.org/10.26773/smj.240220

Harris, J., Lipson, A., & Santos, J. D. (2023). *Evaluation and Management of Enuresis in the General Paediatric Setting*. Canadian Paediatric Society. https://cps.ca/en/documents/position/evaluation-and-management-of-enuresis-in-the-general-paediatric-setting

Health & Medicine. (2020). *Diet and Cancer: Investigating the Mechanisms of Polyphenolic Compounds in Extra Virgin Olive Oil—Research Outreach*. https://researchoutreach.org/articles/diet-cancer-investigating-mechanisms-polyphenolic-compounds-extra-virgin-olive-oil/

Huang, T., Liang, Z., Wang, K., Miao, X., & Zheng, L. (2025). Novel Insights Into Athlete Physical Recovery Concerning Lactate Metabolism, Lactate Clearance and Fatigue Monitoring: A Comprehensive Review. *Frontiers in Physiology*, *16*. https://doi.org/10.3389/fphys.2025.1459717

Ilmi, M. A., Setijono, H., Roepajadi, J., Turi, M., & Putri, S. T. (2025). Reduction in pain intensity, range of motion and serum creatine kinase through manipulation of sport massage. *Edelweiss Applied Science and Technology*, *9*(5), 1446–1452.

Johns Hopkins Medicine. (2024). *Urinary Incontinence in Children*. https://www.hopkinsmedicine.org/health/conditions-and-diseases/urinary-incontinence/urinary-incontinence-in-children

Jørgensen, C. S., Horsdal, H. T., Rajagopal, V. M., Grove, J., Als, T. D., Kamperis, K., Nyegaard, M., Walters, G. B., Eðvarðsson, V. Ö., Stefánsson, H., Nordentoft, M., Hougaard, D. M., Werge, T., Mors, O., Mortensen, P. B., Agerbo, E., Rittig, S., Stefánsson, K., Børglum, A. D., … Christensen, J. H. (2021). Identification of Genetic Loci Associated With Nocturnal Enuresis: A Genome-Wide Association Study. *The Lancet. Child & Adolescent Health*, *5*(3), 201–209. https://doi.org/10.1016/S2352-4642(20)30350-3

Kafrawi, F. R., Nurhasan, N., Wahjuni, E. S., Ayubi, N., Muhammad, H. N., Kusnanik, N. W., & Komaini, A. (2023). Massage Has the Potential to Accelerate Recovery and Decrease Muscle Soreness after Physical Exercise (Literature Review). *International Journal of Human Movement and Sports Sciences*, *11*(1), 170–175. https://doi.org/10.13189/saj.2023.110120

Kandemir, E., Sezer, A., & Sarikaya, M. (2025). Stratifying Treatment-Resistant Monosymptomatic Nocturnal Enuresis: Identifying the Subgroup Most Responsive to Biofeedback Therapy. *Diagnostics*, *15*(17), 2247. https://doi.org/10.3390/diagnostics15172247

Kannan, P., & Bello, U. M. (2022). The Efficacy of Different Forms of Acupuncture for the Treatment of Nocturnal Enuresis in Children: A Systematic Review and Meta-Analysis. *Explore*, *18*(4), 488–497. https://doi.org/10.1016/j.explore.2021.11.008

Lauters, R. A., Garcia, K. W., & Arnold, J. J. (2022). *Enuresis in Children: Common Questions and Answers*. *106*(5).

Li, X., Wen, J. G., Xie, H., Wu, X. D., Shen, T., Yang, X. Q., Wang, X. Z., Chen, G. X., Yang, M. F., & Du, Y. K. (2020). Delayed in toilet training association with pediatric lower urinary tract dysfunction: A systematic review and meta-analysis. *Journal of Pediatric Urology*, *16*(3), 352.e1-352.e8. https://doi.org/10.1016/j.jpurol.2020.02.016

Liao, J., Zhu, L., Xie, D., Wang, X., & Zhou, P. (2024). Improving the quality of life of children and parents with nocturnal enuresis: The role of health education. *Frontiers in*

Pediatrics, *12*, 1464465. https://doi.org/10.3389/fped.2024.1464465

LV, Z.-T., Song, W., Wu, J., Yang, J., Wang, T., Wu, C., Gao, F., Yuan, X., Liu, J., & Li, M. (2015). Efficacy of Acupuncture in Children with Nocturnal Enuresis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Evidence-Based Complementary and Alternative Medicine*, *2015*, 1–12. https://doi.org/10.1155/2015/320701

Mayow, A., Elmi, A., Mukhtar, M., Dirie, M., Adan, M., Siad, M., Matan, M., & Salad, F. (2026). Prevalence and Factors Associated with Nocturnal Enuresis Among Children Aged 6–14 Years in Mogadishu: A Hospital-Based Cross-Sectional Study. *Pediatric Health, Medicine and Therapeutics*, *Volume 17*, 1–11. https://doi.org/10.2147/PHMT.S559350

Mazza, A. D. (2025). Olive Oil and Longevity: A Review of Evidence Linking Mediterranean Fats to Healthy Aging. *Journal of Nutrition and Health Sciences*, *12*(1).

McLaughlin, L., Brown, R., & Majothi, F. (2025). *Nocturnal enuresis*. York. https://hnyppr.org.uk/web/york/w/nocturnal-enuresis-pathway

Modi, P., Agarwal, R., & Singhal, L. (2024). Clinico-Epidemiological Profile of Children Presenting With Enuresis. *International Journal of Science and Research Archive*, *12*(1), 2092–2096. https://doi.org/10.30574/ijsra.2024.12.1.0964

Nevéus, T., Fonseca, E., Franco, I., Kawauchi, A., Kovacevic, L., Nieuwhof-Leppink, A., Raes, A., Tekgül, S., Yang, S. S., & Rittig, S. (2020). Management and Treatment of Nocturnal Enuresis—An Updated Standardization Document From the International Children's Continence Society. *Journal of Pediatric Urology*, *16*(1), 10–19. https://doi.org/10.1016/j.jpurol.2019.12.020

Nieuwhof-Leppink, A. J., Schroeder, R. P. J., Van De Putte, E. M., De Jong, T. P. V. M., & Schappin, R. (2019). Daytime urinary incontinence in children and adolescents. *The Lancet Child & Adolescent Health*, *3*(7), 492–501. https://doi.org/10.1016/S2352-4642(19)30113-0

Pediatric Patient Education. (2024). Bedwetting and School-aged Children. *Pediatric Patient Education*, (Juni). https://doi.org/10.1542/peo_document012

Perrone, P., & D'Angelo, S. (2025). Original Article Extra Virgin Olive Oil as a Functional Food for Athletes: Recovery, Health, and Performance. *Journal of Physical Education and Sport*, *25*, 370–381. https://doi.org/10.7752/jpes.2025.02042

Porter, J. S., Paladino, A. J., Russell, K., Rupff, R., Griffith, J., Mai, Y., Zhang, H., Hankins, J. S., & Wang, W. C. (2022). Nocturnal Enuresis in Sickle Cell: Sociodemographic, Medical, and Quality of Life Factors. *Journal of Pediatric Psychology*, *47*(1), 75–85. https://doi.org/10.1093/jpepsy/jsab079

Rahman, U., & Balagopal. (2025). Nocturnal Enuresis and Its Management: An Overview. *International Journal of Academic Medicine and Pharmacy*, *7*(3). https://doi.org/10.47009/jamp.2025.7.3.9

Raising Children Network. (2023). *Urinary Incontinence*. https://raisingchildren.net.au/guides/a-z-health-reference/urinary-incontinence

Ramadhania, N. R. (2026). Chemical Composition and Aromatherapy-Based Relaxation Potential of Selected Indonesian Herbal Essential Oils. *ALCHEMY Jurnal Penelitian Kimia*, *22*(1), 60–73. https://doi.org/10.20961/alchemy.22.1.114348.60-73

Robson, W. L. M., & Mathews, R. I. (2024). *Enuresis Treatment & Management: Approach Considerations, Initial Management, Alarm Therapy*. Medscape. https://emedicine.medscape.com/article/1014762-treatment

Rodríguez-López, P., Lozano-Sánchez, J., Borrás, I., Emanuelli, T., Menendez, J., & Segura Carretero, A. (2020). Structure–Biological Activity Relationships of Extra-Virgin Olive Oil Phenolic Compounds: Health Properties and Bioavailability. *Antioxidants*, *9*, 685. https://doi.org/10.3390/antiox9080685

Saad, B., & Kmail, A. (2025). Olive Oil Polyphenols in Cancer: Molecular Mechanisms and Therapeutic Promise. *Immuno*, *5*(3), 36. https://doi.org/10.3390/immuno5030036

Sattayakhom, A., Wichit, S., & Koomhin, P. (2023). The Effects of Essential Oils on the Nervous System: A Scoping Review. *Molecules*, *28*(9), 3771. https://doi.org/10.3390/molecules28093771

Serreli, G., & Deiana, M. (2020). Extra Virgin Olive Oil Polyphenols: Modulation of Cellular Pathways Related to Oxidant Species and Inflammation in Aging. *Cells*, *9*(2), 478. https://doi.org/10.3390/cells9020478

Shain, S., Gitlin, J., Pantazis, A., Fine, R., Horowitz, M., Friedman, S., Zelkovic, P., Dyer, L., Schlussel, R., Freyle, J., Fang, A., Sommer, J., & Franco, I. (2024). Management of the Refractory Nocturnal Enuresis Patient to Desmopressin in a Pediatric Population: Desmopressin + Oxybutynin vs. Desmopressin + Imipramine. *Journal of Pediatric Urology*, *20*(4), 603.e1-603.e8. https://doi.org/10.1016/j.jpurol.2024.05.024

Shamsi, H., Okhovatian, F., & Khademi Kalantari, K. (2022). Physiological and Neurophysiological Effects of Sports Massage on the Athletes' Performance: A Review Study. *The Scientific Journal of Rehabilitation Medicine*, *11*, 680–691. https://doi.org/10.32598/SJRM.11.5.12

Sharifi, H., Minaie, M. B., Qasemzadeh, M. J., Ataei, N., Gharehbeglou, M., & Heydari, M. (2017). Topical use of Matricaria recutita L (Chamomile) Oil in the Treatment of Monosymptomatic Enuresis in Children: A Double-Blind Randomized Controlled Trial. *Journal of Evidence-Based Complementary & Alternative Medicine*, *22*(1). https://doi.org/10.1177/2156587215608989

The Royal Children's Hospital Melbourne. (2019). *Clinical Practice Guidelines: Enuresis—Bed wetting and Monosymptomatic Enuresis*. https://www.rch.org.au/clinicalguide/guideline_index/Enuresis_-_Bed_wetting_and_Monosymptomatic_Enuresis/?utm_source=copilot.com

Wang, L., Mikhail, M., Varghese, A., Rickard, M., Chua, M., Lorenzo, A., & Santos, J. D. (2025). Current and Future Perspectives on Managing Primary Nocturnal Enuresis. *Current Bladder Dysfunction Reports*, *20*(1), 14. https://doi.org/10.1007/s11884-025-00784-8

Wei, M., Shen, X., & Wang, S. (2025). Comparative Effects of Recovery Strategies on Exercise-Induced Muscle Fatigue:A Randomized Controlled Trial. *Frontiers in Physiology*, *16*, 1622669. https://doi.org/10.3389/fphys.2025.1622669

Welis, W., Darni, D., & Mario, D. T. (2023). Sports Massage: How does it Affect Reducing Lactic Acid Levels in Athletes? *International Journal of Human Movement and Sports Sciences*, *11*(1), 20–26. https://doi.org/10.13189/saj.2023.110103

Zhai, Y., Zhang, Y., & Gou, H. (2025). Pharmacological treatment of pediatric nocturnal enuresis: A systematic review and network meta-analysis. *Pediatric Nephrology*, *40*(9), 2795–2806. https://doi.org/10.1007/s00467-025-06783-5

Zhang, T., Zhao, J., Dong, W., Wang, X., Hai, G., Bi, Y., & Wei, J. (2026). Characterization and Mechanistic Insights Into the Antioxidant and Anti-Aging Components of Extra Virgin Olive Oil. *Plant Foods for Human Nutrition*, *81*(1), 15. https://doi.org/10.1007/s11130-025-01465-x

Zubaida, I., Dhani, D., Anugrah, S., & Triprayogo, R. (2023). Revitalizing Performance: Exploring the Influence of Sports Massage and PNF Stretching on Lactic Acid Recovery in Females Futsal Athletes. *Journal Sport Area*, *8*(3), 310–317. https://doi.org/10.25299/sportarea.2023.vol8(3).13712