Ukrainian Journal of Nephrology and Dialysis
Scientific and Practical, Medical Journal

Founder:
- National Kidney Foundation of Ukraine

ISSN 2304-0238;
eISSN 2616-7352

Journal homepage: https://ukrjnd.com.ua

Research article

doi: 10.31450/ukrjnd.4(84).2024.10

Anggit Prasetya[1,2], Agus Santosa[1], Jebul Suroso[1]

Nursing intervention: Kinesio taping to reduce restless legs syndrome symptoms in patients undergoing hemodialysis

[1]Faculty of Health Sciences, Universitas Muhammadiyah Purwokerto, Banyumas, Central Java, Indonesia
[2]Prof. Dr. Margono Soekarjo Regional General Hospital, Banyumas, Central Java, Indonesia

Citation: Prasetya A, Santosa A, Suroso J. Nursing intervention: Kinesio taping to reduce restless legs syndrome symptoms in patients undergoing hemodialysis. Ukr J Nephrol Dial. 2024;4(84):86-91. doi: 10.31450/ukrjnd.4(84).2024.10.

Abstract. *Restless legs syndrome (RLS) is a common neurological disorder affecting hemodialysis patients, significantly impacting their quality of life. While traditional treatments can provide relief, complementary interventions such as Kinesio taping (KT) may offer additional benefits. This study aimed to evaluate the effectiveness of KT in reducing RLS symptoms in patients undergoing hemodialysis.*
Methods. A quasi-experimental study with a one-group pretest-posttest design was conducted from June to August 2024 at the hemodialysis unit of Prof. Dr. Margono Soekarjo Regional General Hospital, Banyumas, Central Java, Indonesia. Thirty-nine patients aged 18 years or older and experiencing RLS symptoms were selected using simple random sampling. Patients with diabetes mellitus or those who did not complete the intervention were excluded. RLS symptom severity was assessed at baseline, three days, and six days post-intervention using the Assessment Criteria for Diagnostic Restless Legs Syndrome. Data were analyzed using the Wilcoxon test to assess the effect of KT.
Results. The study found a significant reduction in RLS symptoms after the KT intervention. Mean RLS scores showed a consistent decrease across three domains: pain, itching, and crawling sensations. By day six, pain reduced from a baseline of 3.54 to 1.22, itching from 3.32 to 1.43, and crawling sensation from 2.46 to 1.3. Other symptoms, including heat and muscle stiffness, also showed significant improvement, with p-values < 0.001.
Conclusions. Our preliminary findings suggest that KT can be an effective non-pharmacological intervention for alleviating RLS symptoms in hemodialysis patients. KT may serve as a beneficial nursing intervention to reduce RLS symptoms in this population. This simple, non-invasive technique should be considered as part of comprehensive RLS care for patients undergoing hemodialysis.
Keywords: *kinesio taping, restless legs syndrome, hemodialysis, nursing intervention*

Article history:
Received September 22, 2024
Received in revised form October 21, 2024
Accepted October 22, 2024

Conflict of interest. The authors declare no conflict of interest.

Correspondence should be addressed to Agus Santosa: agussantosa@ump.ac.id

УДК: 614.253.5:[616.61-085.38-073.27+617.58]:615.825

Анггіт Прасетя[1,2], Агус Сантоса[1], Джебул Суросо[1]

Сестринське втручання: кінезіотейпування для зменшення симптомів синдрому неспокійних ніг у пацієнтів, які лікуються методом гемодіалізу

[1]Факультет наук про здоров'я, Університет Мухаммадії Пурвокерто, Баньюмас, Центральна Ява, Індонезія
[2]Регіональна загальна лікарня ім. Маргоно Сукарджо, Баньюмас, Центральна Ява, Індонезія

Резюме. *Синдром неспокійних ніг (СНН) є поширеним неврологічним розладом у пацієнтів, які лікуються методом гемодіалізу (ГД), що суттєво впливає на якість життя хворих. У той час як традиційні методи лікування можуть лише забезпечити полегшення, додаткові втручання, такі як кінезіотейпування (КТ), можуть запропонувати додаткові переваги. Це дослідження мало на меті оцінити ефективність КТ у зменшенні симптомів СНН у ГД пацієнтів.*

Методи. З червня по серпень 2024 року у відділенні гемодіалізу Регіональної загальної лікарні імені проф. Маргоно Соекарджо, Банюмас, Центральна Ява, Індонезія, було проведено квазіекспериментальне дослідження з одногруповою схемою претест-посттест. Тридцять дев ять пацієнтів у віці 18 років і старше, які мали симптоми СНН, були включені до дослідження за допомогою простої випадкової вибірки. Пацієнти з цукровим діабетом або ті, хто не завершив втручання, були виключені. Тяжкість симптомів СНН оцінювали на початку, через три та шість днів після втручання за допомогою критеріїв оцінки діагностики синдрому неспокійних ніг. Дані аналізували за допомогою тесту Вілкоксона.

Результати. Дослідження виявило значне зменшення симптомів СНН після втручання КТ. Середні бали таких показників як біль, свербіж і відчуття повзання мурашок продемонстрували послідовне зниження. На шостий день біль зменшився з вихідного рівня 3,54 до 1,22 бали, свербіж з 3,32 до 1,43 бали, а відчуття повзання з 2,46 до 1,3 балів. Інші симптоми, включаючи жар і ригідність м'язів, також показали статистично значуще покращення ($p < 0,001$).

Висновки. Наші попередні результати свідчать, що КТ може бути ефективним немедикаментозним втручанням для полегшення симптомів СНН у ГД пацієнтів. КТ може бути корисним медсестринським втручанням для зменшення симптомів СНН у цій популяції. Цю просту, неінвазивну техніку слід розглядати як частину комплексної допомоги ГД пацієнтам з СНН.

Ключові слова: *кінезіотейпування, синдром неспокійних ніг, гемодіаліз, медсестринське втручання.*

Introduction. Restless legs syndrome (RLS) is a prevalent and debilitating condition, especially among patients undergoing hemodialysis. It is characterized by an irresistible urge to move the legs, often accompanied by uncomfortable sensations such as itching, pain, and tingling. The prevalence of RLS in this population varies widely, with estimates ranging from 6.6% to 80%, largely due to differences in diagnostic criteria, study methodologies, and patient populations [1–4]. Hemodialysis patients, due to the chronic nature of their condition and associated physiological disruptions, are particularly vulnerable to RLS, which significantly impacts their quality of life [5]. Despite its high prevalence, managing RLS in these patients remains challenging due to complex pathophysiological factors, including uremia, iron deficiency, and chronic inflammation [6, 7].

Agus Santosa
agussantosa@ump.ac.id

Pharmacological treatments such as dopaminergic agents and gabapentin have shown efficacy in reducing RLS symptoms; however, these medications often have side effects and may not be suitable for long-term use in all patients [8, 9] Non-pharmacological interventions, including reflexology, massage, and aerobic exercise, have also shown some success in alleviating symptoms and improving sleep quality [10, 11]. Nevertheless, there remains a need for alternative, non-invasive treatments that can be easily applied and integrated into the daily routines of hemodialysis patients, particularly for those who continue to experience discomfort despite current treatments. This presents an empirical gap in identifying effective, low-risk interventions for managing RLS in this population.

Kinesio taping (KT) has emerged as a potential therapeutic approach for a variety of conditions involving pain and discomfort, yet its application specifically for RLS remains underexplored. Previous studies have shown that KT can improve muscle function, enhance proprioception, and increase circulation, potentially offering relief for symptoms associated with RLS [12–14]. Despite these promising mechanisms, a notable theoretical gap exists in understanding how KT can be effectively utilized for RLS symptom management in

hemodialysis patients. Most existing studies focus on KT's effects in musculoskeletal conditions, and limited empirical evidence addresses its use in neurological conditions such as RLS.

This study aims to address both the empirical and theoretical gaps by investigating the effectiveness of KT as a non-pharmacological intervention for reducing RLS symptoms in hemodialysis patients. This study's contribution lies in exploring KT as an underutilized intervention for RLS in hemodialysis patients, offering a novel approach in symptom management. The findings highlight KT's potential utility as an adjunctive non-pharmacological treatment, with implications for improving patient quality of life.

Materials and methods. This quasi-experimental study used a one-group pretest-posttest design [15] and was conducted from June to August 2024 in the Hemodialysis Unit of Prof. Dr. Margono Soekarjo Regional General Hospital in Banyumas, Central Java, Indonesia. The research received ethical approval from the Ethics Committee of Prof Dr. Margono Soekarjo Regional General Hospital (Approval No: KEPK/RSMS/420/05090). All participants provided written informed consent before inclusion in the study.

The study population comprised patients undergoing hemodialysis. A total of 39 respondents were selected using simple random sampling, with inclusion criteria of patients aged 18 years or older, regularly undergoing hemodialysis, experiencing RLS symptoms, and willing to participate [16, 17]. Patients with comorbid diabetes mellitus or those who did not complete the intervention were excluded to reduce potential confounding effects, as diabetes is known to independently affect RLS symptoms. Excluding these cases allowed a more focused evaluation of the effectiveness of KT in a homogenous RLS patient population.

The study's outcome was RLS symptom severity, measured using the Assessment Criteria for Diagnostic Restless Legs Syndrome. This tool provides a multi-dimensional assessment, evaluating pain, itching, crawling sensations, and muscular stiffness on a 0–4 scale, where 0 indicates no symptoms and 4 denotes the most severe level [18]. Symptom data were collected at three points: baseline, three days post-intervention, and six days post-intervention.

The KT intervention was applied to the affected lower extremities, targeting muscle activation areas around the calves and shins. The tape was applied at approximately 15–25% tension to offer moderate support without restricting movement (Fig. 1).

Fig 1. Kinesio taping applications.

Each application remained for 3–5 days, with reassessment and reapplication as needed. Taping was conducted by trained practitioners, and participants received basic instructions on reapplication if required post-study.

For the statistical analysis, the Wilcoxon test was used to analyze the effectiveness of KT in reducing RLS symptoms in hemodialysis patients [19].

Results. Among the study participants, there were 16 males and 23 females, aged 26 to 81, with most falling within the 46–55 age range. The majority experienced RLS with varying severity levels, and a significant proportion had moderate to severe symptoms. When analyzed by gender, both male and female patients displayed a similar distribution of RLS severity, with a notable percentage experiencing severe symptoms (Table 1).

KT was applied to mitigate RLS symptoms, with its effectiveness evaluated at three intervals: at baseline (before intervention), three days post-intervention, and six days post-intervention. Results demonstrated substantial improvements in key symptoms, including pain, itching, crawling sensations, sensations of heat, and muscle cramps or stiffness. Pain and itching showed especially consistent reductions from baseline through day six, while crawling sensations, heat, and muscle stiffness also displayed marked improvement over time (Fig. 2).

Table 1

Demographic and clinical characteristics of the participants (n=39)

Characteristics	Result
Sex	
Man	16 (41%)
Woman	23 (59%)
Age, years old	
Mean	46-55
Min-Max	26-81
Grade RLS	
Mild	0 (0%)
Moderat	16 (41%)
Sever	23 (59%)
Grade RLS based on sex	
Man	Mild 0 (0%); Mild 5 (13%); Sever 11(28%)
Woman	Mild 0 (0%); Mild 11 (28%); Sever 12 (31%)

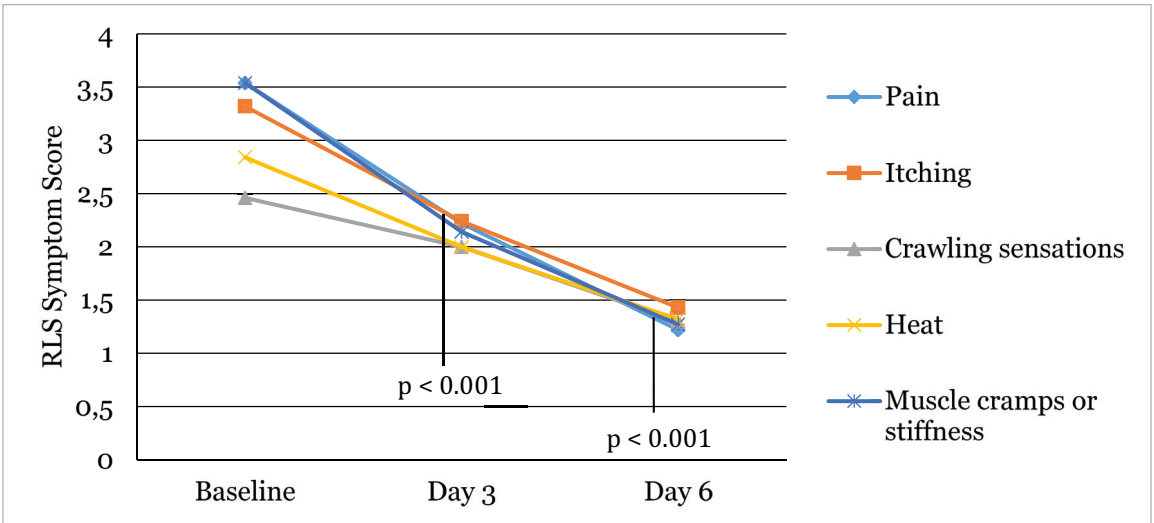

Fig 2. Effectiveness of kinesio taping in reducing RLS symptoms

Statistical analysis confirmed the symptom reductions were significant, with p-values < 0.001 across all parameters. Qualitative feedback from patients further supported these findings, with patients reporting high comfort levels with KT application during both hemodialysis sessions and daily activities. No adverse effects or discomfort were noted during the study period, suggesting KT as a well-tolerated intervention. These findings indicate that KT could serve as an effective, non-pharmacological approach to reduce RLS symptoms and improve the quality of life for hemodialysis patients with RLS.

Discussion. The findings of this study demonstrate that KT effectively reduces RLS symptoms in patients undergoing hemodialysis. Symptoms such as pain, itching, crawling sensations, heat, and muscle cramps or stiffness showed significant improvement after KT application, with statistical analysis revealing p-values < 0.001 across all symptom parameters. These results suggest that KT can be a beneficial non-pharmacological intervention for managing RLS in hemodialysis patients.

Qualitative feedback highlighted patient comfort with KT, as patients consistently reported ease of application and tolerance of the tape both during hospital hemodialysis sessions and at home. This positive feedback aligns with KT's intended design as a non-invasive intervention, supporting its feasibility for long-term use. Additionally, the absence of adverse effects, such as skin irritation, further reinforces KT's suitability for integration into routine care for RLS management in hemodialysis patients.

The physiological mechanisms underlying KT's effectiveness in alleviating RLS symptoms likely include improvements in muscle function and pain modulation. KT is known to enhance proprioception, improve neuromuscular control, and increase local circulation and lymphatic flow [12, 20]. This enhanced circulation can help reduce discomfort associated with the urge to move the legs, a characteristic of RLS [21]. In this study, reductions in pain, itching, and crawling sensations support the hypothesis that KT's circulatory and neuromuscular effects play a significant role in symptom relief.

Previous studies have shown that KT can reduce pain and improve functional outcomes in patients with musculoskeletal and neurological conditions [22, 23]. Although direct evidence of KT's effect on RLS is limited, mechanisms observed in other contexts, such as increased proprioceptive feedback and improved balance, may explain the positive outcomes in this study. Enhanced proprioception and muscle activation likely contributed to better limb control, potentially reducing the frequency of involuntary leg movements common in RLS patients [12].

Managing RLS in hemodialysis patients remains a challenge due to the multifactorial nature of the condition, with contributing factors such as iron deficiency, uremia, and imbalances in calcium and phosphorus metabolism well-documented [6, 7]. Chronic inflammation in end-stage renal disease further exacerbates RLS symptoms [24]. While pharmacological treatments, such as dopaminergic agents like pramipexole and gabapentin, have been effective [8, 9], non-pharmacological interventions like KT provide an appealing alternative, particularly for patients seeking non-invasive therapies.

Other non-pharmacological approaches, such as reflexology, massage, and aerobic exercise, have also shown promise in reducing RLS symptoms and improving sleep quality [10, 11, 25]. Similar to KT, these interventions may improve circulation and muscle relaxation, underscoring the potential of physical function enhancement to relieve RLS discomfort. However, KT has the added advantage of being easy to apply, non-invasive, and convenient for long-term use, distinguishing it from other treatments requiring frequent sessions.

Compared to other interventions, KT offers a continuous and convenient approach that may be particularly suited for hemodialysis patients, who might find frequent appointments challenging. Reflexology and aerobic exercise have been effective in alleviating RLS symptoms, but KT's prolonged symptom relief and suitability for long-term use present it as a unique and valuable option.

The novelty of this research lies in applying KT to a patient population and condition not extensively studied in this context. By evaluating KT's impact on key RLS symptoms, such as pain, itching, and crawling sensations, the study contributes to the understanding of non-pharmacological interventions for RLS and offers a novel approach that could complement existing therapies. The results may significantly impact quality of life improvements for hemodialysis patients with RLS, while also expanding KT's clinical applications.

Despite promising results, this study has limitations, including the potential for self-report bias, as patients' assessments of symptom changes were subjective and could be influenced by personal expectations. Additionally, the small sample size limits generalizability. Future studies should consider a randomized controlled trial design with a larger sample size to validate KT's effectiveness in this population.

Conclusions. In conclusion, KT shows promise as an intervention for reducing RLS symptoms in patients undergoing hemodialysis. Its potential to enhance proprioception, increase circulation, and improve neuromuscular control likely underlies the observed symptom relief. Given its non-invasive nature and potential effectiveness, KT could be integrated into standard nursing care practices for RLS management among hemodialysis patients. Future studies should aim to develop standardized KT protocols, considering individual patient needs and incorporating multidisciplinary insights to optimize outcomes.

Conflict of interest statement. The authors declare that they have no competing interests.

Funding source. The research was entirely self-funded.

Author Contributions. All the authors equally participated in draft preparation, manuscript revision, and content evaluation. All authors have read and agreed to the content of the manuscript and confirm the accuracy and integrity of every detail of this research.

Data Availability Statement. The data used in this study are available from the corresponding author and all co-authors upon request.

Acknowledgment. All authors thank Margono Soekarjo Regional General Hospital and Universitas Muhammadiyah Purwokerto for their support.

References:

1. *Salib M, Memon AN, Gowda AS, Rallabhandi B, Bidika E, Fayyaz H, et al.* Dialysis Patients With Restless Leg Syndrome: Can We Relieve Their Suffering? Cureus. 2020;12(8):e10053. doi:10.7759/cureus.10053.
2. *Tang M, Ge J, Sun K, Cui B, Guan Y, Wang J.* A Network Meta-analysis of the Effectiveness and Safety of Drugs for Restless Legs Syndrome in Dialysis Patients. Semin Dial. 2021;35(4):293-306. doi:10.1111/sdi.13021.

3. *Tutan D, Ulfberg J, Aydemir N, Eser B, Doğan İ.* The Relationship Between Serum Selenium Levels and Restless Leg Syndrome in Chronic Kidney Disease Patients. Medicina (B Aires). 2023;59(10):1795. doi:10.3390/medicina59101795.
4. *Harahap RH, Muzasti RA, Nasution AT.* Laboratory finding and restless legs syndrome in regular hemodialysis patients. Int J Res Sci Manag. 2020;7(11):68-71. doi: 10.29121/ijrsm.v7.i11.2020.8.
5. *Dikici S, Bahadir A, Baltaci D, Ankarali H, Eroglu M, Ercan N, et al.* Association of Anxiety, Sleepiness, and Sexual Dysfunction With Restless Legs Syndrome in Hemodialysis Patients. Hemodial Int. 2014;18(4):809-818. doi:10.1111/hdi.12175.
6. *Kahvecioğlu S, Yıldız D, Büyükkoyuncu N, Celik H, Tufan F, Kılıç AK, et al.* Effect of Renal Transplantation in Restless Legs Syndrome. Exp Clin Transplant. 2016;14(1):45-9. doi: 10.6002/ect.2014.0163.
7. *Neves PDM de M, Graciolli FG, Oliveira IB, Bridi RA, Moysés RMA, Elias RM.* Effect of Mineral and Bone Metabolism on Restless Legs Syndrome in Hemodialysis Patients. J Clin Sleep Med. 2017;13(01):89-94. doi: 10.5664/jcsm.6396.
8. *Safarpour Y, Vaziri ND, Jabbari B.* Restless Legs Syndrome in Chronic Kidney Disease- A Systematic Review. Tremor Other Hyperkinet Mov (N Y). 2023;13:10. doi: 10.5334/tohm.752.
9. *Hajian S, Nikfam MRR, Esmayeilzad Z.* Comparison of the Effects of Pramipexole and Gabapentin on the Treatment of Restless Leg Syndrome in End-Stage Chronic Renal Failure Patients Undergoing Hemodialysis. J Nephropathol. 2020;9(3):e25-e25. doi: 10.34172/jnp.2020.25.
10. *Ghanbari A, Shahrbabaki PM, Dehghan M, Mardanparvar H, Abadi EKD, Emami A, et al.* Comparison of the Effect of Reflexology and Swedish Massage on Restless Legs Syndrome and Sleep Quality in Patients Undergoing Hemodialysis: A Randomized Clinical Trial. Int J Ther Massage Bodywork.2022;15(2):1-13. doi: 10.3822/ijtmb.v15i2.705.
11. *Mortazavi M, Vahdatpour B, Ghasempour A, et al.* Aerobic Exercise Improves Signs of Restless Leg Syndrome in End Stage Renal Disease Patients Suffering Chronic Hemodialysis. Sci World J. 2013;2013(1). doi: 10.1155/2013/628142.
12. *Kim WI, Choi YK, Lee JH, Park YH.* The Effect of Muscle Facilitation Using Kinesio Taping on Walking and Balance of Stroke Patients. J Phys Ther Sci. 2014;26(11):1831-1834. doi: 10.1589/jpts.26.1831.
13. *Lim C, Park Y, Bae Y.* The Effect of the Kinesio Taping and Spiral Taping on Menstrual Pain and Premenstrual Syndrome. J Phys Ther Sci. 2013;25(7):761-764. doi: 10.1589/jpts.25.761.
14. *Hartanto WD.* Physical Exercise Intervention in Reducing the Severity Level of Restless Leg Syndrome in Hemodialysis Patients: Literature Review. J Aisyah J Ilmu Kesehat. 2023;8(3). doi: 10.30604/jika.v8i3.2179.
15. *Miller CJ, Smith SN, Pugatch M.* Experimental and quasi-experimental designs in implementation research. Psychiatry Res. 2020;283:112452. doi: 10.1016/j.psychres.2019.06.027.
16. *Kang H.* Sample size determination and power analysis using the G*Power software. J Educ Eval Health Prof. 2021;18:17. doi: 10.3352/jeehp.2021.18.17.
17. *Elfil M, Negida A.* Sampling methods in Clinical Research; an Educational Review. Emerg (Tehran, Iran). [Internet]. 2017;5(1):e52-e52. Available from: https://pubmed.ncbi.nlm.nih.gov/28286859/.
18. *Brindani F, Vitetta F, Gemignani F.* Restless legs syndrome: differential diagnosis and management with pramipexole. Clin Interv Aging. 2009;4:305-313. doi: 10.2147/cia.s4143.
19. *Proudfoot JA, Lin T, Wang B, Tu XM.* Tests for paired count outcomes. Gen psychiatry. 2018;31(1):e100004. doi: 10.1136/gpsych-2018-100004.
20. *Choi YK, Park YH, Lee JH.* Effects of Kinesio Taping and McConnell Taping on Balance and Walking Speed of Hemiplegia Patients. J Phys Ther Sci. 2016;28(4):1166-1169. doi: 10.1589/jpts.28.1166.
21. *Bae SH, Lee JH, Oh KA, Kim KY.* The Effects of Kinesio Taping on Potential in Chronic Low Back Pain Patients Anticipatory Postural Control and Cerebral Cortex. J Phys Ther Sci. 2013;25(11):1367-1371. doi: 10.1589/jpts.25.1367.
22. *Aksu NT, Erdoğan M, Erdoğan A.* The Effect of Kinesio Taping on Pain, Respiratory Function, and Muscle Strength After Thoracotomy. Turkish J Thorac Cardiovasc Surg. 2023;31(4):507-516. doi: 10.5606/tgkdc.dergisi.2023.24407.
23. *Kaplan Ş, Alpaycı M, Karaman E, Çetin O, Özkan Y, İlter S, et al.* Short-Term Effects of Kinesio Taping in Women With Pregnancy-Related Low Back Pain: A Randomized Controlled Clinical Trial. Med Sci Monit. 2016;22:1297-1301. doi: 10.12659/msm.898353.
24. *Capelli I, Pizza F, Ruggeri M, Gasperoni L, Carretta E, Donati G, et al.* Time Evolution of Restless Legs Syndrome in Haemodialysis Patients. Clin Kidney J. 2021;14(1):341-347. doi: 10.1093/ckj/sfz148.
25. *Ghasemi M, Rejeh N, Bahrami T, Heravi-Karimooi M, Tadrisi SD, Vaismoradi M.* Aromatherapy Massage vs. Foot Reflexology on the Severity of Restless Legs Syndrome in Female Patients Undergoing Hemodialysis. Geriatrics. 2021;6(4):99. doi: 10.3390/geriatrics6040099.