ORIGINAL RESEARCH

Impact of Lavender Herbal Tea on Sleep Quality in Elderly Patients with Poor Sleep Quality: A Randomized Study

Ece Yigit[1]* iD, Sevket Yalcin[2] iD

[1]Department of Internal Medicine, Faculty of Medicine, Istanbul Medipol University, Istanbul, Türkiye

[2]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Istanbul Medipol University, Istanbul, Türkiye

* Corresponding Author: Ece Yigit, e-mail: drece-89@hotmail.com

Abstract

Objective: Aromatherapy has been used as a complementary alternative therapy in elderly adults with poor sleep quality. Lavender has sedative, anxiolytic, and analgesic properties. This study aimed to evaluate effect of lavender herbal tea in different doses on sleep quality of elderly people**.**

Material-Method: This study has been designed as a prospective, randomized study with a two-arm parallel design. There were 94 patients aged between 65 and 75 years with a Richards-Campbell Sleep Questionnaire (RCSQ) score of <75. Patients were sequentially randomized into two groups as 1 g and 2 g lavender tea bags used for three months. Demographic and clinical characteristics were recorded. The RCSQ was administered initially and during the 1st-month and 3rd-month follow-up visits.

Results: There was no significant difference between groups in demographic and clinical characteristics (p>0.05) or in terms of baseline RCSQ scores (p=0.685). However, 1st-month and 3rd-month RCSQ scores in patients who used 2 g lavender tea bags were significantly higher than those who used 1 g herbal tea bags (p<0.001 and p<0.001, respectively). Additionally, the 1st-month and 3rd-month RCSQ scores were significantly higher than baseline RCSQ scores in both groups (p<0.05).

Conclusion: Our findings revealed that lavender herbal tea improved sleep quality in elderly patients with sleep problems. Consumption of higher doses of lavender tea (2 g vs. 1 g) resulted in significantly higher RCSQ scores. Therefore, use of lavender may be recommended in individuals with sleep problems in form of herbal tea preparations.

Keywords: Aromatherapy, Lavandula/Levander, Herbal Tea, Elderly, Sleep Quality.

INTRODUCTION

Elderly adults with chronic insomnia usually suffer from poor sleep quality[1,2]. There is a direct correlation between age and the prevalence of sleep problems[1]. Deterioration of sleep quality leads to several physical and psychological problems, and different types of treatment modalities, including behavioral and cognitive therapies and sleep hygiene practices, and pharmacological therapy, have been recommended to overcome these problems[1,2]. Traditional and herbal therapies have recently gained popularity in this regard[1,3]. Aromatherapy has been used as a complementary alternative therapy to manage stress, muscle spasms, and sleep disturbances[4,5]. Essential oils of the aromatic plants can be produced via the steam distillation of their flowers' heads and leaves[6]. Inhalation, massaging, and bathing in the extracted essential oils are the frequently used aromatherapy methods[4]. Lavender has been used due to its

sedative, anxiolytic, and analgesic properties[2,7-11]. Previous studies reported improvements in mood and sleeping problems after lavender use[12,13]. Lavender is also used to treat depression and anxiety[14]. There are different approaches regarding lavender use, utilizing respiratory, gastrointestinal, or cutaneous routes[7]. The use of its inhalable forms has reportedly improved sleep quality and increased sleep duration[6]. The use of lavender was also associated with a reduction in depression and insomnia, relief of anxiety, and calming of the mind[2,7]. It is believed that herbal tea exerts its effects in several psychological and physiological ways[7]. The scent of lavender herbal tea activates the limbic system, promoting the release of different types of neurotransmitters such as encephalin, endorphin, noradrenaline, and serotonin. These neurotransmitters may trigger changes in human emotions[7]. On the other hand, it has been speculated

that the risk of neurotoxicity and hepatic, renal, and cutaneous toxicity during the application of an essential oil via inhalation, massaging, and bathing can be higher than the risks associated with the consumption of herbal tea of the same aromatic plant[15]. In other words, consumption of herbal tea of any aromatic plant may have lower risks of side effects and allergic reactions and milder effects overall, compared to the methods of aromatherapy involving the administration of the essential oil of the same aromatic plant[2]. The relationship between lavender aromatherapy and sleep quality has been studied in diverse populations[4,16]. However, there is still some controversy on the efficiency of herbal tea in elderly people with sleep disturbances. In this context, the objective of this study is to evaluate the effect of the consumption of lavender herbal tea in different doses on the sleep quality of elderly people.

MATERIALS AND METHODS

Research design

This study has been designed as a prospective, randomized study with a two-arm parallel design to investigate the effect of the consumption of lavender tea in two different dosages on the sleep quality of elderly people. The protocol of this study was approved by the Ethical Committee of Istanbul Medipol University (date:26.10.2021, no:1046). This study was carried out in accordance with the principles set forth in the Declaration of Helsinki. Informed consent of the patients who participated in the study was obtained in advance.

Population and sample

The study population comprised the patients admitted to the outpatient clinics of Internal Medicine and Physical Therapy and Rehabilitation at Istanbul Medipol University Hospital. The study sample consisted of the patients who were a) aged between 65 and 75 years and literate, b) without lack of communication problems, c) with a Richards-Campbell Sleep Questionnaire (RCSQ) score of <75, and d) with normal cognitive functions. Patients, who were allergic to any herbal tea or lavender, had severe sleep disorders and have been receiving treatments for these disorders, have been using anti-depressive and anti-anxiety drugs, had anemia requiring parenteral treatment, severe comorbidities, including coronary artery disease, congestive heart failure, hypo-or hyperthyroidism, and alcohol abuse were excluded from the study. RCSQ was used to identify the patients with sleep problems. RCSQ is a diagnostic tool used to

evaluate the quality of sleep. Richards developed this five-item self-report questionnaire in 1987[17]. The questionnaire initially had five items, including sleep depth, latency, frequency of awakenings, time awake, quality of sleep, and subsequently was adapted to include a sixth item, that is, the perceived noise level in the environment during the night, to assess the quality of night sleep. The patients responded to each item using a visual analog scale ranging from zero to 100. Scores less than 75 indicate poor sleep quality[18]. Karaman and Ozer carried out the questionnaire's Turkish validity and reliability studies in 2015[18].

Sample size

A pilot study was performed with 20 people who were divided into two groups based on the use of 1 g and 2 g lavender tea bags. The analysis of the RCSQ scores of these 20 participants revealed a 33% difference between the groups in the percent changes between the baseline and 3rd-month RCSQ scores. Accordingly, the sample size was calculated as 42±39.6 for Group 1 and 42±63.9 for Group 2. The type I error (α value) was 0.05, and the power of the study (1-β) was 80%. A 10% drop-out rate was factored in, resulting in 47 participants per group (94 participants in total). The sample size calculation was performed using MedCalc® Statistical Software version 19.7.2 (MedCalc Software Ltd, Ostend, Belgium; https://www.medcalc.org; 2021). Consequentially, patients (n=94) were sequentially randomized into two groups, with 47 patients in each group. Patients in Group 1were provided 1 g lavender tea bags, whereas the patients in Group 2 were provided 2 g lavender tea bags.

Interventions

All patients were instructed to drink one cup (200 ml) of lavender tea preparations prepared using 1 g lavender tea bags in Group 1 and 2 g lavender tea bags in Group 2within the last hour before going to sleep for three months. The patients were also advised to inhale the scent of lavender. The herbal teabag preparations contained the flowers of *Lavandula intermedia* and were steeped for 10 minutes before drinking. A total of 90 teabags were provided to each participant, and their consumption of the tea bags was checked at one-month intervals.

Variables

The patients' demographic (age, gender) and descriptive characteristics (educational and marital status, comorbidities) were obtained during the first time they were interviewed face-to-face. The RCSQ

was administered to the patients in a quiet and comfortable room a total of three times; at the start of the study (RCSQ-baseline) and one month (RCSQ-1), and three months after the start of the study (RCSQ-3).

Blinding

The patients and the researcher who assessed the questionnaires were blind to the groupings.

Statistical analysis

The RCSQ-1 and RCSQ-3 scores were the primary outcomes of the study. The secondary outcome was the percent (%) changes observed between the RCSQ-1 and RCSQ-3 scores and the RCSQ-baseline scores.

Descriptive statistics were expressed as mean ± standard deviation values in the case of continuous variables that were determined to conform to the normal distribution, and as median and minimum-maximum values in the case of continuous variables that were determined not to conform to normal distribution. Categorical variables were expressed as numbers and percentages. The normal distribution of the numerical variables was analyzed using the Shapiro-Wilk test. The student's t-test was used to compare two independent groups with numerical variables that conform to the normal

distribution, whereas the Mann-Whitney U test was used to compare two independent groups with numerical variables that do not conform to normal distribution. The Pearson's chi-squared test was used to compare the differences between categorical variables in 2x2 tables. The Fisher's Exact test with Yates continuity correction was used in the analyses where the Pearson's chi-squared test could not be used. The Friedman test was used to analyze more than two continuous variables that do not conform to normal distribution. In the next step, the Post-Hoc analysis was performed using the Wilcoxon-Signed Rank test with Bonferroni correction to uncover the significant differences between the variables.

MedCalc® Statistical Software version 19.7.2 (MedCalc Software Ltd, Ostend, Belgium; https://www.medcalc.org; 2021) was used in all statistical analyses. Probability (*p*) values≤ 0.05 were deemed to indicate statistical significance.

RESULTS

The mean ages of the patients in Groups 1 and 2 were calculated as 68.9±2.9 and 68.9±3 years, respectively (p=0.985). There was no significant difference between the groups in gender (p=0.999) or in other demographic and clinical characteristics (p>0.05) (Table 1).

Table 1. Demographic and clinical characteristics of the study groups.

	Group 1 (n=47)	Group 2 (n=47)	p-value
Age (year)	68.9±2.9	68.9±3	0.985*
Sex			
Female	28 (59.6)	27 (57.4)	0.999**
Male	19 (40.4)	20 (42.6)	
Marital status			
Married	31 (66)	29 (61.7)	0.830**
Single	16 (34)	18 (38.3)	
Educational status			
Primary	12 (25.5)	11 (23.4)	
College	17 (36.2)	16 (34)	0.914***
University or higher	18 (38.3)	20 (42.6)	
Comorbidities			
Hypertension	24 (51.1)	23 (48.9)	0.999**
Diabetes mellitus	16 (34)	17 (36.2)	0.999**
Gastritis	20 (42.6)	22 (46.8)	0.836**
Osteoporosis	21 (55.3)	19 (40.4)	0.835**

*: Mann-Whitney U test, **: Yates's continuity correction test, ***: Chi-square test

The mean RCSQ-baseline scores were calculated as52.5±7.5 and 53.1±7 in Groups 1 and 2, respectively. The difference between the mean RCSQ-baseline scores of the groups was insignificant (p=0.685). However, there were significant differences between the RCSQ-1 and RCSQ-3 scores of the groups (p <0.001 and p<0.001, respectively). The RCSQ-1 and RCSQ-3 scores of Group 2 were significantly higher than those of Group 1 (Table 2).

Table 2. The Richards-Campbell Sleep Questionnaire scores and their changes during the study.

	Group 1 (n=47)	Group 2 (n=47)	p-value
Baseline	51.7 [40.0- 65.8]	51.7 [40.8- 65.8]	0.685*
1st month	58.4±6.9	66.7±7.5	<0.001*
3rd month	66.8±7.8	76.4±10.5	<0.001**

*: Mann-Whitney U test, **: Student t test

There were also significant differences between the groups in percent (%) changes observed between the RCSQ-1 and RCSQ-3 scores and the RCSQ-baseline scores. Significant increases were recorded in the RCSQ-1 and RCSQ-3 scores compared to the RCSQ-baseline scores in both groups (p<0.001) (Table 3) (Figure 1).

Table 3. Comparison of the percent (%) changes in the Richards-Campbell Sleep Questionnaire scores between different study intervals

	Group 1 (n=47)	p-value	Group 2 (n=47)	p-value
1st month-baseline	9.4 [-6.3-41.9]	<0.001	25.8 [-2.6-70]	<0.001
3rd month-1st month	13.6 [-4.7-35.4]	<0.001	13.6 [-3.5-50]	<0.001
3rd month-baseline	14.9 [-15.1-54.7]	<0.001	28.3 [-14.7-97.6]	<0.001

§: median [min-max], Friedman test with Bonferroni correction

The most significant change was recorded in Group 2 between the RCSQ-3 and RCSQ-baseline scores. The patients in the study groups reported no side effects related to lavender herbal tea usage.
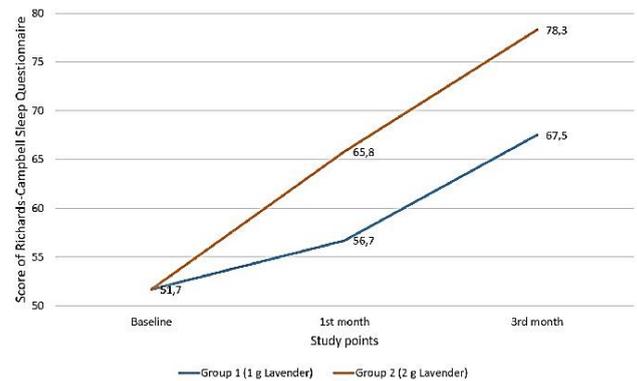

Figure 1. Trends of Richards-Campbell Sleep Questionnaire with 1 g and 2 g of lavender tea.

DISCUSSION
The findings of this study revealed that lavender herbal tea improved sleep quality in elderly patients with sleep problems. The consumption of a higher dose (2g) of lavender tea resulted in more improvements in sleep quality compared to the consumption of a lower dose (1g).

It is a known fact that anti-depressant and anxiolytic medications administered for sleep problems have considerable side effects. The effects of aromatherapy have been studied previously in the context of depression, anxiety, and sleep problems, taking the detrimental effects of such therapies into consideration[7,8]. Although the relevant outcomes show variations depending on the types of aromatic plants studied, the application routes utilized, the sleep-quality measurement tools used, and the characteristics of the study groups, there is a widespread belief that aromatherapy causes relief in the symptoms of depression, anxiety, and poor sleep quality and makes the patients feel good[2,19].

Herbal tea is a traditional form of using aromatic plants[20]. Other forms of use include essential or volatile oils, tinctures, liquid alcoholic extracts, capsules, chewing tablets, lozenges, lollipops, and creams. Although the stability of each form has not been studied in detail, herbal tea bags were preferred as the form of aromatic plants in this study merely based on convenience, considering that they are both inexpensive and easy to use[20].

Previous studies revealed the beneficial effects of lavender preparations, including herbal tea, on depression and poor sleep quality. These effects

| **International Journal of Traditional and Complementary Medicine Research** | **Publisher** *Duzce University* |

were attributed to the ingredients of lavender that act on various neurotransmitters[6,7,21,22]. Several studies reported significant improvements in sleep quality with the use of different Levander preparations[3,10,16,23-30]. However, there are only two studies that investigated the effect of lavender herbal tea on sleep quality[2,7]. In one of these two studies, Bazrafshan et al.[7] investigated the effect of lavender herbal tea on depression and anxiety scores in an elderly group and observed significant improvements after consumption of 2 g lavender herbal tea bags for two weeks. In the other study, Chen et al.[2] investigated the effect of using 2 g lavender tea bags for two weeks on fatigue, depression, and sleep quality in women with sleep disturbances during the postpartum period, yet did not observe any improvement in the sleep quality of the participants. In Chen's study, the positive effect of lavender herbal tea initially observed on postpartum depression was short-lived and became insignificant after four weeks[2]. In comparison, in this study, two different doses of lavender tea were used (1 g and 2 g tea bags) and for a more extended period (three months). Consequentially, significant improvements were observed at the end of three months with the use of both 1 g and 2 g doses. From among the two doses, the use of 2 g lavender tea bags resulted in higher increases in the RCSQ scores compared to the use of 1 g lavender tea bags. Jager et al.[31] did not detect lavender in the blood after 90 minutes of the consumption of the lavender tea. Based on this result, they concluded that the metabolic effect of the herbal tea form of the lavender might be less than its essential oil form given the trace amount of the aromatic molecules in herbal tea preparations. Therefore, multiple daily consumptions of lavender tea are needed to achieve a long-lasting effect.

In addition to studies in which a positive relation was found between the use of lavender preparations and the relief observed in the symptoms of depression and anxiety scores, there are also studies that reported no improvements in the anxiety levels with the use of lavender tea[6]. To give an example, Seifi et al.[11] performed a 2-day intervention using lavender essential oil inhalation in patients who underwent coronary artery bypass graft surgery and found no improvement in anxiety scores three days after the surgery. Hence, this study's authors believe that the duration of the intervention and the route of lavender application is of primary importance in achieving desired outcomes.

Limitations of the study
It is known that there are reciprocal relationships between depression, anxiety, and poor sleep quality; however, only sleep quality was assessed in this study. Secondly, the sleep quality measurements of the patients were carried out right after the patients finished using the lavender tea. If measurements could be repeated after a certain period, it could have been possible to assess how long the effects of the lavender tea have lasted. Selecting the patients from a single center was another limitation. Additionally, patients' adherence to herbal tea consumption was not measured, and it was assumed that the patients used lavender tea as instructed. It is clear that any non-adherence might have negatively affected the results.

CONCLUSION
In conclusion, the findings of this study revealed that lavender herbal tea improved sleep quality in elderly patients with sleep problems. Consumption of higher doses of lavender tea (2 g vs. 1 g) resulted in significantly higher RCSQ scores. Therefore, the use of lavender may be recommended in individuals with sleep problems in the form of herbal tea preparations.

REFERENCES
1. Adib-Hajbaghery M, Mousavi SN. The effects of chamomile extract on sleep quality among elderly people: A clinical trial. *Complement Ther Med*. 2017;35:109-114.
2. Chen SL, Chen CH. Effects of Lavender Tea on Fatigue, Depression, and Maternal-Infant Attachment in Sleep-Disturbed Postnatal Women. *Worldviews Evid Based Nurs*. 2015;12(6):370-379.
3. Genç F, Karadağ S, Kılıç Akça N, Tan M, Cerit D. The Effect of Aromatherapy on Sleep Quality and Fatigue Level of the Elderly: A Randomized Controlled Study. *Holist Nurs Pract*. 2020;34(3):155-162.
4. Her J, Cho MK. Effect of aromatherapy on sleep quality of adults and elderly people: A systematic literature review and meta-analysis. *Complement Ther Med*. 2021;60:102739.

5. Kawabata N, Hata A, Aoki T. Effect of Aromatherapy Massage on Quality of Sleep in the Palliative Care Ward: A Randomized Controlled Trial. *J Pain Symptom Manage*. 2020;59(6):1165-1171.

6. Greenberg MJ, Slyer JT. Effectiveness of Silexan oral lavender essential oil compared to inhaled lavender essential oil aromatherapy on sleep in adults: a systematic review protocol. *JBI Database System Rev Implement Rep*. 2017;15(4):961-970.

7. Bazrafshan MR, Jokar M, Shokrpour N, Delam H. The effect of lavender herbal tea on the anxiety and depression of the elderly: A randomized clinical trial. *Complement Ther Med*. 2020;50:102393.

8. Akhondzadeh S, Kashani L, Fotouhi A, et al. Comparison of Lavandula angustifolia Mill. tincture and imipramine in the treatment of mild to moderate depression: a double-blind, randomized trial. *Prog Neuropsychopharmacol Biol Psychiatry*. 2003;27(1):123-127.

9. Fismer K. Pilkington K. Lavender and sleep: a systematic review of the evidence. *Eur J Integr Med*. 2012;4:e436-e447.

10. Emami-Sigaroudi A, Salari A, Nourisaeed A, et al. Comparison between the effect of aromatherapy with lavender and damask rose on sleep quality in patients undergoing coronary artery bypass graft surgery: A randomized clinical trial. *ARYA Atheroscler*. 2021;17(1):1-9.

11. Seifi Z, Beikmoradi A, Oshvandi K, Poorolajal J, Araghchian M, Safiaryan R. The effect of lavender essential oil on anxiety level in patients undergoing coronary artery bypass graft surgery: A double-blinded randomized clinical trial. *Iran J Nurs Midwifery Res*. 2014;19(6):574-580.

12. Graham PH, Browne L, Cox H, Graham J. Inhalation aromatherapy during radiotherapy: results of a placebo-controlled double-blind randomized trial. *J Clin Oncol*. 2003;21(12):2372-2376.

13. Lehrner J, Marwinski G, Lehr S, Johren P, Deecke L. Ambient odors of orange and lavender reduce anxiety and improve mood in a dental office. *Physiol Behav*. 2005;86(1-2):92-95.

14. López V, Nielsen B, Solas M, Ramírez MJ, Jäger AK. Exploring Pharmacological Mechanisms of Lavender (Lavandula angustifolia) Essential Oil on Central Nervous System Targets. *Front Pharmacol*. 2017;8:280.

15. Tseng YH. Aromatherapy in nursing practice. *Hu Li Za Zhi*. 2005;52(4):11-15.

16. Faydalı S, Çetinkaya F. The effect of aromatherapy on sleep quality of elderly people residing in a nursing home. *Holist Nurs Pract*. 2018;32(1):8-16.

17. Richards K. Techniques for measurement of sleep in critical care. *Focus Crit Care*. 1987;14(4):34-40.

18. Özlü ZK, Özer N. Richard-Campbell Uyku Ölçeği Geçerlilik ve Güvenilirlik Çalışması. *J Turkish Sleep Med*. 2015;2:29-32.

19. Muzzarelli L, Force M, Sebold M. Aromatherapy and reducing preprocedural anxiety: A controlled prospective study. *Gastroenterol Nurs*. 2006;29(6):466-471.

20. Gyllenhaal C, Merritt SL, Peterson SD, Block KI, Gochenour T. Efficacy and safety of herbal stimulants and sedatives in sleep disorders. *Sleep Med Rev*. 2000;4(3):229-251.

21. Kutlu AK, Yılmaz E, Çeçen D. Effects of aroma inhalation on examination anxiety. *Teach Learn Nurs*. 2008;3(4):125-130.

22. Seiiedi-Biarag L, Mirghafourvand M. The effect of lavender on mothers sleep quality in the postpartum period: a systematic review and meta-analysis. *J Complement Integr Med*. 2022. Online ahead of print

23. Hoya Y, Matsumura I, Fujita T, Yanaga K. The use of nonpharmacological interventions to reduce anxiety in patients undergoing gastroscopy in a setting with an optimal soothing environment. *Gastroenterol Nurs*. 2008;31(6):395-399.

24. Yogi W, Tsukada M, Sato Y, et al. Influences of Lavender Essential Oil Inhalation on Stress Responses during Short-Duration Sleep Cycles: A Pilot Study. *Healthcare (Basel)*. 2021;9(7):909.

25. Davari H, Ebrahimian A, Rezayei S, Tourdeh M. Effect of Lavender Aromatherapy on Sleep Quality and Physiological Indicators in Patients after CABG Surgery: A Clinical Trial Study. *Indian J Crit Care Med*. 2021;25(4):429-434.

26. Kavurmacı M, Sarıaslan A, Yıldız İ. Determination the effects of lavender oil quality of sleep and fatigue of students. *Perspect Psychiatr Care*. 2022;58(3):1013-1020.

27. Dos Reis Lucena L, Dos Santos-Junior JG, Tufik S, Hachul H. Lavender essential oil on postmenopausal women with insomnia: Double-blind randomized trial. *Complement Ther Med*. 2021;59:102726.

28. Gürler M, Kızılırmak A, Baser M. The effect of aromatherapy on sleep and quality of life in menopausal women with sleeping problems: A non-randomized, placebo-controlled trial. *Complement Med Res*. 2020;27(6):421-430.

29. Ozkaraman A, Düğüm Ö, Özen Yılmaz H, Usta Yesilbalkan Ö. Aromatherapy: The effect of lavender on anxiety and sleep quality in patients treated with chemotherapy. *Clin J Oncol Nurs*. 2018;22(2):203-210.

30. Yıldırım D, Kocatepe V, Can G, et al. The effect of lavender oil on sleep quality and vital signs in palliative care: a randomized clinical trial. *Complement Med Res*. 2020;27(5):328-335.

31. Jäger W, Buchbauer G, Jirovetz L, Fritzer M. Percutaneous absorption of lavender oil from a massage oil. *J Soc Cosmet Chem*. 1992;43(1):49-54.