

**The Effect of Lavender Scent Recommended to the Elderly on Sleep Quality and
Physical Balance: Randomized Controlled Study**

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MATERIAL AND METHOD

Research Design

This study is a pretest-posttest designed parallel group, randomized controlled trial. The study is registered with Clinical Trials with protocol number NCT05377697.

Hypotheses

H1: The sleep quality of elderly individuals recommended lavender scent is better than the sleep quality of elderly individuals in the control group.

H1: The balance level of elderly individuals who were recommended lavender scent is higher than the balance level of elderly individuals in the control group.

The Place and Properties of the Study

This study was conducted in a neighborhood in Karatay district of Konya province between January 2023 and January 2024. In order to determine the characteristics and addresses of individuals living in the neighborhood where the study was conducted, two large housing estates in the neighborhood where the study was conducted were evaluated in two separate clusters as collective living areas. After providing the necessary information about the thesis research to the management boards of the sites, the addresses of elderly people were identified. A list including contact information of elderly individuals was created. Home visits were realized to the elderly individuals whose addresses were identified and they were informed about the purpose of the study and the practices. The research process was carried out in the home environments of the elderly individuals who agreed to participate in the research.

Variables of the Study

The dependent variables of the study were sleep quality and balance level. The independent variable was determined as lavender scent application and the control variables were determined as thirteen types of variables including age, gender, marital status, number of children, employment status, educational status, health problems, smoking, feeling of restfulness, activity status, beverage consumption, practices for falling asleep, and history of falls in the last year.

Target Population and Sample of the Study

The population of the study consisted of 661 elderly individuals over the age of 65 living in the region where the research was conducted. G-Power (v3.1.9.2) program was used to determine the sample size to be reached. According to the applied power analysis, 90 people in total, 45 intervention and 45 control was determined as the right minimum sample size with 80% power, 0.6 effect size and 0.05 margin of error. The study conducted by Ozkaraman et al. (2018) evaluating the effect of lavender application on anxiety and sleep quality in patients receiving chemotherapy was taken as reference for the calculation. Considering the unexpected cases such as non-participation in the research or non-compliance with the inclusion criteria, it was aimed to reach 120 people, which is approximately 30% more than the sample size, and finally 120 elderly individuals living in housing estates were reached. The elderly individuals who were planned to be included in the sample group were interviewed and informed about the study. After the interview, 18 elderly individuals reported that they did not want to participate in the study. It was determined that 12 elderly individuals from the group had not meet the inclusion criteria of the study. The sample group of the study consisted of 90 elderly individuals who met the inclusion criteria and agreed to participate in the study.

Inclusion And Exclusion Criteria

All individuals who were over 65 years of age, had no olfactory impairment, and did not have a disease that would prevent communication were included in the study. The individuals who were allergic to lavender, had a chronic respiratory disease, were taking sleep-inducing medications, were bedridden, or had physical limitations were not included in the study.

Randomization and Blinding

In this conducted study, blinding could not be possible because the researcher and the participant were aware of the intervention. A statistician independent of the research transferred the sample list of 90 elderly individuals who met the research criteria to a computer-based program (www.random.org) and created a random number table. In the study, stratified randomization was performed according to gender. Permutation method was used to ensure balance between strata. The blocks were formed in pairs using the letters 'A' and 'B' and completed using a table of random numbers obtained from the computer environment (www.random.org).

After determining the assignment lists, the status of the letters 'A' and 'B' indicating the intervention and control groups was determined by flipping a coin. The created assignment lists were placed in two different colored envelopes (women in yellow, men in green) to represent the strata and the envelopes were sealed. The envelopes were handed over to the researcher who is responsible for the assignment by the statistician. The relevant responsible researcher visited the participants who met the inclusion criteria and filled the informed consent form. The envelope in which the assignment was done was then opened to determine whether the participant was included in the intervention or control group. The data obtained as a result of the research were coded as 'A' 'B' by the researcher and transferred to the computer. In order to prevent bias in the evaluation of the data, the coded data were analyzed by a statistician who was independent of the study. Thus, statistical blinding was ensured.

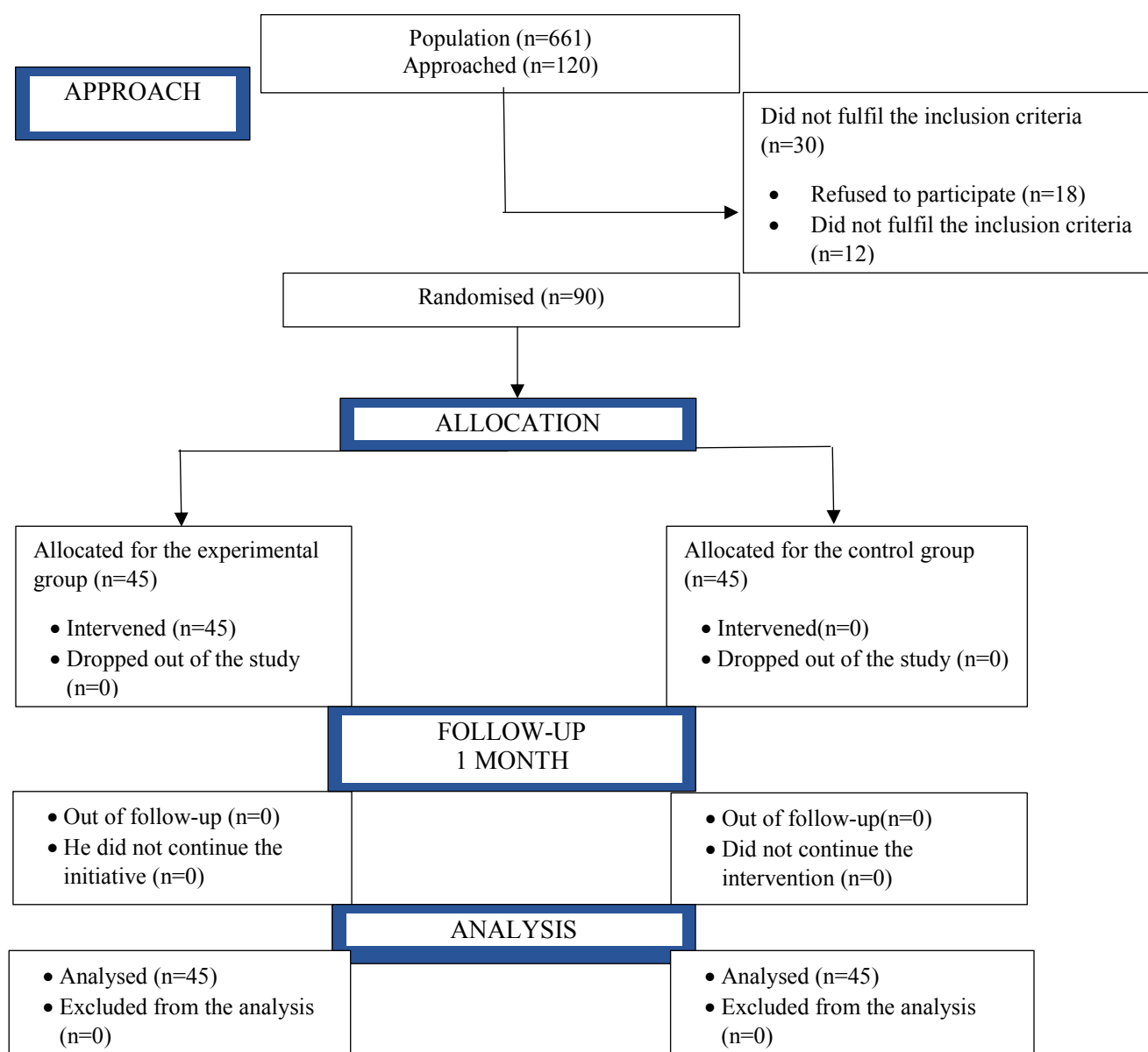


Figure 1. Consort Flow Diagram

Data Collection Tools

Personal Information Form, Pittsburgh Sleep Quality Index and Berg Balance Scale were used for data collection.

Personal Information Form

This form, which was developed by the researchers by reviewing the literature (Rafii et al., 2020; Muz, & Tasci, 2017; Tosur, 2017), consists of 13 closed-ended questions including socio-demographic characteristics of individuals (age, gender, marital status, number of children, employment status, education status, health problems, smoking, feeling of rest, activity status, beverage consumption, practice for falling asleep, history of falls in the last year).

Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a Self-Report Scale assessing sleep quality and sleep disturbance over a one-month period. Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse et al. in 1989 and its validity and reliability study in our country was conducted by Agargun et al. (Agargun et al. 1996). The PSQI, which assesses sleep quality over the last month, includes a total of 24 questions. Nineteen of these questions are self-report questions and are answered by the patient, while five questions are answered by a spouse or roommate and are used only for clinical information and are not included into scoring. The last one of the self-report questions (Question 19) concerns the presence of a roommate or spouse and is not included in the scoring. The PSQI, which includes 19 questions to assess the quality and quantity of sleep and the presence and severity of sleep disturbance has 7 components including subjective sleep quality (question 6 scoring), sleep latency (sum of questions 2 and 5a), sleep duration (question 4 scoring), habitual sleep efficiency (calculated by questions 1, 3 and 4), sleep disturbance (sum of questions 5b, c, d, e, f, g, h, i, j), use of sleeping pills (question 7) and daytime dysfunction (sum of questions 8 and 9). Some of the components are specified by a single item, others are obtained by grouping several items. Each item is assessed on a 0–3-point scale and the sum of the 7 component scores constitutes the total PSQI score. The total score has a value between 0–21, a high total score indicates poor sleep quality. A total PSQI score of less than 5 indicates the good sleep quality and a score of more than 5 indicates the poor sleep quality. The Cronbach's alpha internal consistency coefficient of the scale was reported as 0.80 (Agargun et al., 1996). It was determined that the internal consistency Cronbach's alpha value was 0.91 in the intervention and control groups in this study.

Berg Balance Scale (BBS)

The Berg Balance Scale (BBS) was originally developed for the assessment of postural control and is widely used in many rehabilitation fields. The scale contains 14 items. Scoring is based on the person's ability to perform these 14 items independently to perform the movement, meeting their needs in a given time or distance. The items include daily activities involving static sitting and standing balance as well as transferring, turning, picking up objects, etc. Each item is rated between 0 and 4. The maximum total score is 56 points. It takes approximately 10-15 minutes to complete the scale. The Cronbach's alpha value of the original scale was determined as 0.96. The internal consistency coefficient of each item varies between 0.76 and 0.96 (Şahin et al., 2008, Berg et al., 1995). The Cronbach's alpha value calculated for the BBS in all participants for this study was found 0.95.

Data Collection

Research data was collected between January 2023 and June 2023. Firstly, it was determined whether the individuals over the age of 65 residing in the neighborhood where the research was conducted meet the research criteria or not. A suitable time period of the elderly individuals who consented to participate in the study for being at home was determine and they were randomly assigned to the groups. The researcher visited the participants at their home and at the appropriate time and then collected data using the “Personal Information Form”, “Pittsburg Sleep Quality Index (PSQI)” and “Berg Balance Scale (BBS)”. The filling of the data collection tools took approximately 25-30 minutes.

Collection of Pre-test Data of Lavender and Control Group

In order to collect the pre-test data, the individuals who accepted the study were visited their homes. Then the researcher gave information about the study after introducing himself/herself. And then the participants were asked to fill in the Personal Information Form and the PSQI form. After the individuals marked the closest options to them on the forms, the forms were received. Finally, the items included in the BBS were read and the instructions were applied and observed by the researcher. As a result of the researcher's observation, the form was filled by marking the appropriate options.

Intervention to the Lavender Group

Lavender pouches were created by the researchers as to be applied to the lavender group. While creating the pouches, the lavender was collected from the lavender garden, the large branches

were removed, cleaned and dried. The dried lavender was sieved to separate the leaves. Then the lavender was then placed in transparent (gauze) pouches weighing 13 g each. Participants were mentioned about lavender's fragrance, its benefits and its effect on sleep. Participants were asked to place the lavender pouches on the front of their pillowcase during the day and to keep the lavender pouches in an open place near the bed at night when they went to sleep. When they woke up in the morning, they were told to put the pouch back on the front of the pillow and to apply this routine every day for a month. It was explained that they should not sleep with a different pillow or in a different room for a month, and that they should not make any changes to their sleeping arrangements.

Collection of Post-test Data of Lavender and Control Group

The post-test data were collected on the date, one month after the pre-test data were collected. In order to collect the post-test data, elderly individuals were visited with the participants at a predetermined time. Participants were asked to fill in the PSQI form. After the individuals marked the closest options to them on the forms, the forms were received. The items in the PSQI were observed by the researcher, the forms were filled in and the data collection process was completed.

Statistical Analysis of Data

The data obtained as a result of the research was made using SPSS for Windows version 18.0 (SPSS Inc. Chicago, IL, USA) package program. For statistical significance, value $p < 0.05$ was accepted as significant. In the analysis of data, descriptive statistics were used as number (n), percentage (%), standard deviation (SD), arithmetic mean (\pm) and median values. The conformity of the data to normal distribution was examined through using visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests).

According to the normality test results, t-test, chi-square tests, Wilcoxon signed rank test were used in independent groups in the analysis of parametric variables and Mann Whitney U and Fisher Exact tests were used in the analysis of nonparametric variables.

Ethical Dimension of the Research

Before starting the research, Ethical Approval was obtained from the KTO Karatay University Non-Drug and Medical Device Research Ethics Committee (Date of Decision: 23/12/2022, Number of Decision: 2022/030). Permission for Utilization the Scales was obtained from the authors of the scales used in this study. Participants were informed about the purpose of the

study, that there would be no financial loss, that participation in the study would be based on voluntariness, that the findings in this study would be used only for scientific purposes, and how lavender would be applied, and then verbal and written consents of the participants were obtained. The provisions of the Helsinki Declaration were complied with at every stage of the research. After the study was completed, the elderly individuals in the control group were informed about the lavender scent and they were provided with lavender sachets, too.

Limitations of the Study

The research results can only be generalized to this group since the research results were obtained from individuals over the age of 65 who were not in a severe chronic disease phase. The research results cannot be generalized to other age groups or to individuals in a severe chronic disease phase.

FINDINGS

A total of 90 elderly individuals, 45 lavender and 45 in the control group, were included in this study, which was conducted to determine the effect of lavender scent recommended to elderly individuals on sleep quality and physical balance.

The mean age of the lavender group was 74.60 ± 7.18 years and the mean age of the control group was 70.82 ± 5.83 years. The mean age of the lavender group was significantly higher than the control group ($p < 0.05$). 40% ($n=18$) of the participants in the lavender group and 53.3% ($n=24$) of the participants in the control group were male. 66.7% ($n=30$) of the lavender group and 82.2% ($n=37$) of the control group were married. Individuals in the lavender and control groups had the same percentage for number of having children. The educational status of the lavender and control groups was similar. Homogenous distribution was provided between the groups in terms of gender, marital status, number of children, employment status, and educational level ($p > 0.05$; Table 1).

The proportion of individuals with at least one health problem in the lavender group was significantly higher than in the control group ($p < 0.05$). Smoking rates of lavender and control groups were similar ($p = 0.227$). It was stated that 35.6% ($n=16$) of the lavender group and 71.1% ($n=32$) of the control group consumed 4 or more cups of tea/coffee during the period from dinner to bedtime. The proportion of those who consumed 4 or more cups of tea/coffee was significantly higher in the control group than in the lavender group ($p = 0.001$). The rates of doing any activity in the lavender and control groups were similar ($p = 0.133$). 28.9% ($n=13$) of

the lavender group and 55.6% (n=25) of the control group stated that they felt rested after waking up. The proportion of those who felt rested after waking up was significantly higher in the control group than in the lavender group ($p=0.010$). The rates of those who used any application to fall asleep in the lavender and control groups were similar ($p=0.643$). The rate of participants with a history of falls was significantly higher in the lavender group compared to the control group ($p<0.05$; Table 2).

A score of 5 or less from the total of the PSQI scale indicates that sleep quality is good and a decrease in the score indicates an increase in sleep quality. When the PSQI Sleep Quality scores of the participants were analyzed, the mean posttest scores of the Lavender group in PSQI Sleep Quality, Sleep Latency, Sleep Duration, Daytime Dysfunction and PSQI Total were statistically significantly lower than the pretest scores ($p<0.05$). In the control group, the posttest mean score of PSQI Sleep Latency was statistically significantly lower than the pretest ($p<0.05$). No statistically significant difference was observed in the other sub-dimensions of the PSQI scale in the control group ($p>0.05$). When the pre-test and post-test scores of the lavender group and the control group were compared, it was determined that only the post-test mean score of the PSQI Sleep Quality sub-dimension of the lavender group was significantly lower than the post-test mean score of the control group ($p<0.05$), and there was no significant difference in the other sub-dimensions ($p>0.05$) (Table 3). The participants' high scores obtained from the Berg Balance Scale indicated that their balance levels were good. When the mean BBS scores of the lavender group and the control group from the pretest were evaluated, it was found that the balance score of the control group was statistically significantly higher. The mean BBS score of the lavender group increased from 38.31 ± 11.84 to 41.48 ± 10.82 after performed application and this increase was statistically significant. In the control group without performed any application, the mean BBS score increased from 42.93 ± 10.07 to 43.42 ± 10.09 . This increase in the control group was significant ($p<0.05$). However, it was determined that the increase in the lavender group was higher than the increase in the control group (Table 4).

DISCUSSION

As individuals get older, deterioration in sleep quality occurs same as other systems of the body (Gunes, 2015). Insomnia problem is mostly seen in the elderly population (Patel et al., 2018). In addition to problems such as initiating and maintaining sleep, the regenerative, restorative and healing effect of sleep is also reduced (Başer & Hisar, 2021; Hernandez & Feinsilver, 2017; Zalai et al., 2017; Gunes, 2015; Zengin, 2015). Insomnia causes deterioration in the physical activity of individuals during the day, gait and balance problems, thus decreasing the quality of

life (Senturk, 2018). In addition, a high level of alertness is required to ensure balance control. Accordingly, it has great importance to get sleep in sufficient time and quality for this process to function properly (Şahin Onat et al., 2014). Today, many nonpharmacological methods are used to regulate sleep. Aromatherapy is an application that is welcomed due to its easy use, rapid response, non-invasive and low side effects (Midilli et al., 2019; Abbaszadeh et al., 2017; Başer & Hisar, 2021). Aromatherapy has many benefits such as improving the life quality of the individual, relaxing the brain and body, reducing pain, reducing anxiety, significantly improving self-care and sleep quality, reducing anxiety, regulating high blood pressure and pulse (Boz & Teskereci, 2016; Kurt & Tatlı Cankaya, 2021; Bilgic, 2017; Kavurmacı & Tan, 2014; Hajibagheri et al., 2014; Ueki et al., 2014; Hodge et al., 2014). It is important for nurses, who are one of the professional groups dealing with the care of elderly individuals, to know nonpharmacological methods for such reasons (Başer & Hisar, 2021; Hernandez & Feinsilver, 2017; Zalai et al., 2017). In this study, it was aimed to determine the sleep quality and balance levels of elderly individuals who were recommended lavender scent, and according to the results obtained from the study; it was observed that sleep quality increased and sleep duration decreased in the group recommended lavender. In systematic reviews conducted by Hwang and Shin (2015) and Lillehei and Halcon (2014) at different times, it was stated that application of lavender oil by inhalation facilitates sleep and it is effective in eliminating sleep problems. Cho et al. (2017) conducted a study to determine the effect of lavender scent on stress, heart rate, blood pressure, sleep quality; they asked patients hospitalized in intensive care to smell three drops of lavender oil dripped on an aromatherapy stone with a deep breath ten times before going to bed, and then hung the stone at the bedside. At 08:00 a.m. in the morning, the aromatherapy stone was taken from its place of hanging. As a result, it was stated that there were significant differences between Lavender and control group in terms of stress, heart rate, blood pressure and sleep quality. Rafii et al. (2020) examined the effect of aromatherapy massage with lavender and chamomile oil on anxiety and sleep quality in patients hospitalized in the burn unit and formed three groups of 35 people: intervention, control and placebo. The placebo group was applied baby oil, and the lavender group was applied chamomile and lavender oil 20 minutes before sleeping. It was stated that the sleep quality of the patients who were applied aromatherapy massage with a mixture of chamomile and lavender oil was better than the placebo and control group. Cheraghbeigi et al. (2019) reported an increase in sleep quality in cardiac patients who were massaged with lavender oil. In the literature, it is possible to come across many studies indicating that aromatherapy massage application using lavender oil with different patient groups improves sleep quality (Ozlu & Bilican, 2017; Ayik & Ozden,

2018; Davari et al., 2021). It is also seen that there are studies indicating the positive effects of lavender inhalation on sleep other than lavender oil massage application in the literature (Lytle, 2014; Muz & Tasci, 2015; Karadag et al., 2015; Afshar et al., 2015; Hamzeh et al., 2020).

Among the studies conducted with the participation of elderly individuals, Pekcetin and Inal (2019) examined the relationship between sleep quality and fatigue and quality of life in elderly individuals and found that fatigue, sleep and quality of life were related in elderly individuals. Considering all these studies, it is seen that the application of lavender plant by inhalation or massage has serious positive effects on many problems such as sleep, anxiety, life findings and stress. In this study conducted with the participation of elderly individuals, lavender was used to facilitate falling asleep by providing calming, stress reduction and relaxation effects, thus increasing sleep quality and sleep duration, and the findings and results we obtained from the study supported this situation.

In this study, it was observed that sleep quality increased and sleep duration decreased in the lavender group who were applied lavender therapy. In the study conducted by Lillehei et al. (2015) to determine the sleep quality and duration of lavender oil, the lavender group was asked to attach a patch containing lavender oil and the control group was asked to attach an empty patch to their chests. At the end of the study, it was determined that the sleep quality and being rested levels of the lavender group increased significantly compared to the control group, while no difference was found between the two groups regarding to sleep duration. In line with these results, while there was an increase in sleep quality in both studies, in the study conducted by Lillehei et al. (2015), there was no difference between the two groups in sleep duration, while the reason for the difference between sleep durations in this study was thought because of application way of the lavender to the individuals, the application duration or the different age groups studied.

In the study, Sleep Latency, Sleep Duration and Sleep Quality, which are sub-dimensions of PSQI, were found to be better after lavender application. In the study by Akgun (2021), which examined the effect of aromatherapy massage on sleep quality and sleepiness level in the elderly, it was found that the mean values of sleep latency, sleep duration and habitual sleep activity before aromatherapy massage were higher than the mean values of the scale after aromatherapy massage application and there were statistically significant differences between them. It was found that the Pittsburgh sleep quality scale values before the aromatherapy massage application were higher than the values after the massage and there were statistically significant differences between them. In this context, Akgun's study supports the results of this

research. According to the results obtained from the study, sleep quality was lower in the lavender group after lavender application. When the posttest data of the lavender and control groups were analyzed, the lower post-test data of the lavender group showed better sleep quality. The results of the research show parallelism with the information in the literature.

According to another result obtained from the study, the mean BBS pre-test score of the lavender group was statistically significantly lower than the mean post-test score, and the mean BBS pre-test score of the control group was statistically significantly lower than the mean post-test score. The reason for the increase in the mean scores in both groups was thought to be the 'Hawtrone Effect', in another mean 'people tend to perform better when they participate in or watch an intervention'. In a study conducted by Gunes (2015), it was evaluated the effect of exercise on the balance levels of elderly individuals and found that the BBS score of the Lavender group was higher and significant than the BBS score of the control group. In the study conducted by Ido (2016) with geriatric individuals living in a nursing home, it was reported that the mobility and especially the balance of the group with daytime sleepiness were more impaired. In the study conducted by Tosur (2017) with frail and non-frail elderly people aged 65 years old and over, it was stated that frailty of elderly individuals increased as sleep quality decreased and sleep latency (time to fall asleep) prolonged. In the results of this study, it was determined that the sleep quality of the Lavender group increased according to the post-test data, and the balance scores also increased. In line with this information, it is thought that the inability of elderly individuals to get enough sleep, worsening of sleep quality and difficulty in falling asleep positively affect the balance level and so cause a decrease in balance problems. Consequently, in this study, it was observed that lavender scent affects sleep and thus BBS. In the study on the effects of insomnia on postural control and gait parameters conducted by Tuncer (2019), which shows similar characteristics, it is stated that the postural control and gait parameters of individuals who are sleep deprived for 24 hours are impaired and as a result, individuals encounter negative situations such as falls and fractures. These results show that lavender scent applied to reduce the risk of falls in the elderly can improve sleep quality, regulate balance and reduce problems such as falls and bumps frequently encountered by the elderly. In line with the results, Hypotheses which were determined at the beginning of the study were accepted; H1 'The mean score of the elderly individuals who were offered lavender scent from the sleep quality test is different from the elderly individuals in the control group.' and H1 'The mean score of the elderly individuals who were offered lavender scent from the balance test is different from the elderly individuals in the control group.'

CONCLUSIONS AND RECOMMENDATIONS

In this study conducted to determine the effect of lavender scent recommended to the elderly on sleep quality and physical balance; it was observed that sleep quality, sleep latency and total sleep quality of the lavender group improved significantly. It was determined that balance levels of the individuals with improved sleep quality were also implicitly increased. In line with the results, it is recommended to plan the application of lavender scent by inhalation for evidence-based fall prevention programs in order to improve the quality of life of elderly individuals and to reduce health costs, to increase the competencies of aromatherapy use in nursing practices, to add aromatherapy practices to the curricula of nursing departments, to plan in-service trainings for aromatherapy practices among nursing practices of hospital management, and to plan expense costs for consumables to be used in practices. In order for aromatherapy to be an actively used application in the nursing profession, it is thought that the need for experimental studies investigating the effect of lavender scent on different problems continues.

References

- Abbaszadeh, R., Tabari, F., Taherian, K., & Torabi, S. (2017). Lavender Aromatherapy in Pain Management: A Review Study. *Pharmacophore*, 8(3), 50-54.
- Afshar, M. K., Moghadam, Z. B., Taghizadeh, Z., Bekhradi, R., Montazeri, A., & Mokhtari, P. (2015). Lavender Fragrance Essential Oil and The Quality of Sleep In Postpartum Women. *Iranian Red Crescent Medical Journal*, 17(4).
- Agargün, M.Y., Kara, H., & Anlar, Ö. (1996). Validity and Reliability of Pittsburgh Sleep Quality Index. *Turkish Journal of Psychiatry*, 7(2), 107-115.
- Aktas, H., Şaşmaz, C. T., Kılincer, A., Mert, E., Gülbol, S., Külekcioglu, D., & Demirtaş, A. (2015). Investigation of Factors Associated with Physical Activity Level and Sleep Quality in Adults. *Mersin University Journal of Health Sciences*, 8(2), 60-70.
- Ayık, C., & Özden, D. (2018). The Effects of Preoperative Aromatherapy Massage on Anxiety and Sleep Quality of Colorectal Surgery Patients: A Randomized Controlled Study. *Complementary Therapies in Medicine*, 36, 93-99
- Başer, G., Ve Hisar, F. (2021). Nonpharmacological Interventions to Eliminate Sleep Problems in Elderly Individuals: Systematic Review. *Hacettepe University Journal of Nursing Faculty*, 8(2), 178-185
- Berg, K., Wood-Dauphinee, S., Williams, J. I. (1995). The Balance Scale: Reliability Assessment with Elderly Residents and Patients with An Acute Stroke. *Scandinavian Journal of Rehabilitation Medicine*, 27(1), 27-36.
- Bilgic, S. (2017). A Holistic Practice in Nursing; Aromatherapy. *Namık Kemal Medical Journal*, 5(3), 134-141.
- Boz, İ. & Teskereci, G., (2016). *Complementary Therapies in Nursing Care*. Antalya: Tms Matbaacılık.

- Bulut Doğan, S. (2016). Sleep Disorders and Treatment in the Elderly. *Turkey Clinics J Psychiatry-Special Topics* 2016;9(4):33-41
- Buyse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A New Instrument For Psychiatric Practice and Research. *Psychiatry Research*, 28(2), 193-213.
- Ceyhan, Ö., Göriş, S., Ve Zincir, H. (2018). An Important Problem Affecting Sleep in Elderly Individuals: Incontinence. *Journal of Health Sciences*, 27(1), 29-35.
- Cheraghbeigi, N., Modarresi, M., Rezaei, M., & Khatony, A. (2019). Comparing the Effects of Massage and Aromatherapy Massage with Lavender Oil on Sleep Quality of Cardiac Patients: A Randomized Controlled Trial. *Complementary Therapies in Clinical Practice*, 35, 253-258.
- Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The Effects of Aromatherapy on Intensive Care Unit Patients' Stress and Sleep Quality: A Nonrandomised Controlled Trial. *Evidence-Based Complementary and Alternative Medicine*, 2017.
- Da Silva, E. F., Paniz, V. M. V., Laste, G., & Dasilva Torres, I. L. (2013). The Prevalence of Morbidity and Symptoms Among the Elderly: A Comparative Study Between Rural and Urban Areas. *Ciência & Saúde Coletiva*, 18(4), 1029.
- Davari, H., Ebrahimian, A., Rezayei, S., & Tourdeh, M. (2021). Effect Of Lavender Aromatherapy On Sleep Quality and Physiological Indicators in Patients After Cabg Surgery: A Clinical Trial Study. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine*, 25(4), 429.
- Demir, C. (2019). The Most Healing Odour: Lavender Detail Magazine, 7(77).
- Fisler, M., & Quante, A. (2014). A Case Series on The Use of Lavendula Oil Capsules in Patients Suffering from Major Depressive Disorder and Symptoms of Psychomotor Agitation, Insomnia and Anxiety. *Complementary Therapies in Medicine*, 22(1), 63-69
- Güneş, G. Y. (2015). The Effect of Exercise on Physical Activity, Fear of Movement, Fatigue and Sleep Quality in the Elderly. Master's Thesis, Hacettepe University Institute of Health Sciences, Ankara.
- Hajibagheri, A., Babaii, A., & Adib-Hajbaghery, M. (2014). Effect Of Rosa Damascene Aromatherapy on Sleep Quality in Cardiac Patients: A Randomized Controlled Trial. *Complementary Therapies In Clinical Practice*, 20(3), 159-163
- Hamzeh, S., Safari-Faramani, R., & Khatony, A. (2020). Effects Of Aromatherapy with Lavender and Peppermint Essential Oils on The Sleep Quality of Cancer Patients: A Randomized Controlled Trial. *Evidence-Based Complementary and Alternative Medicine*, 2020.
- Hernandez, Ab., Feinsilver, Sh., (2017). Sleep in The Elderly: Normal and Abnormal. Pandi-Perumal Sr. Synopsis of Sleep Medicine. Apple Academic Press Inc; Usa
- Hodge, N. S., Mccarthy, M. S., & Pierce, R. M. (2014). A Prospective Randomized Study of The Effectiveness of Aromatherapy for Relief of Postoperative Nausea and Vomiting. *Journal Of Peri-anesthesia Nursing*, 29(1), 5-11.
- Hwang, E., & Shin, S. (2015). The Effects of Aromatherapy on Sleep Improvement: A Systematic Literature Review and Meta-Analysis. *The Journal of Alternative and Complementary Medicine*, 21(2), 61-68.

- İdo, J. (2016). The Effect of Sleep Pattern on Mobility and Quality of Life in Geriatrics Living in Nursing Home (Master's Thesis, Istanbul Medipol University Institute of Health Sciences).
- Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects Of Aromatherapy on Sleep Quality and Anxiety of Patients. *Nursing İn Critical Care*, 22(2), 105-112.
- Kavurmacı M, Tan M. Uremic Itching and Aromatherapy Application. *Gumushane University Journal of Health Sciences*, 2014;3(1):674-82
- Kurt, N. C., & Tatlı Çankaya, İ. İ. (2021). Aromatherapy Applications and Essential Oils. *Mersin University Faculty of Medicine Lokman Hekim Journal of History of Medicine and Folkloric Medicine*, 11(2), 230-241
- Lillehei, A. S., & Halcon, L. L. (2014). A Systematic Review of The Effect of Inhaled Essential Oils on Sleep. *The Journal of Alternative and Complementary Medicine*, 20(6), 441-451.
- Lillehei, A. S., Halcón, L. L., Savik, K., & Reis, R. (2015). Effect Of Inhaled Lavender and Sleep Hygiene on Self-Reported Sleep Issues: A Randomized Controlled Trial. *The Journal of Alternative and Complementary Medicine*, 21(7), 430-438.
- Lytle, J., Mwatha, C., & Davis, K. K. (2014). Effect Of Lavender Aromatherapy on Vital Signs and Perceived Quality of Sleep in the İntermediate Care Unit: A Pilot Study. *American Journal of Critical Care*, 23(1), 24-29.
- Maslow, A. H. (1943). A Theory of Human Motivation. *Psychological Review*, 50, 370-396.
- Midilli, T. S., Eser, I., & Yucel, S. (2019). The use of nonpharmacological methods in pain management of nurses working in surgical clinics and factors affecting their use. *ACU Journal of Health Sciences*, 10(1), 60-66.
- Modén, B., Merlo, J., Ohlsson, H., & Rosvall, M. (2010). Psychotropic Drugs and Falling Accidents Among the Elderly: A Nested Case Control Study İn The Whole Population of Scania, Sweden. *Journal Of Epidemiology and Community Health*, 64(5), 440.
- Muz, G., & Tascı, S. (2017). Effect of Aromatherapy Via Inhalation on the Sleep Quality and Fatigue Level İn People Undergoing Hemodialysis. *Applied Nursing Research*, 37, 28-35.
- Ozkaraman " A, Dügüm O, " Yılmaz HO, " Yecilbalkan OU. " Aromatherapy: the effect of lavender on anxiety and sleep quality in patients treated with chemotherapy. *Clin J Oncol Nurs*. 2018;22(2):203–210.
- Akgun, M., Muberra, Oz., & Uymaz, P. (2021). The effect of aromatherapy massage on older people's sleep quality and sleepiness. *Psychiatry*, 22(10), 1-14.
- Ozlu, Z. K., & Bilican, P. (2017). Effects Of Aromatherapy Massage on The Sleep Quality and Physiological Parameters of Patients in A Surgical Intensive Care Unit. *African Journal of Traditional, Complementary and Alternative Medicines*, 14(3), 83-88.
- Ozol, D., & Ozvurmaz, S. (2018). Sleep and Sleep Disorders in Elderly Patients. <https://www.solunum.org.tr/tusaddata/book/677/17102018114822-031.Pdf>. Chapter, 31, 345-354.
- Pekcetin, S., & Inal, Ö. (2019). The Relationship of Sleep Quality with Fatigue and Quality of Life in Elderly Individuals. *Acıbadem University Journal of Health Sciences*, (4), 604-608.

- Pekcetin, S., & Inal, Ö. (2019). The Relationship of Sleep Quality with Fatigue and Quality of Life in Elderly Individuals. *Acıbadem University Journal of Health Sciences*, (4), 604-608.
- Rafii, F., Ameri, F., Haghani, H., & Ghobadi, A. (2020). The Effect of Aromatherapy Massage with Lavender and Chamomile Oil on Anxiety and Sleep Quality of Patients with Burns. *Burns*, 46(1), 164-171.
- Sahin, F., Yilmaz, F., Ozmaden, A., Kotevogl, N., Sahin, T., & Kuran, B. (2008). Reliability and Validity of the Turkish version of The Berg Balance Scale. *Journal of Geriatric Physical Therapy*, 31(1), 32-37.
- Sahin Onat, Ş., Ünsal Delialioğlu, S., & Özel, S. (2014). Relationship of Balance with Functional Status and Quality of Life in Geriatric Population. *Turkish Journal of Physical Medicine & Rehabilitation/Turkish Journal of Physical Medicine and Rehabilitation*, 60(2).
- Sentürk, A., & Kartın, P. T. (2018). The effect of lavender oil application via inhalation pathway on hemodialysis patients' anxiety level and sleep quality. *Holistic nursing practice*, 32(6), 324-335.
- Terzi, A., Gebressalesie, H. T., & Yıldırım, Y. (2020). Aromatherapy Applications in Elderly Individuals: A Systematic Review. *Journal Of Traditional Medical Complementary Therapies*, 3(3).
- Tosur, T. (2017). Evaluation of Sleep Quality in Frail and Non-Frail Elderly Aged 65 and over.
- Tuncer, B. (2019). The Effects of Insomnia on Postural Control and Gait Parameters. (Master's Thesis, Trakya University Institute of Health Sciences).
- Ueki, S., Niinomi, K., Takashima, Y., Kimura, R., Komai, K., Murakami, K., & Fujiwara, C. (2014). Effectiveness Of Aromatherapy In Decreasing Maternal Anxiety for A Sick Child Undergoing Infusion in a Pediatric Clinic. *Complementary Therapies in Medicine*, 22(6), 1019-1026.
- Zalai, D., Bingeliene, A., & Shapiro, C. (2017). Sleepiness in the elderly. *Sleep medicine clinics*, 12(3), 429-44
- Zengin, N. (2015). Sleep Problems and Solution Suggestions in Elderly Patients in Intensive Care Unit. *Journal of Intensive Care Nursing*, 19(2), 80-87.