DERLEME REVIEW

DOI: 10.5336/jtracom.2020-74494

A Review of Studies on the Effect of Lavender on Sleep of Cancer Patients: Systematic Review

Kanser Hastalarında Lavantanın Uyku Üzerindeki Etkisini Değerlendiren Çalışmaların İncelenmesi: Sistematik Derleme

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ABSTRACT Sleep disorders are an important problem frequently seen in cancer patients. It is known that especially lavender from aromatherapy applications is used for sleep disorders and effective. The purpose of the study is to review the studies on the effect of lavender on sleep of cancer patients. The study was conducted by scanning Pubmed, Google Scholar, CINAHL, EBSCOhost, MEDLINE, ScienceDirect, Ovid, ProQuest, Web of Science and ULAKBIM National Databases (January 2000-April 2020). The keywords "Lavender", "Cancer", and "Sleep" were used to access the articles. A total of 15 articles were reached. Five articles meeting the inclusion criteria were included in the review. 367 participants and 5 articles were included in the review. According to the reviewed articles, lavender which was applied to patients by inhalation and massage methods via a piece of cotton with lavender oil placed at the base of the nose or in the form of an aroma stick using aromatherapy diffuser for minimum two nights can enhance their sleep quality and decrease their sleep disorders. Any side effect of lavender was not reported during the studies. Since lavender is easy to use, cheap and has no side effect, it was stated that lavender can be applied to patients to enhance their sleep quality. Number of the studies investigating the effect of lavender on sleep of cancer patients is limited. Therefore, it is thought that there is a need of randomized controlled trials with participation of higher number of patients to make generalization.

Keywords: Lavender; sleep; oncology nursing; palliative care

ÖZET Uyku bozuklukları kanser hastalarında sıklıkla görülen önemli bir problemdir. Aromaterapi uygulamalarından özellikle lavantanın uyku problemlerinde kullanıldığı ve etkili olduğu bilinmektedir. Çalışmanın amacı kanser hastalarında lavantanın uyku üzerindeki etkisini değerlendiren çalışmaları incelemektir. Çalışma Pubmed, Google Scholar, CINAHL, EBSCOhost, MEDLINE, ScienceDirect, Ovid, ProQuest, Web of Sciene ve ULAKBİM Ulusal Veri Tabanları (Ocak 2000-Nisan 2020) taranarak yürütülmüştür. Çalışmalara ulaşmak için "Lavanta", "Kanser", "Uyku" anahtar kelimeleri kullanılmıştır. Toplam 15 makaleye ulaşılmıştır. Çalışmaya alınma kriterlerini karşılayan 5 çalışma incelemeye dahil edilmiştir. Derlemeye 367 katılımcı ve 5 çalışma dahil edilmiştir. İncelenen çalışmalara göre hastalara en az iki gece, aromaterapi difüzörü ile, aromastik şeklinde ya da burnun altına konulan lavanta yağı emdirilmiş pamuk ile yapılan inhalasyon yöntemi ve masaj yöntemi ile lavanta uygulaması hastaların uyku kalitesini arttırıp, uyku bozukluklarını azaltabilir. Çalışmalar sırasında ise lavantanın herhangi bir yan etkisi bildirilmemiştir. Lavantanın kullanımının kolay, maliyetinin ucuz olması ve yan etkisinin olmaması nedeniyle uyku kalitesinin arttırılmasında hastalara uygulanabileceği belirtilmiştir. Kanser hastalarında lavantanın uyku üzerindeki etkisini inceleyen çalışmalar oldukça sınırlıdır. Çalışmaların sınırlı olması nedeniyle genelleme yapabilmek için daha fazla sayıda hastanın katılımı ile gerçekleştirilen randomize kontrollü çalışmalara ihtiyaç olduğu düşünülmektedir.

Anahtar Kelimeler: Lavanta; uyku; onkoloji hemşireliği; palyatif bakım

Cancer patients are frequently seen to suffer from sleep disorders. However, patients, their families, and healthcare providers are prone to overlook this. According to the literature, 29 to 32% of the general population, and 45 to 58% of cancer patients suffer from sleep-related problems.[1,2]

Particularly lavender from aromatherapy applications is used for sleep disorders and effective.[3,4] Lavender is also widely used to treat many disorders such as anxiety, stress, depression, pain, and menstrual symptoms.[5-7] It can be rubbed into the skin, inhaled, or applied via aroma-massage. It has been

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Peer review under responsibility of Journal of Traditional Medical Complementary Therapies.

Received: 24 Feb 2020 ***Received in revised form:*** 06 May 2020 ***Accepted:*** 21 May 2020 ***Available online:*** 27 May 2020

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shown to increase the effect of gamma-aminobutyric acid on the amygdala, thereby creating a sedative and narcotic effect on the user. This means that it carries traits that are similar to benzodiazepines.[8] To date, few studies examining the effect of lavender on sleep problems of cancer patients have been conducted. This study aims to review the studies evaluating the effect of lavender on sleep in cancer patients.

MATERIAL AND METHODS

This study was prepared using the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) checklist, which guides authors to improve the presentation of systematic reviews and meta-analysis studies.[9]

The study was conducted by scanning Pubmed, CINAHL, MEDLINE, Web of Science, and TUBITAK ULAKBIM National Databases, using three keywords, “Lavender”, “Cancer”, and “Sleep.” in Turkish and English. The articles whose full text can be reached without any filtering and published in Turkish or English in the literature between January 2000 and April 2020 were included in the review. 15 of a total of 188 articles, which were accessed, were examined further detail. Ten studies were excluded, including one systematic review, two normal reviews, three studies involving mixed group samples, and four studies examining different effects of lavender (Figure 1). Remaining were five studies that examined the effect of lavender on sleep of cancer patients and these studies were included in this study.

The inclusion criteria of this systematic review were identified according to the PICOS (P: Population, I: Interventions, C: Comparisons, O: Outcomes, S: Study).[10] The participants who were 18 years old and above, and had been diagnosed with cancer were included in the study.

Age, socioeconomic status, and ethnicity were not taken into account for the inclusion criteria.

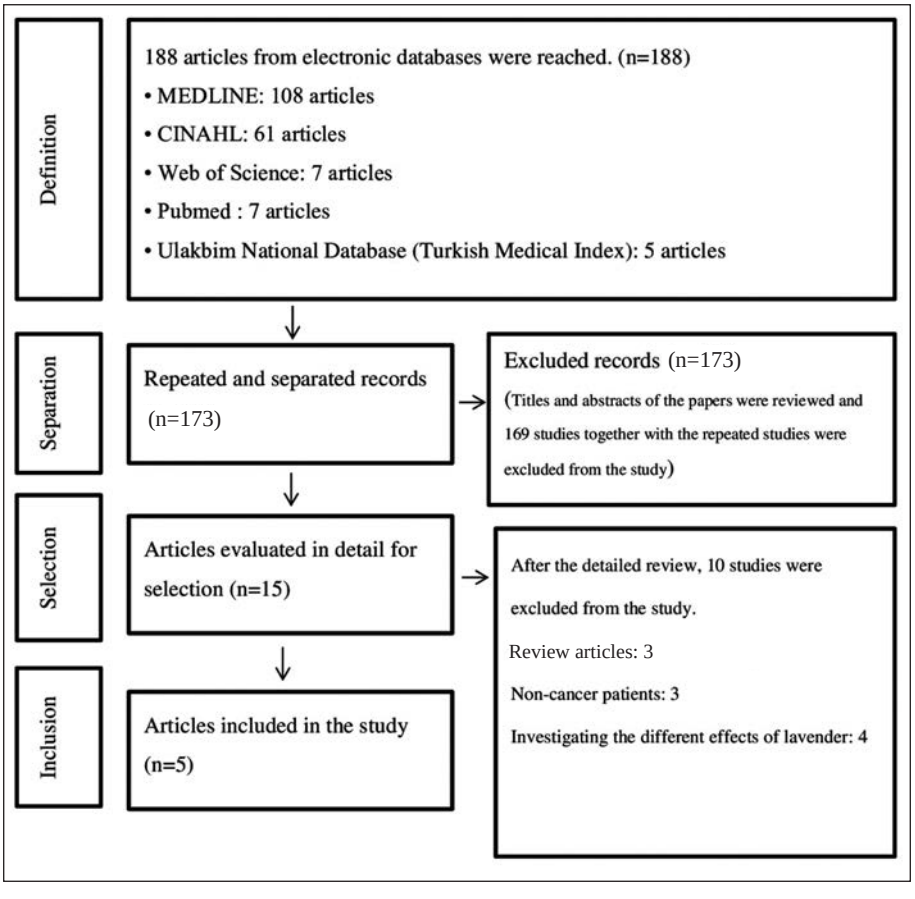


FIGURE 1: PRISMA flow chart for properties of the studies included in the review.

Interventions: Either lavender was directly inhaled by the patients or applied via massage to them or lavender oil was added into the mixture oils during aromatherapy.

Comparison groups: Studies with intervention and control groups including cancer patients were included.

Results: Those evaluating the sleep quality before and after the lavender application were included.

Study designs: Randomized controlled studies and experimental research articles that were related to the aforementioned subject, published in either Turkish or English, and were fully accessible were chosen for their potentially high evidence grade and thus included in this review.

RESULTS

Among the five studies included in the review, four were randomized controlled, and one was experimental (Table 1).

In the randomized controlled trial conducted by Hamzeh et al., in 2020, 120 patients were randomly assigned to lavender, peppermint, and control groups. The intervention groups inhaled three drops of the essential oil for 7 days. In the control group, aromatic distilled water was used. Pittsburgh Sleep Quality Inventory (PSQI) was used in their study. While no significant difference was observed between the PSQI mean scores of the participants in three groups before the application, a statistically significant difference was determined after the intervention. The PSQI mean scores were lower in lavender and peppermint groups compared to the control group. Aromatherapy can enhance the sleep quality of cancer patients. To confirm the findings, further studies should be conducted.[11]

Özkaraman et al., conducted a randomized controlled trial by assigning homogeneously the patients, who were currently undergoing chemotherapy, to three groups based on a computer-generated randomization list. Neither the patients nor the nurse, who was collecting the data, were blinded to the content of the bottles given to the patients. Groups one (n=30) and two (n=20) were given lavender oil and tea tree oil, respectively, while group three (n=20) was not given any aromatherapy at all. Three drops of lavender oil or tea tree oil were drop-wised on a piece of cotton placed along each patient's shoulder and neck, 10 inches below their nose. The initial evaluation of the patients in all the groups was performed by using Patient Identification Form, The State-Trait Anxiety Inventory-STAI [The State Anxiety Scale (S-Anxiety) And The Trait Anxiety Scale (T-Anxiety)], and Pittsburgh Sleep Quality Index (PSQI) just before the chemotherapy cycle. Then, during the cycle, a nurse applied the aromatherapy containing either lavender or tea tree oil. Upon completion of the cycle, they filled out the S-Anxiety form again. Later, the same nurse provided the patients with written and verbal training on how to use these oils before discharging them. They inhaled these oils for five minutes at 21:00 every night over the course of a month. The patients, after their chemotherapy cycle, were evaluated for the second time, using the T-Anxiety and PSQI. No difference was observed among pre- and post-chemotherapy state anxiety scores of the groups. Additionally, a significant difference was observed in pre- and post-chemotherapy STAI and PSQI scores of lavender group, suggesting that lavender oil was effective.[8]

Blackburn et al., conducted a double-blind randomized controlled trial in 2017 by including 50 patients, above the age of 18, who were just diagnosed with acute leukemia and were hospitalized in order to undergo their first four-week intensive induction chemotherapy. The trial was conducted as a crossover study in which the patients also constituted the control group. In the first week of the study, which lasted for totally three weeks, the subjects were randomly assigned to two groups; experimental (n=25)-to which essential oil was administered- and control (n=25). The patients were asked to prefer one of lavender, chamomile or mint essential oils, due to the importance of odor preferences and their previous aroma experiences (positive or negative). Within the scope of the application, the patients inhaled drops of each essential oil on a cotton gauze. Then, they sniffed coffee beans before inhaling next essential oil in order to eliminate the effect of scent of the previ-

TABLE 1: The studies on the effect of lavender on sleep of cancer patients.

		Patient Group		Intervention/Approach Applied			
Study	**Aim of the Study**	**Experimental**	**Control**	**Experimental Group**	**Control Group**	**Assessment**	**Conclusion**
Hamzeh S, Safari-Faramani R, Khatony A, 2020	To compare the effect of inhalation aromatherapy with lavender and peppermint essential oils on the sleep quality of cancer patients	80 cancer patients	40 cancer patients	A 20-minute aromatherapy session with lavender essential oil (n=40) or peppermint essential oil (n=40) for 7 days	Inhalation of aromatic distilled water for 7 days Sleep Quality Inventory (PSQI)	Demographic information questionnaire and Pittsburgh score compared to the control	The lavender and peppermint groups had a lower PSQI mean group.
Özkaraman A, Dügüm Ö, Özen Yılmaz H, Usta Yeşilbakan Ö, 2018	To examine the effects of lavender oil aromatherapy n othe anxiety and sleep quality of patients undergoing chemotherapy	50 cancer patients undergoing. chemotherapy Lavender oil group (n=30); Tea tree oil group (n=20)	20 cancer patients undergoing chemotherapy	3 drops of lavender or tea tree oil were drop-wised on a piece of cotton, placed on the patient's shoulders and necks, 10 inches below their noses. Aromatherapy was applied by a nurse during chemotherapy.	No application was made	Patient Identification Form, The State-Trait Anxiety Inventory –STAI [The State Anxiety (S-Anxiety) and Trait Anxiety Scales (T-Anxiety)], Pittsburgh Sleep Quality Index (PSQI)	It was reported that pre- and post-chemotherapy State anxiety scores did not differ between the groups. There was a significant difference between pre- and post-chemotherapy Trait Anxiety Inventory scores and Sleep Quality scores in lavender group and the lavender was effective.
Blackburn L, Achor S, Allen B, Bauchmire N, Dunnington D, Klisovic RB, Naber SN, Roblee K, Samczak A, Tomlinson-Pinkham K, Chipps E, 2017	To determine the effect of aromatherapy of healing of insomnia and other common symptoms in patients newly diagnosed with acute leukemia.	25 acute leukemia patients, newly diagnosed and hospitalized for 4 weeks of intensive induction chemotherapy	25 acute leukemia patients, newly diagnosed and hospitalized for 4 weeks of intensive induction chemotherapy	Diffuser aromatherapy was administered for approximately 8 hours a day over one week, followed by a one-week waiting period, and finally by placebo of rose water for one week.	Diffuser placebo with rose water were administered for approximately 8 hours a day over a week, followed by a one-week waiting period, and finally by aromatherapy for one week.	Pittsburgh Sleep Quality Index (PSQI), The Edmonton Symptom Assessment Scale–Revised (ESASr), The Final Evaluation of Aromatherapy (FEA)	It was stated that aromatherapy extended the sleep duration, enhanced the sleep quality, and decreased the sleep disorders.
Dyer J, Cleary L, McNeill S, Ragsdale-Lowe M, Osland C, 2016	To investigate the effect of aroma sticks on patients' sleep problems, how patients evaluate the effect of aroma sticks, and which one of three oil mixtures they preferred most.	65 cancer patients suffering from sleep problems	None	The patients were asked to place the aroma stick beneath their noses and inhale it four or five times per day for minimum two nights and maximum 13 weeks. When and how long they used aroma stick was left entirely up to them.	-	Patient Questionnaire which was prepared for this audit and agreed by the hospital clinical audit committee.	94% of the patients said that the aroma sticks decreased their sleep problems. 92% stated that they would continue to use them. The findings showed that aromatherapy helped relieve and put the patients to sleep.
Soden K, Vincent K, Craske S, Lucas C, Ashley, 2004	To compare the effects of aromatherapy massage and normal massage on the physical and psychological symptoms in advanced-stage cancer patients.	Advanced-stage cancer patients receiving treatment in palliative care Massage Group with mixture of lavender oil and sweet almond oil (1% dilution mixture) (n=16) and massage group with only pure oil (n=13).	Advanced-stage cancer patients receiving treatment in palliative care (n=13)	Back massage was given to both massage groups for 30 minutes per week for 4 weeks .	No application was made.	The VAS of Pain Intensity and a Modified Tursky Pain Descriptors Scale, The Verran and Snyder-Halpern (VSH) Sleep Scale, The Hospital Anxiety and Depression (HAD) Scale; The Rotterdam Symptom Checklist (RSCL) were filled each week	No significant difference was found between the groups in terms pain control, anxiety, or enhanced quality of life. On the other hand, their sleep and depression scores of both massage groups were found to improve significantly

ous oil. The control group smelled rosewater, which has an odor but is not an essential oil, as placebo. During the week two, the patient waited for one week. During the week three, the experimental group smelled the placebo and the control group inhaled the essential oil. The researchers were aware of when the essential oil was applied to the subjects, but the patients and the personnel were unaware, hence the trial was conducted as a double-blind study. The essential oils and the placebo were kept in standard aromatherapy bottles whose labels were masked by tape. The essential oils were diffused in the room using an aromatherapy diffuser to establish a standard for their flow. Eight drops of essential oil or placebo was used in the diffusers and the application was started at 09:00 and lasted for 8 hours. The doors of the room were kept closed during the diffusion, except for when personnel either entered or exited the room. The Pittsburgh Sleep Quality Index (PSQI) was used to assess the patients' sleeplessness levels before and during the application each week. A high total score indicates impaired sleep quality. The Edmonton Symptom Assessment Scale-Revised (ESASr) was used to assess symptom severity. At the end of the study, the patients were asked to fill out the Final Evaluation of Aromatherapy (FEA), prepared by the researcher about their overall experiences with the aromatherapy. The results of the study revealed that the patients liked lavender oil the most, followed by mint and chamomile, respectively. Before the application, most of the patients obtained a sleep quality mean score of 12.7 points so they had a poor sleep quality. During the weeks with the placebo following the application, their mean score was found to be 12.4 points. PSQI mean score of the patients receiving aromatherapy in the weeks one and three was lower compared to the score obtained in the week when placebo was applied. the aromatherapy lowered their PSQI mean scores by approximately 2.53 points. The researchers reported that aromatherapy increased the sleep duration and quality and decreased sleep disorders.[12]

In 2016, Dyer et al. conducted an experimental study to investigate the effect of aroma sticks on sleep problems of patients, as well as how those patients assessed the effect of aroma sticks, and which one of three oil mixtures they preferred most. The first oil mixture contained bergamot oil and sandalwood oil, the second one contained frankincense, tangerine, and lavender oils. The third one was the mixture of orange, bitter orange, lavender, bergamot, tangerine, and Roman chamomile oils. The sample included 65 cancer patients who applied to the complementary medical therapists due to sleep problems among the patients who were hospitalized or examined in the clinics of two hospitals where the study was conducted. The patients were asked to choose which aroma stick they would use for minimum two nights in order to answer the questions about their current sleep-related problems and to evaluate the effects of the aroma sticks on their sleep. The patients were asked to place the chosen aroma stick beneath their noses and inhale in four or five times. When and how long they used the aroma stick was left entirely up to them. Patient questionnaire which was prepared for this audit and agreed by the hospital clinical audit committee was used in the study. In this prospective study, the application lasted for 13 weeks. Patients were found to prefer the mixtures of bergamot oil and sandalwood oil, and Frankincense, tangerine and lavender oils. 94% of the patients stated that the aroma sticks reduced their sleep problems, and 92% expressed that they would continue to use them. In conclusion, the study revealed that aromatherapy helped relieve and put patients to sleep.[13]

In 2004, Soden et al. conducted a double-blind randomized controlled trial to compare the effect of aromatherapy massage and normal massage on physical and psychological symptoms in advanced-stage cancer patients and included patients receiving treatment in the palliative care. A 2.4-point decrease in the VAS score was considered as the final value in the pain assessment from the beginning to the end of the study. The patients were randomly assigned to three groups. Group one (n=16) was massaged using a mixture of lavender oil and sweet almond oil (1% dilution), Group two (n=13) was massaged using pure oil only, and Group three (n=13) was not massaged at all. Groups one and two were given a 30-minute back massage once a week for a four-week period. All of the patients were asked to fill out the

VAS of Pain Intensity and a Modified Tursky Pain Descriptors Scale, The Verran and Snyder-Halpern (VSH) Sleep Scale, The Hospital Anxiety and Depression (HAD) Scale, and The Rotterdam Symptom Checklist (RSCL) each week. No significant difference was found among the groups in terms of pain control, anxiety, or enhanced quality of life. On the other hand, the sleep and depression scores of both massage groups were found to improve significantly.[14]

DISCUSSION

Insomnia is a symptom characterized by having difficulty in falling asleep and maintaining sleep, and suffering irregular sleep patterns for at least one month.[15-16] It is one of the most common symptoms experienced by cancer patients, especially those who are at the advance stage of the disease.[1,17] The causes of insomnia in cancer patients include numerous reasons such as the treatment type, environmental factors and the psychological state of the patient.[18] Insomnia can also exacerbate other symptoms and result in impaired overall health. It is important to manage insomnia, which also impairs the quality of life of patients.[1]

Different studies have revealed many effects of lavender. The studies have shown strong sedative, anxiolytic, anticonvulsant, antiepileptic, motor inhibitor and spasmolytic and sleep regulatory effects of lavender by suppressing the central nervous system. It has been stated in the studies that while no toxic effect was found for lavender; on the other hand, laboratory studies have revealed that it has an effect strengthening sleep-inducing activity of various agents including alcohol, chloral hydrate and hexobarbital.[19]

Five studies were included in this review to investigate the effect of lavender on sleep of cancer patients. These studies were conducted in Iran, Turkey, the United States of America and the United Kingdom between 2004 and 2020. In four of them, lavender oil was applied by inhalation.[8,11-13] In the fifth study, it was applied by massage.[14] All of five studies revealed that lavender oil enhanced sleep quality. Additionally, it increased duration of sleep, facilitated the act of failing asleep, and reduced sleep-related problems.[8,11-14]

In their study, Blackburn et al. found that patients preferred one of lavender, chamomile, and peppermint oils for aromatherapy. However, they did not individually analyze the effects of the oils. Therefore, based on the results of the study, it is unclear whether or not lavender plays an effective role in improving sleep.[12]

In the study by Dyer et al., lavender oil was not used alone in the aroma sticks and it was mixed with different oils. At the end of the study, it was determined that the participants used aroma sticks for their sleeping problems. In this study, the effect of lavender oil was not clearly shown. However, the participants preferred aroma stick containing also lavender oil more.[13]

None of these studies reported that lavender oil caused side effect.

CONCLUSION

Number of studies examining the effect of lavender on sleep in cancer patients is very limited. Although it was shown in the studies that the lavender enhanced the sleep quality, there were differences between the application methods. According to the reviewed articles, lavender which was applied to patients by inhalation and massage methods via a piece of cotton with lavender oil placed at the base of the nose or in the form of an aroma stick using aromatherapy diffuser for minimum two nights can enhance their sleep quality and decrease their sleep disorders.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Vildan Kocatepe;* ***Design:*** *Vildan Kocatepe, Dilek Yıldırım, Gülbeyaz Can;* ***Control/Supervision:*** *Gülbeyaz Can;* ***Data Collection and/or Processing:*** *Vildan Kocatepe, Dilek Yıldırım;* ***Analysis and/or Interpretation:*** *Vildan Kocatepe, Dilek Yıldırım;* ***Literature Review:*** *Vildan Kocatepe, Dilek Yıldırım, Gülbeyaz Can;* ***Writing the Article:*** *Vildan Kocatepe, Dilek Yıldırım, Gülbeyaz Can;* ***Critical Review:*** *Vildan Kocatepe, Dilek Yıldırım, Gülbeyaz Can;* ***References and Fundings:*** *Vildan Kocatepe, Dilek Yıldırım, Gülbeyaz Can.*

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