

## Original Article

# Usage of Aromatherapy in Symptom Management in Cancer Patients: A Systematic Review

**Baykal Dilek, PhD**

Assistant Professor, Halic University, School of Nursing. Istanbul, Turkey

**Comlekci Necmiye**

Research Assistant, Bartin University, Faculty of Health Sciences, Department of Nursing. Bartin, Turkey

**Correspondence:** Baykal Dilek, Assistant Professor. Halic University, School of Nursing. Istanbul, Turkey  
e-mail: dbaykal@hotmail.com

### Abstract

**Background:** Several symptoms caused by the disease itself and the treatments that are provided may be observed in cancer patients. It is important to eliminate or minimize these symptoms.

**Aim:** The purpose of this study was to investigate usage of aromatherapy practices in cancer patients for symptom management.

**Methods:** For the last 5 years (2014-2019), the keywords “cancer”, “pain”, “anxiety”, “depression”, “sleep management”, “aromatherapy” and “nausea and vomiting” were searched on the “PUBMED”, “CINAHL”, “Google Scholar” and “Web of Science” databases, and a total of 72 studies were reached. It was found that twelve of these studies were on usage of aromatherapy in symptom management in cancer patients, and these studies were examined.

**Conclusion:** It was observed in the reviewed studies that aromatherapy practices were utilized as a safe method in symptom management in cancer patients. Whether topically or in form of inhalation, aromatherapy is used in management of patient’s pain, sleep disorders, anxiety, depression, nausea and vomiting and improvement of their general health status.

**Keywords:** aromatherapy, symptom management, cancer patients

### Introduction

Cancer has a high incidence rate among non-contagious diseases in developed and developing countries. Patients may experience several symptoms such as pain, dyspnea, fatigue and depression. While these symptoms may be related to the disease itself, they may also emerge in relation to the treatment that is provided to the patient. Taking symptoms under control in cancer patient helps improvement of their quality of life (Guleser, et al. 2012). Aromatherapy entered the history of medicine 5000 years ago as a result of obtaining volatile oils based on distillation of herbs in the Middle East and Egypt (Ozpolat, et al. 2018). Today, with the increase in the popularity of complementary medicine, aromatherapy has been used frequently for non-pharmacological symptom management in cancer patients. Essential oils that are used in aromatherapy reduce certain physical and psychological symptoms and provide relaxation.

They are most frequently used in the form of inhalation (direct or by diffusion) and topical application. When aromatherapy is applied in the form of inhalation, it does not show its effect only due to the smell of the oil. The physiological and psychological effects created by scents in the body are also utilized.

Additionally, scent molecules affect the limbic system of the brain, and the heart rate, blood pressure, respiratory rate, memory and hormones. Furthermore, the amygdala, which is found in the limbic system, is activated in cases of fear, anger and emotional trauma, and it reanimates or reminds emotional memories. In topical application, oils are applied through massaging, mild rubbing or spraying. In this process, essential oils show their effects by being absorbed by the circulation and nervous systems. However, many people have concerns about the idea that massage would lead to metastasis of the tumor by increasing blood circulation. No

evidence has been found to confirm the reasonability of these concerns. Attention should be paid only the pressure to be applied with the massage to prevent complications related to patients with bone metastases (Singh & Chaturvedi, 2015).

**Aim of the study:** The purpose of this systematic review is to compare different aromatherapy practices and different methods of applying these in management of symptoms that are seen in cancer patients. Additionally, with this systematic review, it will be possible to define (1) for management of which symptoms in cancer patients aromatherapy practices are utilized, (2) essential oils used in aromatherapy for cancer patients and (3) the methods of applying the essential oils that are used.

**Methodology:** The systematic review utilized the PRISMA guide (<http://www.prisma-statement.org/> Access date: 20.05.2019). For the last 5 years (2014-2019), the keywords “cancer”, “pain”, “anxiety”, “depression”, “sleep management”, “aromatherapy” and “nausea and vomiting” were searched on the “PUBMED”, “CINAHL”, “Google Scholar” and “Web of Science” databases, and the literature review process is shown in detail in the PRISMA flow chart (Figure 1). Randomized controlled studies written in the English language on aromatherapy practices in cancer patients were included. studies on patients with diagnoses other than cancer, those written in another language and those whose full text could not be obtained were excluded. The titles and abstracts of the accessed literature were independently assessed by the authors. Then, the entirety of the text was examined by the authors in terms of the methods and explicitness of the interventions that were made. To reduce the risk of bias, the authors performed the literature search and review processes independently of each other up to the point of writing in this systematic review.

## Results

For the last 5 years (2014-2019), the keywords “cancer”, “pain”, “anxiety”, “depression”, “sleep management”, “aromatherapy” and “nausea and vomiting” were searched on the “PUBMED”, “CINAHL”, “Google Scholar” and “Web of Science” databases, and a total of 72 studies were reached. Among these studies, 31 were excluded for not being related to cancer patients, 6 were excluded as they were duplicates, 11 were eliminated as their full texts could not be

accessed, and 13 were excluded as their samples and the interventions they applied were not clearly explained. The results of 11 studies were examined in this systematic review (Figure 1).

The results of 11 studies that were published in the last 5 years within the period of 2014-2019 were examined. Table 1 shows the information on the reviewed studies regarding their authors, year, objective, design, intervention that is applied and results. From the reviewed studies, it is understood that aromatherapy practices were applied in different forms and to manage different symptoms in cancer patients.

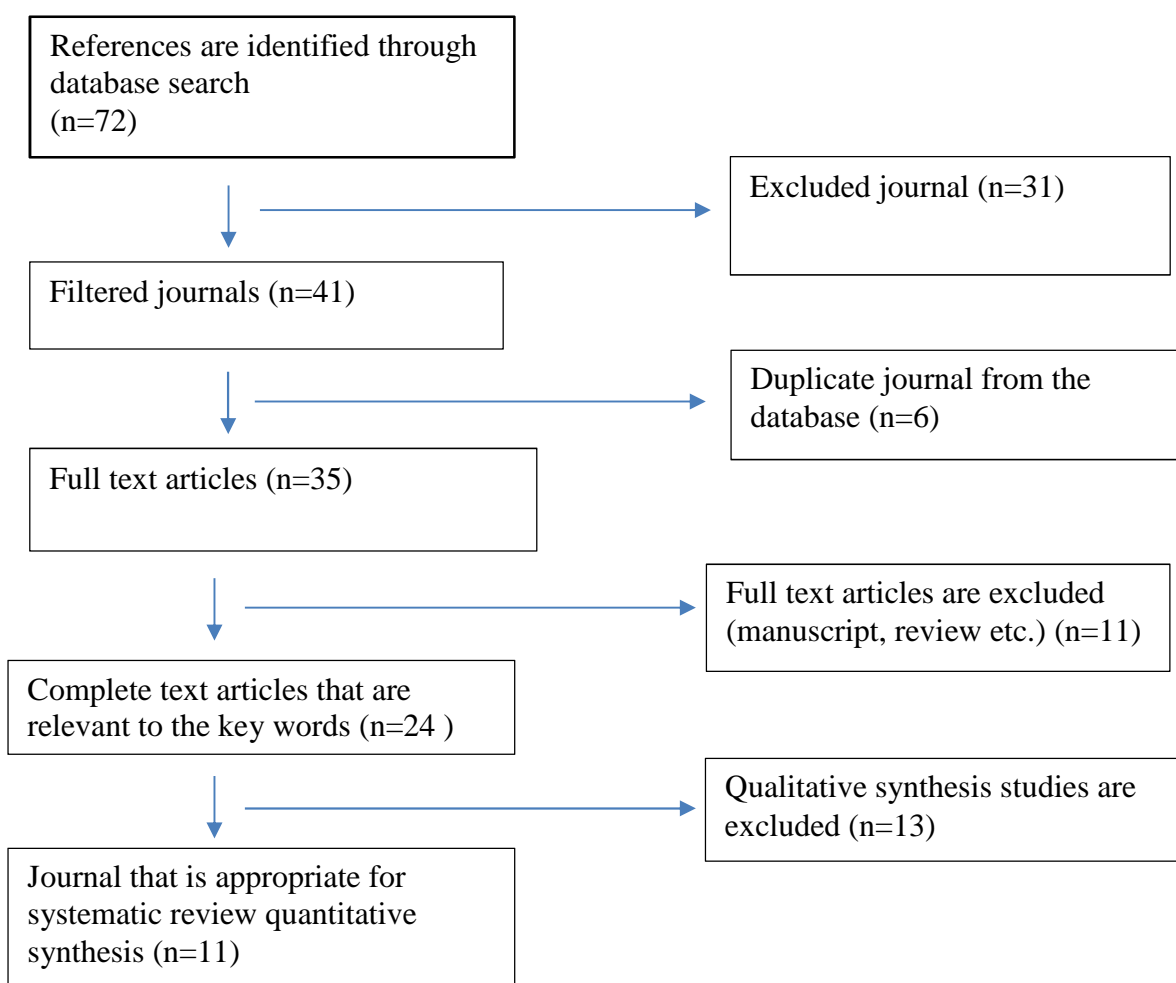
Aromatherapy is a non-pharmacological method that aims to make it easier for the patient who encounters life-threatening diseases to cope with the problems they experience due to the disease that is encountered or the treatment that is received. In this method that utilizes essential oils, the problems of the patient are dealt with in a holistic approach, and it is aimed to increase quality of life.

In the literature, it is seen that aromatherapy in cancer patients has been applied for the purposes of reducing pain, anxiety, depression, nausea and vomiting and increasing quality of life and general health status.

**Usage of aromatherapy in managing pain:** In cancer patients, aromatherapy inhibits GABA (gamma amino butyric acid) and reduces pain by affecting the glutamate bonds of neurotransmitters. In reducing pain, especially the substance linalool that is found in lavender oil is effective. Lavender oil also plays a role in regulation of emotional responses, heart rate, blood pressure and respiration (Singh & Chaturvedi, 2015). In a study on patients with breast cancer, massage was applied with essential oils to manage symptoms such as pain, anxiety, depression, emotional problems, insomnia, nausea and vomiting.

The essential oils that were applied to 135 women in 7 massage sessions based on their preference (lavender, bergamot, lemongrass, neroli, grapefruit, frankincense, sandal wood) were diluted in the ratio of 1%. While there were no significant changes in the pain and insomnia scores in comparison to the pre-intervention scores, it was concluded that fatigue and depression decreased, and the emotional statuses of the patients were better (Clemon-Crosby, et al. 2018).



**Figure 1. PRISMA Flow Diagram**

When aromatherapy was applied on a group consisting of pediatric cancer patients, who are more sensitive to pain and painful medical procedures, it was observed that pain decreased, and the anxiety caused by medical procedures was not experienced (Jibb, et al. 2015). However, no randomized controlled trial for the use of aromatherapy in pediatric cancer patients was found. Since randomized controlled studies on children increased ethical concerns it was thought that no studies were found in the literature.

#### **Usage of aromatherapy in managing psychological symptoms:**

Anxiety and depression may be observed frequently in cancer patients due to the nature of the disease and complication of the treatments that are applied. Aromatherapy is utilized to reduce anxiety and provide relaxation. When massage is applied especially with essential oils, blood circulation increases, stress decreases, and this helps relaxation (Shin, et al. 2016).

If anxiety and depression are not treated, they lead to disruption of sleep quality and worsening in the general state of mental wellness (Kandasamy, et al. 2011). A study that was carried out with lavender oil and colorectal cancer patients applied 10 minutes of back massage two times before the operation and reported that the anxiety levels of the patients decreased, and their sleep quality increased (Ayik & Ozden, 2018).

#### **Usage of aromatherapy in managing nausea-vomiting:**

Nausea and vomiting are observed prevalently in especially gynecological oncology patients due to chemotherapy or opioid usage. The taste changes the patients already have and reduced oral intake due to affected olfactory receptors may become even worse by addition of nausea and vomiting. Nausea and vomiting in cancer patients lead to problems such as significant electrolyte imbalance, dehydration and anorexia (Hamadani, et al. 2007). Because of all these reasons, the general health statuses of patients are disrupted. The essential oils that are used to manage nausea-vomiting show their effect on the central nervous system. In the central nervous system, the amygdala, hippocampus and limbic system play a role in processes such as recalling and memory. The essential oils used in aromatherapy stimulate the central nervous system through inhalation and help formation of positive emotions or elimination of negative emotions. Essential oils are utilized to prevent nausea and vomiting and

reduce anxiety and depression for these characteristics (Zeng, et al. 2018). A study that was carried out with 60 breast cancer patients compared the effects of ginger essential oil and ginger smell. In the study, the patients were given necklaces made out of Murano glass and asked to always keep these necklaces on their neck. Inside the necklaces of the patients in the two groups, they put 2 drops of ginger essential oil and a fluid smelling like ginger. When they were asked to smell these 3 times a day for at least 2 minutes even though they did not have any symptoms, there was no significant difference between the two groups in terms of their symptoms such as nausea, vomiting and fatigue. The explained this outcome with the effect of the scent of ginger in both groups. On the other hand, the general quality of health in the ginger essential oil group was reported to be higher (Lua, et al. 2015). A study on reduction of chemotherapy-related nausea-vomiting in pediatric cancer patients created three groups for usage of ginger essential oil (n=10), Johnson's baby shampoo (n=19) and water (n=10). They put 4 drops of liquid on a piece of cotton and placed it inside a capped sterile urine sampling container. The double-blind nature of the study was preserved by putting yellow food coloring inside the liquids so that they would look similar. The children were asked to take 3 deep breaths from inside the container before starting chemotherapy and inhale it whenever they need to during chemotherapy. The 3 groups were compared 30 minutes after chemotherapy ended, and no significant change was observed in their nausea and vomiting. As a result of the study, it was determined that a total of 21 patients experienced nausea, and there was a decrease in the nausea levels of 67%, worsening in 5% and no change in 28% (Evans, et al. 2018). Other than inhalation, aromatherapy application was also evaluated by massaging. In a study in breast cancer patients, when aromatherapy was applied through massaging, there were decreases in symptoms such as nausea, vomiting, pain and fatigue for up to 10 weeks (Ovayolu, et al. 2014). In another study where different essential oils (peppermint (2%), bergamot (1%) and cardamom (1%) mixed with 100 ml sweet almond oil) were used, the patients in the inhalation group were asked to breathe normally for 3 minutes after putting 2 ml of oil from the mixture on a piece of cotton. In the massage group, they applied Swedish massage to both feet for a total of 20 minutes with 2 ml of essential oil. It was reported that

inhalation aromatherapy and massage applications reduced the severity of nausea triggered by chemotherapy (Zorba & Ozdemir, 2018).

**Usage of aromatherapy in managing sleep disorders:** Sleep is very important in achieving a state of physical and psychological well-being. Qualitative and quantitative inadequacy of sleep delays the recovery and rehabilitation of patients.

Aromatherapy is also utilized in solution of sleep problems of cancer patients. When lavender, peppermint and chamomile oils were applied on newly diagnosed acute leukemia patients for 4 weeks in which they received intense chemotherapy, the authors observed that there was a decrease in symptom load (fatigue, taste changes, depression, anxiety and general well-being) (Lisa Blackburn, et al. 2017).

The aroma other than lavender oil that is used the most frequently in management of sleep disorders is rose oil. Different concentrations of rose oil were examined in cancer patients. The researchers asked the patients to apply 5 drops of 5% and 10% concentrations of rose oil on cotton and inhale it for 20 minutes starting at 30 minutes before they go to bed, and they observed a concentration-independent increase in sleep latency, quality and nighttime sleep duration (Heydaridad, et al. 2019).

**Usage of aromatherapy for general health status:** The essential oils that are used in aromatherapy show their effect on general health-related functions such as heart rate, respiration, blood pressure and salivation by influencing the central and peripheral nervous system (Hongratanaworakit, 2004). Especially bergamot, lavender and geranium are used frequently (Chang & Shen, 2011).

A study that was carried out with 3 groups that contained conscious (n=15) and unconscious (n=5) palliative care patients and healthy controls (n=10) had the participants inhale 3-4 drops of lemon and lavender essential oils applied on surgical mask, while water was applied to the masks in the control group.

Before the intervention, they measured heart rate, respiratory rate, SpO<sub>2</sub>, systolic and diastolic blood pressures.

While there was an increase in all parameters when lemon oil was used in conscious and unconscious patients, it was observed that SpO<sub>2</sub> decreased when lavender oil was applied (Goepfert et al., 2017). However, a study with breast cancer patients did not find the practice to be effective. In the aromatherapy group among breast cancer patients, based on their preferences, one of 3 different aromatic oils of “ylang-ylang”, “orange” and “lavender” was hanged overhead one day before their surgery. The control group received no intervention. The quality of life, satisfaction and vital signs of the participants were recorded throughout their hospitalization process. No significant difference was found between the groups (Tamaki et al., 2017).

The effects of aromatherapy were also investigated in thyroid cancer patients who were receiving radioactive iodine treatment. 1 ml of lemon essential oil and 0.5 ml of ginger essential oil were mixed, and a group of patients (n=35) were asked to inhale it. Distilled water was used for the other group (n=36).

The patients were asked to inhale these liquids for 10 minutes during radiotherapy. When the functions of their salivary glands were measured before and after the intervention, improvement was seen in the functions of the parathyroid and submandibular salivary glands of the participants in the group where the intervention was applied. It was concluded that, by applying aromatherapy on thyroid cancer patients under treatment of radioactive iodine, it is possible to prevent reduction in the secretion of their salivary glands (Nakayama et al., 2016).

**Table 1. Studies that were included in the systematic review**

Authors, year	Title	Aim of the research	Design	Sample size and scope	Intervention	Results
Ovayolu et al., 2014.	The effect of aromatherapy and massage administered in different ways to women with breast cancer on their symptoms and quality of life.	To assess the effects of aromatherapy and massage applied to women with breast cancer in different ways (classical massage, fragrance and aromatherapy massage) on symptoms and quality of life.	RCT's	280 patients. Fragrance group (n = 70), classical massage group (n = 70), aromatherapy massage group (n = 70), control group (n = 70).	The fragrance group was mixed with lavender, mint, chamomile, jasmine, violet, rosemary and eucalyptus. Patients were asked to smell this mixture by spraying on sterile sponge for 5 minutes, 3 times a week and for 1 month. The classical massage group was treated with olive oil for 35 minutes on legs (15 minutes), arms (10 minutes), feet (5 minutes) and hands (5 minutes) 3 times a week for 1 month. Aromatherapy massage group with the same oils, the same areas for 35 minutes 3 times a week for 1 month massage was applied. No intervention was applied to the control group.	Compared to the control group, the symptoms of the intervention group were decreased. It is reported that especially aromatherapy massage is effective in increasing the total quality of life. It was observed that aromatherapy massage was significantly effective in reducing the physical and psychological symptoms of the patients due to chemotherapy in the 6th and 10th weeks.
Lua et al., 2015.	Effects of inhaled ginger aromatherapy on chemotherapy-induced nausea and vomiting and health-related quality of life in women with breast cancer	To assess the efficacy of inhaled ginger aromatherapy on nausea, vomiting and health-related quality of life (HRQoL) in chemotherapy breast cancer patients.	RCT's, single blind, cross-over	60 female patients	Both groups were given necklaces made of murano glass. Ginger essential oil in one part of the necklace, while only 2 drops of ginger smell. They were asked to smell 3 times a day for at least 2 minutes, even if they had no symptoms.	There was no difference between the two groups in reducing symptoms (nausea, vomiting, fatigue, etc.). However, it has been reported that ginger essential oil is more effective than ginger odor in improving overall health quality.
Nakayama et al., 2016.	A Randomized Controlled Trial for the Effectiveness of Aromatherapy	To investigate effects of aromatherapy in decreasing salivary gland damage for patients	RCT's	Patients were divided into two groups. Group A (n = 35) was mixed with 1 ml of lemon	Patients were asked to inhale the fluid given for 10 minutes during radiotherapy. The functions of the salivary glands were measured before and after the intervention.	The parathyroid and submandibular salivary glands showed changes in the intervention group. It has been found to be effective in preventing salivary gland secretion in thyroid cancer patients under radioactive iodine treatment.

	in Decreasing Salivary Gland Damage following Radioactive Iodine Therapy for Differentiated Thyroid Cancer	undergoing radioactive iodine (RAI) therapy with differentiated thyroid cancer (DTC).		essential oil and 0.5 ml of ginger oil, and group B (n = 36) used distilled water.		
Lisa Blackburn et al., 2017.	The effect of aromatherapy on insomnia and other common symptoms among patients with acute leukemia	To determine if the use of aromatherapy improves insomnia and other common symptoms in hospitalized patients with newly diagnosed acute leukemia.	RCT'S	50 patients hospitalized for intensive induction chemotherapy for the first four weeks	Three scents (lavender, mint, chamomile) were offered to the patients during the trial. Each patient was randomized to selected aromatherapy intervention to measure sleep quality and other common symptoms.	Most patients reported poor quality sleep at baseline, but aromatherapy had a statistically significant positive impact. Improvements were noted in tiredness, drowsiness, lack of appetite, depression, anxiety, and well-being because of aromatherapy.
Goepfert et al., 2017	Aroma oil therapy in palliative care: a pilot study with physiological parameters in conscious as well as unconscious patients	To analyze the reactions of healthy test persons and conscious as well as unconscious palliative patients to aroma stimuli.	Pilot RCT's	The control group consisting of healthy subjects (n=10), conscious palliative care patient (n=15), unconscious palliative care patient (n=5)	They allowed the participants to be inhaled by putting 3-4 drops of lemon and lavender oil on the surgical mask. Water in the control group. They measured heart rate, respiratory rate, SpO2, systolic and diastolic blood pressure before the intervention.	Significant physiological changes were reported in all three groups. They reported an increase in all parameters in lemon oil and decreased SpO2 in lavender oil in conscious and closed patients. Healthy participants concluded that they had different reactions from palliative care patients regardless of their state of consciousness.
Tamaki et al., 2017	Randomized trial of aromatherapy versus	To compare the quality of life, vital signs and sleep quality,	RCT'S	110 patients aromatherapy group, 52 patients	Patients in the aromatherapy group were asked to choose one of three types of aroma oils: ylang-ylang, orange and lavender. The aroma oil of their choice was placed on the	They reported that there was no significant difference in quality of life, vital signs and sleep quality between the aromatherapy group and the control



	conventional care for breast cancer patients during perioperative periods.	and the effects of aromatherapy and conventional treatment in perioperative periods of breast cancer patients.		control group	bedside from 9:00 am to 6 am on the day before surgery. Quality of life was evaluated during the hospital stay. In addition, vital signs and impressions of the patients were recorded until discharge from the hospital.	group.
Evans et al., 2018.	The Use of Aromatherapy to Reduce Chemotherapy-Induced Nausea in Children With Cancer: A Randomized, Double-Blind, Placebo-Controlled Trial	To evaluate the effect of ginger on reducing nausea and vomiting caused by chemotherapy in pediatric cancer patients.	RCT's, double blind, placebo control	Ginger aroma group (n = 10), Johnson baby shampoo group (n = 19) and water group (n = 10)	4 drops of liquid cotton were dripped onto the lid. It is colored with yellow food coloring to make liquids look similar. Before chemotherapy, each child was asked to take 3 deep breaths through the cup and were asked to use them as needed throughout the CT. Evaluation was performed before CT and 15 to 30 minutes after the end.	A total of 21 patients had nausea during chemotherapy. It was reported that 67% had decreased nausea, 5% had worsening and 28% had no change. There were no significant changes between the 3 groups.
Ayik & Ozden, 2018.	The effects of preoperative aromatherapy massage on anxiety and sleep quality of colorectal surgery patients: A randomized controlled study.	To investigate the effects of aromatherapy massage on anxiety and sleep quality in patients undergoing colorectal surgery in the preoperative period.	RCT's	Aromatherapy massage group (n=40) and control group (n=40)	According to the "Back Massage Guide", aromatherapy massage was applied twice using 10% lavender oil ( <i>Lavandula Hybrida</i> ) for ten min. before surgery. The control group received standard nursing care in accordance with the hospital procedure and did not apply any intervention.	They concluded that the anxiety levels of patients receiving aromatherapy massage decreased and their sleep quality increased.
Zorba&Ozdemir,2018.	The Preliminary Effects of Massage and	To investigate the effect of aromatherapy via massage and	Semi-RCT's Pilot Trial	71 patients with breast cancer were divided into 3	English peppermint 2%, bergamot 1% and cardamom 1% were mixed with 100 ml sweet almond oil. Patients in the massage group received	In the control group, nausea and retching scores were significantly higher than the intervention group. They also concluded that the incidence of nausea was

	Inhalation Aromatherapy on Chemotherapy-Induced Acute Nausea and Vomiting: A Quasi-Randomized Controlled Pilot Trial.	inhalation on nausea and vomiting due to chemotherapy.		groups. Massage (n=25), inhalation (n=25) and control (n=25).	Swedish foot massage with 20-min. aromatherapy, while those in the inhalation group received aromatherapy with 3-min. inhalation before the second, third and fourth chemotherapy cycles. The control group received only routine treatment.	significantly lower in the inhalation group than in the massage group.
Chemo-Crosby et al., 2018.	Aromatherapy Massage for Breast Cancer Patients: A Randomized Controlled Trial	To evaluate the effect of aromatherapy on the reduction of symptoms (pain, anxiety, depression, emotional problem, insomnia, nausea/ vomiting) in breast cancer patients.	RCT's	In the intervention group (n=135), 6 appointments were made and they applied massage with essential oils. In the control group (n=149) they did not apply any intervention.	Seven essential oils (lavender, lemongrass, neroli, grapefruit, bergamot, frankincense, sandal wood) were applied to the intervention group with 1% mixing according to the wishes of the patients. They found that patients mostly preferred lavender and bergamot oil.	In the aromatherapy group, pain, insomnia scores did not change, whereas emotional functions, fatigue and depression decreased after 6 weeks.
Heydarirad et al., 2019.	Efficacy of aromatherapy with Rosa damascena in the improvement of sleep quality of cancer patients: A randomized controlled clinical trial	To determine the effect of aromatherapy on sleep quality in cancer patients.	RCT's, single blind.	The use of rose oil in different concentrations was compared in 45 cancer patients. 5% (n=15), 10% (n=15) and control (n=15)	The patients were asked to inhale 5 drops of 5% and 10% drops of rose oil on cotton for 30 minutes before going to bed for 2 weeks.	It was concluded that there was an increase in sleep quality, latency and nighttime sleep duration in aromatherapy groups, regardless of their intensity.

**Conclusions/Recommendations:** Consequently, based on the studies that were reviewed, it is seen that aromatherapy practices have been utilized as a safe method for management of the symptoms of cancer patients. Although the methods of applying aromatherapy are different, it is utilized in management of patient's pain, sleep disorders, anxiety, depression, nausea and vomiting and increasing their general well-being.

As aromatherapy practices are a method that is non-phar- non-invasive, they do not cause complications on the Jibb L.A., Nathan P.C., Stevens B.J., Yohannes L., Stinson J.N. (2015). Psychological and physical interventions for the management of cancer-related pain in pediatric and young adult patients: an integrative review. In *Oncology nursing forum*. Oncology Nursing Society. 42, 6, E339).  
Kandasamy A., Chaturvedi S. K., & Desai G. (2011). Spirituality, distress, depression, anxiety, and quality of life in patients with advanced cancer. *Indian journal of cancer*, 48(1), 55.  
Lisa Blackburn M. S., Sara Achor B. S. N., AD, B. A., Nicole Bauchmire M. S., Danielle Dunnington A. D., Klisovic R. B., ... & Tomlinson-Pinkham K. (2017, July). The effect of aromatherapy on insomnia and other common symptoms among patients with acute leukemia. In *Oncology nursing forum* (Vol. 44, No. 4, p. E185). Oncology Nursing Society.  
Lua P. L., Salihah N., & Mazlan N. (2015). Effects of inhaled ginger aromatherapy on chemotherapy-induced nausea and vomiting and health-related quality of life in women with breast cancer. *Complementary therapies in medicine*, 23(3), 396-404.  
Nakayama M., Okizaki A., & Takahashi K. (2016). A randomized controlled trial for the effectiveness of aromatherapy in decreasing salivary gland damage following radioactive iodine therapy for differentiated thyroid cancer. *BioMed research international*, 2016.  
Ovayolu O., Sevig U., Ovayolu N., & Sevinc A. (2014). The effect of aromatherapy and massage administered in different ways to women with breast cancer on their symptoms and quality of life. *International journal of nursing practice*, 20(4), 408-417.  
Ozpolat Z., Yildirim G., & Tanyildiz E. (2018, September). Analysis of Relations between Essential Oils and Diseases by Using Association Rules. In *2018 International Conference on Artificial Intelligence and Data Processing (IDAP)*(pp. 1-4). IEEE.  
Shin E. S., Seo K. H., Lee S. H., Jang J. E., Jung Y. M., Kim M. J., & Yeon J. Y. (2016). Massage with or without aromatherapy for symptom relief in people with cancer. *Cochrane Database of Systematic Reviews*, (6).

## References

- Ayik C., & Ozden 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.
- Chang K. M., & Shen C. W. (2011). Aromatherapy benefits autonomic nervous system regulation for elementary school faculty in Taiwan. *Evidence-Based Complementary and Alternative Medicine*, 2011.
- Clemo-Crosby A. C., Day J., Stidston C., McGinley S., & Powell R. J. (2018). Aromatherapy Massage for Breast Cancer Patients: A Randomised Controlled Trial. *J Nurs Womens Health: JNWH-144*. DOI, 10, 2577-1450.
- Evans A., Malvar J., Garretson C., Pedroja Kolovos E., & Baron Nelson, M. (2018). The Use of Aromatherapy to Reduce Chemotherapy-Induced Nausea in Children With Cancer: A Randomized, Double-Blind, Placebo-Controlled Trial. *Journal of Pediatric Oncology Nursing*, 35(6), 392-398.
- Goepfert M., Liebl P., Herth N., Ciarlo G., Buentzel J., & Huebner J. (2017). Aroma oil therapy in palliative care: a pilot study with physiological parameters in conscious as well as unconscious patients. *Journal of cancer research and clinical oncology*, 143(10), 2123-2129.
- Guleser G. N., Taşci S., & Kaplan B. (2012). The experience of symptoms and information needs of cancer patients undergoing radiotherapy. *Journal of cancer education*, 27(1), 46-53.
- Hamadani M., Chaudhary L., Awan F. T., Khan J. K., Kojouri K., Ozer H., & Tfayli A. (2007). Management of platinum-based chemotherapy-induced acute nausea and vomiting: is there a

- superior serotonin receptor antagonist?. *Journal of Oncology Pharmacy Practice*, 13(2), 69-75.
- Heydarirad G., Keyhanmehr A. S., Mofid B., Nikfarjad H., & Mosavat S. H. (2019). Efficacy of aromatherapy with *Rosa damascena* in the improvement of sleep quality of cancer patients: A randomized controlled clinical trial. *Complementary therapies in clinical practice*, 35, 57.
- Hongratanaworakit T. (2004). Physiological effects in aromatherapy. *Songklanakarin J Sci Technol*, 26(1), 117-125.
- Jibb L.A., Nathan P.C., Stevens B.J., Yohannes L., Stinson J.N. (2015). Psychological and physical interventions for the management of cancer-related pain in pediatric and young adult patients: an integrative review. In *Oncology nursing forum*. Oncology Nursing Society. 42, 6, E339).
- Kandasamy A., Chaturvedi S. K., & Desai G. (2011). Spirituality, distress, depression, anxiety, and quality of life in patients with advanced cancer. *Indian journal of cancer*, 48(1), 55.
- Lisa Blackburn M. S., Sara Achor B. S. N., AD, B. A., Nicole Bauchmire M. S., Danielle Dunnington A. D., Klisovic R. B., ... & Tomlinson-Pinkham K. (2017, July). The effect of aromatherapy on insomnia and other common symptoms among patients with acute leukemia. In *Oncology nursing forum* (Vol. 44, No. 4, p. E185). Oncology Nursing Society.
- Lua P. L., Salihah N., & Mazlan N. (2015). Effects of inhaled ginger aromatherapy on chemotherapy-induced nausea and vomiting and health-related quality of life in women with breast cancer. *Complementary therapies in medicine*, 23(3), 396-404.
- Nakayama M., Okizaki A., & Takahashi K. (2016). A randomized controlled trial for the effectiveness of aromatherapy in decreasing salivary gland damage following radioactive iodine therapy for differentiated thyroid cancer. *BioMed research international*, 2016.
- Ovayolu O., Sevig U., Ovayolu N., & Sevinc A. (2014). The effect of aromatherapy and massage administered in different ways to women with breast cancer on their symptoms and quality of life. *International journal of nursing practice*, 20(4), 408-417.
- Ozpolat Z., Yildirim G., & Tanyildiz E. (2018, September). Analysis of Relations between Essential Oils and Diseases by Using Association Rules. In *2018 International Conference on Artificial Intelligence and Data Processing (IDAP)*(pp. 1-4). IEEE.
- Shin E. S., Seo K. H., Lee S. H., Jang J. E., Jung Y. M., Kim M. J., & Yeon J. Y. (2016). Massage with or without aromatherapy for symptom relief in people with cancer. *Cochrane Database of Systematic Reviews*, (6).

- Singh P., & Chaturvedi A. (2015). Complementary and alternative medicine in cancer pain management: a systematic review. *Indian journal of palliative care*, 21(1), 105.
- Tamaki K., Fukuyama A. K., Terukina S., Kamada Y., Uehara K., Arakaki M., ... & Ohuchi N. (2017). Randomized trial of aromatherapy versus conventional care for breast cancer patients during perioperative periods. *Breast cancer research and treatment*, 162(3), 523-531.
- Zeng Y. S., Wang C., Ward K. E., & Hume A. L. (2018). Complementary and alternative medicine in hospice and palliative care: a systematic review. *Journal of pain and symptom management*.
- Zorba P., & Ozdemir L. (2018). The preliminary effects of massage and inhalation aromatherapy on chemotherapy-induced acute nausea and vomiting: a quasi-randomized controlled pilot trial. *Cancer nursing*, 41(5), 359-366.
- <http://www.prisma-statement.org/> Access date: 20.05.2019