Review

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Aromatherapy in Cancer Patients Receiving Palliative Care

Palyatif Bakım Alan Kanser Hastalarında Aromaterapi

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ABSTRACT

Palliative care is a specialty that aims to prevent and reduce the distress of patients and their families who encounter life-threatening diseases. Especially, it aims to eliminate the problems caused by the cancer itself or the treatment methods. Patients diagnosed as having cancer experience many problems such as nausea, vomiting, anxiety, depression and sleep disturbance due to the disease and its treatment. Patients can search for complementary treatment methods such as aromatherapy in order to reduce or eliminate these symptoms and increase their well-being and quality of life. Aromatherapy is defined as the use of essential oils obtained from plants for therapeutic purposes. Essential oils used in aromatherapy are applied in the form of massage, bath or inhalation. In this review, the use of aromatherapy in the treatment of common symptoms in cancer patients receiving palliative care will be discussed.

Keywords: Palliative care, cancer, aromatherapy

ÖZ

Palyatif bakım, yaşamı tehdit eden hastalıklarla karşılaşan hasta ve ailesinin sıkıntılarını önlemeyi ve azaltmayı amaçlayan bir uzmanlık alanıdır. Özellikle kanserin kendisinden veya tedavi yöntemlerinden kaynaklanan problemleri ortadan kaldırmayı amaçlar. Kanser tanısı konmuş hastalar, hastalık ve tedavisine bağlı bulantı, kusma, anksiyete, depresyon ve uyku bozukluğu gibi pek çok sorun yaşamaktadır. Hastalar bu semptomları azaltmak ya da ortadan kaldırmak, iyilik halini ve yaşam kalitesini artırmak amacıyla aromaterapi gibi tamamlayıcı tedavi yöntemlerine başvurabilmektedir. Aromaterapi, bitkilerden elde edilen uçucu yağların, terapötik amaçlı kullanılması olarak tanımlanmaktadır. Aromaterapide kullanılan uçucu yağlar masaj, banyo veya inhalasyon şeklinde uygulanmaktadır. Bu derlemede palyatif bakım alan kanser hastalarında yaygın olarak görülen semptomların iyileştirilmesinde aromaterapi kullanımına değinilecektir.

Anahtar Sözcükler: Palyatif bakım, kanser, aromaterapi

Introduction

Palliative care is a multidisciplinary specialty that has gained importance in recent years and focuses on preventing and reducing the distress of patients and their families who encounter life-threatening diseases. It aims to help patients who need support at all stages of the disease and at the end of life. Palliative care is an approach that aims to eliminate the problems caused by cancer itself or treatment methods, and to increase the quality of life of patients and their relatives. In recent years, many reasons such as the increase in the incidence of cancer and the life span of individuals diagnosed as having cancer, and aggressive treatments in the last stages of life have increased the need for palliative care (1). American Society of Clinical Oncology (ASCO) defined palliative care in cancer patients as "integrating improvements in cancer care for various conditions that affect the quality of life that are painful and distressing for patients and their families" (2).

Today, cancer is one of the most important health problems (3). Cancer patients experience various physical complications (hair loss, nausea, vomiting, pain, fatigue, anorexia, malnutrition and

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weakness) and psychological complications (depression, stress and anxiety) that reduce their quality of life (4,5). Despite recent advances in cancer treatment and the use of various treatments such as surgery, chemotherapy, hormone therapy, radiotherapy, and immunotherapy or biological therapy, patients still suffer from these complications due to the lack of definitive treatment (6). Today, the use of treatments such as complementary medicine is widely preferred to alleviate cancer symptoms, given their naturalness, low risks, less complications, and lower costs (7).

According to the World Health Organization, 80% of cancer patients use complementary medicine methods (8). One of the most widely used complementary therapies is aromatherapy, which refers to the use of aromatic oils to protect and improve physical and mental health, and this method is preferred in many countries such as Switzerland, Germany, the United Kingdom, Canada and the United States (9).

Aromatherapy is used as a popular complementary medicine method in the treatment of many complications in various patients (7). In aromatherapy, essential oils obtained from aromatic plants can be applied in the form of inhalation, massage, diffusion, compresses or baths. After essential oils and their components enter the body through the nose, skin or mucous membranes, they reach the bloodstream and eventually the brain, causing various effects. The molecules in inhaled essential oils reach the olfactory receptors in the nose and bind to different parts of the receptors. Receptors convert odors into electrical impulses and these electrochemical messages, formed by the binding of molecules to the receptors, are transmitted to the limbic system via the olfactory bulb and olfactory pathway. These messages activate the memory and emotional responses through the hypothalamus, allowing the response to be sent to other parts of the brain and to the body, thus causing various physiological effects in the body. For example, it is known that some components in essential oils affect the release of substances such as dopamine, serotonin, noradrenaline and endorphins in the brain stem and thus exert an analgesic effect (10). Essential oil molecules, in topical applications, are absorbed through the pores of the skin and mix with the blood circulation and thus show their physiological and physical effects (11). Different studies have shown that aromatherapy is used to improve the complications of fatigue, depression, stress, anxiety, pain, sleep disorders, nausea and vomiting and increase the quality of life in cancer patients (7).

In this review, aromatherapy methods used to alleviate common symptoms such as nausea, vomiting, anxiety, depression, sleep disturbance and pain in cancer patients receiving palliative care will be examined.

Nausea and Vomiting

Nausea and vomiting are two of the most important gastrointestinal problems that seriously threaten the quality of life of palliative care patients. These symptoms appear due to the disease, due to the presence of cancer in the gastrointestinal tract, or as side effects of the treatments applied (12). Studies report that nausea and vomiting seen in cancer patients cause fluid-electrolyte imbalance, dehydration, weight loss, physiological effects caused by poor drug absorption, and decreased excretion from the kidneys. However, it has negative effects on the social life, work life, daily activities and psychological well-being of the patients. In addition, nausea and vomiting cause some patients to refuse or discontinue chemotherapy (13).

Despite the development of more effective antiemetic agents, nausea and vomiting continue to be among the most disturbing side effects of chemotherapy (14). Studies have documented that the incidence of acute and delayed nausea and vomiting after chemotherapy is higher than 50%, even after antiemetic prophylaxis (15,16). For this reason, it is recommended to use complementary therapies together with pharmacological treatments to reduce chemotherapy-induced nausea and vomiting (CINV) (17). Aromatherapy is one of the complementary therapies commonly used for this purpose. When studies are examined, the use of peppermint and ginger essential oils comes to the fore, especially in coping with CINV (13,18-22).

Aromatherapy with medicinal peppermint (*Mentha piperita* L.) essential oil is recommended as an effective complementary therapy for the treatment of postoperative nausea due to its antiemetic and antispasmodic effects. Studies have shown the effectiveness of *Mentha piperita* in reducing postoperative nausea and vomiting (23), chemotherapy-induced nausea (24), and colon spasms during colonoscopy (25,26) and after colostomy surgery (27). The potential benefits of medicinal peppermint essential oil and aromatherapy include rapid onset of action, no side effects, affordable cost, and easy use, so it is used as a traditional anti-nausea and vomiting medicine (28).

Eghbali et al. (22) conducted a randomized controlled clinical study to determine the effect of aromatherapy containing medicinal peppermint essential oil on nausea and vomiting in the acute phase (first 24 hours) of chemotherapy in 100 cancer patients. Patients with a definite diagnosis of breast cancer and receiving chemotherapy with drugs (cyclophosphamide and adriamycin) that caused moderate to severe nausea were included in the study and the patients were randomly divided into intervention (n=50) and control (n=50) groups. In addition to the standard drugs given by the doctor, the patients in the intervention group were asked to pour two drops of 100% medical peppermint essential oil on a tissue paper 3 times a day (morning, noon and night), put it on the collar of their clothing and breathe normally for 20 minutes. The patients in the control group, on the other hand, used saline in the same way instead of breathing peppermint oil for the specified time. As a result of the study, it was reported that the frequency of nausea and vomiting decreased in 76% of the patients in the aromatherapy group, and there was a significant difference between the intervention and control groups. According to this study, it was stated that the use of aromatherapy with the recommended dose of medicinal peppermint essential oil did not cause any side effects and could be used as a therapeutic method together with medical treatments to improve CINV (22).

The effects of peppermint oil on frequency of nausea, vomiting and retching, and severity of nausea were evaluated in another quasi-randomized controlled study involving 80 cancer patients who underwent different chemotherapy protocols and experienced nausea and vomiting after chemotherapy treatment. The patients were divided into 2 groups as intervention and control groups. In patients in the intervention group (n=36), in addition to routine antiemetic therapy, 3% peppermint oil (18 drops of peppermint oil in 30 mL of sweet almond oil) was administered three times a day (morning, afternoon and evening) for five days following chemotherapy administration to the point between the upper lip and the nose (filtrum), and the patients were asked to take a deep breath after applying the aromatic mixture. Only routine antiemetic treatment was applied to the patients in the control group (n=44). As a result of the study, it was reported that peppermint oil significantly reduced the frequency of nausea, vomiting, retching and the severity of nausea in cancer patients undergoing chemotherapy. For this reason, the authors recommended the use of peppermint oil with antiemetics after chemotherapy, which had a medium and low emetic risk, to cope with CINV (13).

Mapp et al. (18) conducted a study with the participation of 79 patients and evaluated the effectiveness of peppermint essential oil against the intensity of nausea in cancer patients. The results of this study showed that the use of peppermint oil was effective in reducing the intensity of nausea experienced by patients compared to the control group (18). Although the sample size was low, in another study using peppermint oil to combat nausea in palliative care and hospice care, it was reported that the use of peppermint oil together with medical treatment reduced the frequency of nausea (19).

Ginger (*Zingiber officinale*), another herb of choice for dealing with CINV, has a long history in many cultures as a folk remedy for nausea and gastrointestinal ailments. Experimental research has shown that ginger can be effective as an anti-nausea agent; therefore, it has been suggested as a possible candidate for anti-CINV therapy (29). Although the exact mechanism of action is unknown, multiple active ingredients in ginger (gingerols, shogaol, zingiberen, zingerone, and paradol) have been found to exert potentially beneficial effects on many mechanisms involved in the pathophysiology of CINV. Cell culture and animal studies show that these components stimulate oral and gastric secretions (30,31), regulate gastrointestinal motility, and interact with 5-HT3 receptors involved in the CINV reflex (32).

In a study evaluating the effectiveness of ginger aromatherapy on nausea and vomiting in 60 patients with cervical cancer who received chemotherapy, the patients were divided into two groups as intervention (n=30) and control (n=30). The study groups were kept similar in terms of chemotherapy treatment protocol and antiemetic drug use. Patients in the intervention group were asked to add 5 drops of ginger oil to a mask and inhale this oil for 10 minutes, do this 30 minutes before starting the meal and repeat it when they felt nauseated. It was determined that the patients in the intervention group after the application were significantly less likely to experience nausea and vomiting than the control group. Therefore, the authors reported that ginger aromatherapy could be used as an alternative medicine to reduce nausea and vomiting after chemotherapy (20).

Lua and Zakaria (21) conducted a single-blind randomized controlled crossover study to evaluate the efficacy of inhaled ginger aromatherapy on nausea, vomiting, and health-related quality of life in 75 patients with breast cancer receiving chemotherapy. Patients received a 5-day aromatherapy treatment (at least 3 times a day, 2 drops) using ginger essential oil or ginger placebo (reduced therapeutic value, ginger fragrance oil). The patients were divided into 2 groups and the patients in Group 1 (n1=37) were given placebo (ginger essential oil) at the time of the first chemotherapy followed by ginger essential oil at the next chemotherapy. Patients randomized to group 2 (n2:38) were first given ginger essential oil at the time of the first chemotherapy and placebo (ginger fragrance oil) for the next treatment. As a result of the study, it was shown that aromatherapy applied as inhaled ginger essential oil for five days had limited effects in reducing CINV, other than alleviating acute nausea. The authors stated that the evidence from this study should be confirmed by further studies (17).

Zorba and Ozdemir (33) conducted a quasi-randomized controlled study with 75 patients with breast cancer to evaluate the effects of massage and inhalation aromatherapies on CINV. The patients were randomly divided into 3 groups as inhalation, massage and control. Patients in the massage group (n=25) received 20 minutes of aromatherapy foot massage before chemotherapy, while patients in the inhalation group (n=25) received 3 minutes of inhalation aromatherapy before chemotherapy. The control group (n=25) did not receive any treatment other than routine treatment and maintenance procedures. A mixture of English peppermint (*Mentha piperita*; 2%), bergamot (*Citrus bergamia*; 1%) and cardamom (*Elettaria cardamomum*; 1%) was used in 100 mL of sweet almond carrier oil for both inhalation and massage aromatherapy. The researchers followed the effects of aromatic mixture and massage applied before the 2nd, 3rd and 4th chemotherapy courses on the severity of acute nausea after chemotherapy treatment. The severity of nausea was statistically significantly lower among the patients in the massage and inhalation groups than in the control group in all 3 cycles. In conclusion, the authors reported that massage and inhalation aromatherapy are promising for the treatment of CINV (33).

Another study involving 66 cancer patients suffering from CINV compared the effects of cardamom oil (*Elettaria cardamomum*) and inhalation aromatherapy on CINV versus placebo. Patients in the intervention group were asked to take deep 3 breaths twice a day, using pads impregnated with cardamom oil at 5-minute intervals. Distilled water was applied to the placebo group in the same way. In the follow-ups after the application, it was determined that the severity of nausea was significantly less in the intervention group than in the placebo group. As a result of the study, it was reported that inhalation aromatherapy with cardamom oil can be used to reduce the severity of chemotherapy-induced nausea in cancer patients (34).

In a study conducted with 60 cancer patients receiving chemotherapy with highly emetogenic agents, the effect of aromatherapy on CINV was examined. The patients were massaged with 6 drops of medicinal lavender oil (*Lavandula angustifolia*) for 10 minutes, starting from one hour before chemotherapy and every hour until the completion of chemotherapy, and inhalation of medicinal lavender oil was applied to the patients in addition to the massage. A significant decrease in nausea and vomiting was observed in each patient who received aromatherapy, and it was determined that the patients' nausea and vomiting levels decreased statistically significantly one day after chemotherapy administration compared to the control group ($p<0.01$). As a result of the study, it was stated that aromatherapy might be an effective option in the prevention and reduction of side effects such as nausea and vomiting experienced by cancer patients receiving chemotherapy with highly emetogenic agents (35).

Anxiety and Depression

Psychiatric symptoms such as hopelessness, anxiety and depression are common in palliative care patients. Studies show that 25-35% of cancer patients have significant anxiety or depression (36). Depression is a psychiatric disorder that is most common in hospices and palliative care units, especially in cancer patients, and its prevalence is at least 4 times higher than in the general population. It is an important health problem that should be handled carefully in palliative care units in terms of both its prevalence and its consequences (37). However, fear of death, worsening of quality of life and deterioration of social relations cause cancer patients to experience negative conditions such as anxiety and sleep disorders (38). Many pharmacological treatments are used to manage anxiety and depression, but these treatments can sometimes cause negative effects and economic loss. For this reason, complementary therapies such as participating in relaxation exercises, listening to music and aromatherapy can be used in the treatment of anxiety and depression in cancer patients (38).

Wilkinson et al. (39) investigated the effects of massage alone or aromatherapy massage on anxiety in 103 advanced cancer patients in a palliative care setting. The patients were randomly divided into two groups; one group (n=46) was given aromatherapy massage [with Roman chamomile oil (*Anthemis nobilis L.*)] for 3 weeks, while the other group (n=57) was only massaged for 3 weeks. The results showed a significant reduction in anxiety after each massage. Roman chamomile essential oil was shown to have beneficial effects on physical and psychological symptoms in advanced cancer patients. Researchers stated that massage with or without essential oils reduced anxiety levels, however, they concluded that the addition of an essential oil increased the effect of massage and improved physical and psychological symptoms and overall quality of life (39).

A randomized controlled trial was designed to compare the effects of four weeks of aromatherapy massage and massage alone on physical and psychological symptoms in 42 advanced cancer patients receiving palliative care in the UK. Fourty two patients were randomly divided into three groups. Aromatherapy massage group (n=16) was massaged with an inert carrier oil mixed with 1% medical lavender essential oil. The other group (n=13) was only massaged with an inert carrier oil, while the control group (n=13) did not receive any aromatherapy massage. The patients were given either only massage or aromatherapy massage for 30 minutes once a week for 4 weeks. In this study conducted with advanced cancer patients, it was stated that the difference between anxiety levels in aromatherapy massage group and massage only group was not statistically significant. While the level of depression did not change in the aromatherapy massage group, the depression levels decreased in the massage group only. The authors stated in this study that the addition of lavender essential oil did not increase the beneficial effects of massage, but patients with psychological disorders responded better to these treatments (40).

Santosh et al. (35) compared the anxiety levels of the control group with medical lavender oil massage applied together with medical lavender oil inhalation in patients receiving chemotherapy. In the study, it was found that anxiety levels decreased in both groups, and this decrease was statistically significantly higher in the group that received lavender aromatherapy ($p<0.001$) (35).

A clinical study was conducted to evaluate the effect of sweet orange essential oil (*Citrus aurantium L.*) on anxiety and included 42 patients with chronic myeloid leukemia (CML). Among the patients who were randomly divided into 3 groups, 10 mg of diazepam used as a standard anxiolytic drug was administered to the 1st group (n=14), 10 mL of sweet orange essential oil was administered to the 2nd group by inhalation for 30 minutes, and saline solution inhalation was applied for 30 minutes to the 3rd group (n=14), which was the placebo group. Evaluation was made with psychometric scales (STAI-S: State-Trait Anxiety Inventory), and a decrease in STAI-S scores was observed in the Sweet orange oil group, which was associated with anxiolytic effect. As a result of the study, it was observed that sweet orange oil showed anxiolytic effect and reduced anxiety-related signs and symptoms in CML patients (41).

Imanishi et al. (42) conducted a open semi-comparative trial to investigate the effect of aromatherapy massage with an essential oil mixture on psychological and immunological parameters in 12 patients with breast cancer. Aromatherapy massage (eight times in total) was applied to the patients twice a week for 4 weeks, using 30 minutes of Sweet orange oil (*Citrus aurantium*), lavender oil (*Lavandula angustifolia*) and Sandalwood oil (*Santalum album*). In the evaluations, it was shown that after the 5th and 8th sessions, the anxiety level of the patients decreased, the level of depression did not change, however, aromatherapy massage improved the immunological status. Researchers reported that aromatherapy massage was a complementary therapy that significantly reduced anxiety in patients with breast cancer (42).

A clinical study was conducted in 58 hospice patients to examine the effect of aromatherapy hand massage on pain, anxiety and depression in terminal cancer patients. The patients were randomly divided into two, and aromatherapy group (n=28)

was given 5 minutes of hand massage for 7 days with a mixture of Bergamot, Lavender and Frankincense diluted at the rate of 1.5% with sweet almond carrier oil (1:1:1 ratio). In the same way, hand massage was applied to the group (n=30) with only sweet almond carrier oil. The aromatherapy group showed significant differences in pain score (p=0.001) and changes in depression score (p=0.000) compared to the control group. According to the data obtained from the study, it was reported that aromatherapy hand massage had a positive effect on pain and depression in terminal cancer patients (43).

Anxiety is a common problem in patients in the preoperative period. In this context, in a randomized controlled study including 80 patients with breast cancer in whom breast surgery was planned, the effect of lavender oil inhalation on anxiety levels was investigated. The intervention group (n=40) was given gauze containing 3-4 drops of lavender oil (one drop of 0.1 mL at 100% concentration) for 20-minute inhalation on the day of surgery, while the control group (n=40) was given routine pre-surgical instructions. It was stated that both groups had similar levels of anxiety in the preoperative period, however, as a result of the study, the anxiety levels of the patients in the intervention group decreased significantly compared to the control group. According to the results of this study, it was reported that preoperative inhalation aromatherapy with medicinal lavender oil reduced anxiety levels (44).

In a randomized controlled study in which the effect of medicinal lavender oil aromatherapy on anxiety was evaluated in cancer patients receiving chemotherapy (such as breast cancer, lung cancer, ovarian cancer), patients were divided into 3 groups and lavender oil was administered to one group (n=30), tea tree oil aromatherapy was applied to another group (n=20), and no application was made to the control group (n=20). As a result of the study, it was shown that three drops of lavender oil inhaled every night before sleep decreased the anxiety levels of the patients and increased the quality of sleep. However, it was stated that tea tree oil had no effect on state and trait anxiety levels, but increased sleep quality. The authors compared the anxiety scores before and after chemotherapy and reported a statistically significant difference in the lavender group (45).

In a randomized controlled study, Khiewkhern et al. (46) examined the effects of aromatherapy massage (with coconut oil containing 0.05 mL ginger essential oil) for one week and three times a week, on anxiety and depression in patients with colorectal cancer. It was determined that the anxiety levels of the patients who received aromatherapy massage were statistically significantly reduced compared to the patients in the control group (p=0.001). However, there was no statistically significant difference between the groups in terms of depression level (46).

Sleep Disorder

Sleep disorders are one of the important health problems that negatively affect the quality of life in palliative care patients. The prevalence of insomnia, which is reported to be intense in 24-47% of patients in the literature, is reported to be 62% in palliative care patients (47,48). In this patient group, insomnia may increase the severity of other symptoms and negatively affect the quality of life of the individual (47). Many pharmacological and complementary therapies are used in the management of sleep disorders. Complementary treatments include music therapy, art therapy, progressive muscle relaxation exercises, yoga, massage, reflexology, food supplements, and aromatherapy (49).

It has been reported in various studies that medicinal lavender oil is used in the treatment of sleep problems due to their sleep-promoting effects and that it does not have any side effects (50-53). Studies have shown the sedative, anxiolytic, anticonvulsant, antiepileptic, spasmolytic and sleep-regulating effects of *Lavandula angustifolia* by suppressing the central nervous system (49). Because of all these properties, lavender is used for spiritual relaxation, therapeutic purposes (building physical and emotional well-being), and regulation of sleep disorders (45). In an experimental study with cancer patients, aromatherapy sticks containing different essential oils, including lavender, were placed around the patients, and as a result of the study, it was shown that the application of aromatherapy allowed the patients to relax, calm down and fall asleep (53).

Ozkaraman et al. (45) investigated the effect of lavender oil aromatherapy on sleep quality in cancer patients (such as breast cancer, lung cancer, ovarian cancer) undergoing chemotherapy in a randomized, controlled study. There was no significant change was observed in the Pittsburgh Sleep Quality Index (PSQI), which was used to measure sleep quality before and after chemotherapy in patients who were randomly assigned to the lavender oil group (n=30), tea tree oil group (n=20), and control group (n=20). As a result of the study, it was shown that three drops of lavender and tea tree oil inhaled every night before sleep increased the sleep quality of patients (45).

According to a recent study conducted to determine the effect of lavender oil on sleep quality and vital signs in 68 cancer patients receiving palliative care, while the medicinal lavender oil was applied to the patients (Before going to bed, they were asked to take 10 deep breaths of 3 mL of 100% pure lavender oil and the oil was left 1 m away from the patients overnight) in the experimental group (n=34) on the 2nd and 3rd days of the study, no application was made to the control group (n=34). It was observed that the application of lavender oil did not affect the vital signs of the patients, but provided deeper sleep on the 2nd day after the intervention, facilitated them to fall asleep and sleep again when they woke up, and increased their sleep quality. As a result of the study, it was stated that the use of lavender oil was an effective method to increase the overall sleep quality in palliative care patients and could be used safely in the management of sleep problems (49). In their randomized controlled study, Soden et al. (40) found that aromatherapy massage (with lavender essential oil) and classical massage applied to patients receiving palliative care statistically significantly reduced sleep problems.

Rosa damascene Mill (Isparta rose), which is used in the treatment of sleep disorders in cancer patients, is one of the most important species of the Rosaceae family (54). Clinical studies have shown

that *Rosa damascena* has a sedative effect without serious side effects (55,56). Heydarirad et al. (57) conducted a randomized, single-blind, controlled clinical trial to investigate the effect of aromatherapy containing two different concentrations of *Rosa damascena* essential oil on sleep quality in cancer patients. The patients were randomly divided into 3 groups, and each group was treated with rose essential oil at different doses (18 patients 5% rose essential oil in rapeseed oil, 18 patients 10% rose essential oil in rapeseed oil, and 18 patients control group) for 2 weeks at night. Aromatherapy treatment was given. Patients in the aromatherapy group were asked to apply the oil by inhalation for 20 minutes half an hour before going to bed for two weeks. The total PSQI scores used to evaluate sleep quality of both groups (5% and 10%) were found to be close and its effects were reported to be statistically significant compared to the control group. The authors stated that aromatherapy with *Rosa damascena* essential oil could be used as a suitable complementary therapy to improve sleep quality in cancer patients (57).

A double-blind, randomized, controlled clinical trial was conducted to investigate the effect of aromatherapy with diffusion of essential oils (lavender, peppermint, chamomile oil) on sleep and other common symptoms in hospitalized patients newly diagnosed as having acute leukemia. It was reported that aromatherapy application had a positive effect on sleep, and improvements in symptoms such as fatigue, lethargy, loss of appetite, depression and anxiety, which were common in patients, were noted. As a result of the study, it was reported that aromatherapy was a viable intervention to improve insomnia and other symptoms commonly experienced by patients with acute leukemia (58).

According to a randomized controlled study comparing the effect of inhalation aromatherapy with lavender and peppermint oil on the sleep quality of cancer patients, 120 patients included in the study were randomized to lavender (n=40), peppermint (n=40) and control (n=40) groups. Three drops of essential oil were dripped onto cotton for 7 days in the intervention groups, and they were adhered to the patient's collar for 20 minutes and the patients were allowed to breathe. Aromatic distilled water was applied to the control group in the same way. While the PSQI score averages used to determine the sleep quality of the patients did not show a significant difference between the three groups before the application, a statistically significant difference was found after the intervention. PSQI mean scores were lower in lavender and mint groups than in the control group. The results showed that inhalation aromatherapy with lavender and peppermint essential oils had the same effect on the sleep quality of cancer patients. Therefore, it has been reported that this simple and accessible method can be used to improve the sleep quality of cancer patients (59).

According to a randomized controlled clinical study involving 74 cancer patients treated in a palliative care setting, it was reported that a single session (30 minutes) of aromatherapy massage with essential oils (lavender oil, orange oil or a mixture of two oils) did not have a significant effect on improving sleep quality compared to the control group. This result was associated with a single session of massage and not evaluating the long-term effects in the study. Researchers noted that further clinical studies were needed to evaluate the long-term effects of aromatherapy massage (60).

Pain

Pain is a condition that is frequently seen in cancer patients, the most feared by patients and defined as "more terrible than death itself", and it significantly affects the quality of life and integrity of patients. Of cancer patients, 70% experience pain at any stage, and despite effective guidelines developed for the management of cancer pain, 80-90% are undertreated. It has been reported that 90% of patients receiving palliative care experience pain. Therefore, evaluation of pain at regular intervals and review of treatment are an important part of palliative care (61). It is known that due to the difficulties experienced in the evaluation and control of pain in cancer patients, patients frequently resort to complementary methods in addition to medical treatment (61). In the management of cancer pain; integrative methods such as reflexology, aromatherapy, massage, therapeutic touch, and reiki are frequently used to support medical treatment (62).

Pain and anxiety due to medical procedures performed in cancer patients can reduce the patient's compliance with the treatment and cause difficulties in the treatment procedure (63-65). In this context, a quasi-randomized controlled was conducted to examine the effects of inhalation aromatherapy on procedural pain and anxiety after needle insertion into an implantable central venous port catheter in cancer patients. In the study, which included 123 cancer patients who were planned to receive chemotherapy, the patients were randomly divided into the lavender group (n=41), the eucalyptus group (n=41) and the control group (n=41). Before inserting the needle into the implantable venous port catheter, the patients in the intervention group inhaled 3 drops of essential oil for 3 minutes, while the control group did not receive any application. At the end of the study, it was reported that the mean VAS scores of the lavender group were significantly lower than the control group ($p<0.05$), but there was no significant decrease in the VAS scores of the eucalyptus group compared to the control group ($p>0.05$). As a result, it has been stated that lavender essential oil is effective in reducing pain levels during the medical procedure due to its antinociceptive and analgesic properties, and inhalation aromatherapy with lavender can be used to reduce pain during the medical procedure (66).

İlter et al. (67) conducted a quasi-experimental study to evaluate the effect of inhalation aromatherapy on invasive pain, compliance with the procedure, vital signs, and saturation during port catheterization in 60 patients with cancer. For the patients in the intervention group (n=30), it was prepared by diluting orange, chamomile and lavender essential oils (1:1:1 ratio) in 70 mL distilled water, and this aromatic mixture was dripped onto the pillow and the patient inhaled for 15 minutes during the post-catheterization procedure. It was determined that inhalation aromatherapy applied to the patients in the intervention group reduced the pain experienced during the procedure and facilitated the compliance with the procedure; however, it was reported that it did not affect vital signs and saturation. As a result of the study, the

authors recommended the application of inhalation aromatherapy along with pharmacological treatments during the catheterization procedure, as it reduced invasive pain and facilitated compliance with the procedure (67).

In a quasi-experimental study conducted with chemotherapy-treated acute myeloid leukemia (AML) patients with a minimal pain score of 3, it was found that aromatherapy with 2% lavender oil reduced the pain intensity and there was a significant difference in pain intensity between the intervention and control groups (68).

In a randomized controlled study, Ovayolu et al. (69) included 280 patients with breast cancer receiving chemotherapy, and the effect of aromatherapy massage on patients' quality of life, physical and psychological symptoms, and cancer-related pain was investigated. In the aromatherapy massage group (n=70), aromatherapy massage was performed 3 times a week for 35 minutes for 1 month with a mixture of lavender, mint, chamomile, jasmine, violet, rosemary and eucalyptus essential oils (2:2:2:1:1:1:1 ratio) in 1.1% sweet almond oil. The classical massage group (n=70) was massaged by the same way with olive oil. The inhalation group (n=70) was given 5 minutes of inhalation of the aromatic mixture 3 times a week for 1 month, while no intervention was made in the control group (n=70). It was found that classical massage, aromatherapy massage and aromatherapy inhalation had positive effects on quality of life and physical and psychological symptoms, and especially aromatherapy massage was more effective. However, cancer-related pain levels were found to be significantly reduced in the aromatherapy group (69).

In their randomized controlled study, Khiewkhern et al. (46) found that there was a statistically significant decrease in pain levels in patients with colorectal cancer who received aromatherapy massage compared to the control group. In another study, it was reported that cancer patients who expressed pain before aromatherapy massage stated that they were relieved after the application (70). On the other hand, in a randomized controlled study conducted to investigate the effects of four-week aromatherapy massage and massage only on cancer-related pain in advanced cancer patients receiving palliative care, it was reported that there was no statistically significant difference between the pain levels of the group that received aromatherapy massage with lavender essential oil and the group that received only massage. In this study, it was reported that the addition of lavender essential oil did not increase the beneficial effects of massage, but patients with psychological disorders responded better to the treatment (40).

Conclusion and Recommendations

Patients in need of palliative care search for complementary methods such as aromatherapy in order to reduce their physical symptoms, control the side effects of treatment and improve their psychological health, in addition to their primary treatment. Aromatherapy is used to improve symptoms such as depression, anxiety, pain, sleep disorders, nausea and vomiting, which are commonly found in cancer patients receiving palliative care, and to increase their quality of life. The studies examining the effectiveness of aromatherapy in cancer patients receiving palliative care mentioned in our review and some of their findings are summarized in Table 1.

Chemotherapy-induced nausea and vomiting is among the most common and feared side effects of cancer treatments. Peppermint and ginger essential oils are the most researched aromatic oils for coping with CINV. In studies using different essential oils, aromatherapy has been shown to be effective in the treatment of CINV. In this context, it has been stated that aromatherapy can be used as a therapeutic method together with medical treatments to improve and prevent nausea and vomiting.

Anxiety and depression are among the most common complaints in cancer patients and palliative care patients. Lavender oil is the most studied essential oil in the treatment of anxiety and depression in cancer patients. Although the studies indicate that aromatherapy can be used to reduce anxiety and depression in cancer patients, on the other hand, the emergence of different results in studies examining the short and long-term effects of aromatherapy shows that there is a need for well-designed randomized controlled studies.

Another problem frequently encountered in palliative care patients is sleep disorders. One of the consequences of sleep disorders is its negative impact on quality of life and social functioning of the individual. Studies show that sleep disorders in cancer patients can lead to many problems such as fatigue, anxiety, depression and eventually cancer progression if not treated. The effectiveness of tea tree oil, rose oil, peppermint oil and chamomile oil, especially lavender oil, on sleep disorders in cancer patients has been demonstrated in clinical studies. For this reason, aromatherapy can make a positive contribution to the improvement of sleep disorders by adding it to the existing treatment in palliative care patients.

Pain is another common complaint in cancer patients that affects quality of life and integrity. Pain due to cancer or due to medical procedures can reduce the patient's compliance with the treatment and cause difficulties in the treatment procedure. The effectiveness of inhalation and massage aromatherapy applied with lavender, eucalyptus, chamomile and orange essential oils on pain in cancer patients has been supported by clinical studies.

As seen in the clinical studies mentioned in our review, aromatherapy can be used by cancer patients for short-term benefits to prevent nausea and vomiting, reduce pain, anxiety and depression, and improve sleep patterns and well-being. For this reason, it is recommended that aromatherapy be added to the existing treatment for prophylactic and therapeutic

Table 1. Studies examining the effectiveness of aromatherapy in palliative care and cancer patients and some of their findings

Literature	Sample	Research design	Essential oil	Method of application	Symptom	Result
Eghbali et al. (22)	Group of patients with breast cancer receiving chemotherapy (n=100)	RCT	Peppermint oil	Dropping 2 drops of peppermint essential oil on a tissue paper 3 times a day for 5 days, placing it on the collar and breathing naturally for 20 minutes.	Nausea and vomiting	Peppermint oil reduced the frequency of nausea and vomiting, and the discomfort caused by acute nausea.
Efe Ertürk and Taşçı (13)	Cancer patients undergoing chemotherapy (n=80)	quasi-RCT	Peppermint oil	Application of a drop of aromatic mixture to the area between the upper lip and the nose 3 times a day for 5 days after chemotherapy.	CINV	Peppermint oil significantly reduced the frequency of nausea, vomiting, retching, and the severity of nausea.
Mapp et al. (18)	Outpatient cancer patients receiving chemotherapy (n=79)	RCT	Peppermint oil	Putting a damp cloth with 2 drops of peppermint oil on the neck area and wait for 30 minutes.	Nausea	The use of peppermint oil reduced the intensity of nausea compared to the control group.
Seale (19)	Palliative care and hospice patients (n=8)	Quantitative, descriptive study	Peppermint essential oil	Inhalation by adding 1-2 drops of peppermint oil on a cotton swab with medical treatment.	Nausea	The use of peppermint oil in combination with medical treatment reduced the frequency of nausea.
Sriningsih and Lestari (20)	Cervical cancer patients receiving chemotherapy (n=60)	Semi-experimental study	Ginger essential oil	Adding 5 drops of ginger oil into a mask and inhale for 10 minutes and repeating this application 30 minutes before starting the meal and when the patients feel nauseous.	Nausea and vomiting	The use of ginger oil reduced the incidence of patients experiencing nausea and vomiting.
Lua and Zakaria (21)	Group of patients with breast cancer receiving chemotherapy (n=75)	Single blind randomized controlled crossover study	Ginger essential oil	Five days of aromatherapy treatment (2 drops at least 3 times a day) using ginger essential oil or ginger placebo	Nausea, vomiting and quality of life	Ginger oil inhalation has the effect of relieving acute nausea and reducing ENT.
Zorba and Ozdemir (33)	Group of patients with breast cancer receiving chemotherapy (n=75)	quasi-RCT	Aromatic blend of mint (2%), bergamot (1%) and cardamom (1%)	In the 2nd, 3rd and 4th chemotherapy cycles; Inhalation group: smelling 2 mL of aromatic mixture dropped on a cotton ball for 3 minutes before chemotherapy Massage group: 10 minutes of aromatherapy foot massage on each foot	CINV	Applications by massage and inhalation reduced the severity of acute nausea.
Khalili et al. (34)	Patient group with different cancer types receiving chemotherapy (n=66)	RCT	Cardamom oil	In the intervention group, cardamom oil, and in the placebo group, deep breathing three times a day, 2 times a day through pads impregnated with distilled water.	CINV	Cardamom oil inhalation reduced the severity of nausea in the acute phase.

Table 1. Continued

Literature	Sample	Research design	Essential oil	Method of application	Symptom	Result
Santosh et al. (35)	Patient group with different cancer types receiving chemotherapy (n=60)	Semi-experimental study	Lavender essential oil	Massage with 6 drops of lavender oil and inhalation of lavender oil for 10 minutes, every hour, every hour, before and until the end of chemotherapy.	Anxiety, nausea and vomiting	Aromatherapy application with lavender oil reduced anxiety, nausea and vomiting levels.
Wilkinson et al. (39)	Patient group with different cancer types (n=103)	RCT	Roman chamomile essential oil	One hour weekly aromatherapy massage for 3 weeks with Roman chamomile oil.	Anxiety, quality of life, physical and psychological symptoms	Massage with Roman chamomile oil reduced anxiety levels, increased the effectiveness of massage and improved physical and psychological symptoms and overall quality of life.
Soden et al. (40)	Patient group with different cancer types (n=42)	RCT	Lavender essential oil	Massage only for 30 minutes once a week for 4 weeks or aromatherapy massage with lavender essential oil.	Pain, anxiety, sleep and quality of life	The addition of lavender essential oil did not enhance the beneficial effects of massage. However, patients with psychological disorders responded better to treatment.
Pimenta et al. (41)	Chronic myeloid leukemia (CML) patients (n=42)	RCT	Orange essential oil	Ten mg diazepam administration to the 1st group, 10 mL of citrus essential oil inhalation for 30 minutes to the 2nd group, inhalation of saline solution to the placebo group for 30 minutes.	Anxiety	Aromatherapy application with citrus essential oil reduced anxiety-related signs and symptoms in CML patients.
Imanishi et al. (42)	Patient group diagnosed with breast cancer (n=12)	Open semi-comparative trial	Aromatic blend of sweet orange oil, lavender oil and sandalwood oil	Massage (8 times in total) using a 30-minute aromatic mixture twice a week for 4 weeks.	Anxiety, depression and immunological parameters	After the 5th and 8th sessions, the anxiety level of the patients decreased and their depression level did not change. Aromatherapy massage has improved the immunological status.
Chang (43)	Terminal stage cancer patients (n=58)	Pretest-Posttest Control Group model	Blend of bergamot, lavender and frankincense	Five minutes of hand massage for 7 days with an aromatic mixture to the aromatherapy group and a carrier oil to the control group.	Pain, anxiety and depression	Aromatherapy hand massage had a positive effect on pain and depression in terminal cancer patients.
Beyliklioğlu and Arslan (44)	Patients diagnosed as having breast cancer and planned for breast surgery (n=80)	RCT	Lavender oil	Twenty minutes of inhalation from gauze containing 3-4 drops of lavender oil on the day of surgery.	Anxiety	Aromatherapy with lavender oil reduced anxiety levels.

Table 1. Continued

Literature	Sample	Research design	Essential oil	Method of application	Symptom	Result
Ozkaraman et al. (45)	Patient group with different cancer types (n=70)	RCT	Lavender oil, tea tree oil	Inhalation aromatherapy with 3 drops of lavender oil to one group and 3 drops of tea tree oil to one group every night for 1 month	Anxiety and sleep quality	Lavender oil inhaled every night before sleep reduced anxiety levels and improved sleep quality. Tea tree oil had no effect on state and trait anxiety levels, but improved sleep quality.
Khiewkhern et al. (46)	Patient group diagnosed as having colorectal cancer (n=66)	Single-blind-RCT	Ginger essential oil	Aromatherapy massage (with ginger and coconut oil) three times a week for 1 week.	Anxiety, depression, fatigue, pain, nausea, vomiting and	Aromatherapy massage with ginger essential oil showed positive effects on fatigue, pain, anxiety and immunological parameters.
Yıldırım et al. (49)	Cancer patients receiving palliative care (n=68)	RCT	Lavender oil	On the 2nd and 3rd days of the study, 10 deep breaths of 3 mL of 100% pure lavender oil before going to bed in the evening (the oil was left 1 m away from the patient during the night).	Immunological parameters	Lavender oil application increased the sleep quality of the patients, but did not affect their vital signs.
Heydarirad et al. (57)	Patient group with different cancer types (n=54)	Single-blind-RCT	Rose essential oil	Aromatherapy group inhalation of oil (5% and 10% rose essential oil) for 20 minutes half an hour before bedtime for two weeks.	Sleep quality and vital signs	Inhalation aromatherapy applied with rose essential oil increased the sleep quality of the patients.
Blackburn et al. (58)	Patients newly diagnosed as having acute leukemia (n=50)	RCT	Lavender oil, peppermint oil, chamomile oil	Inhalation of 8 drops of essential oil or placebo every night for 3 weeks.	Sleep quality	Aromatherapy practice has a positive effect on sleep and has improved symptoms such as fatigue, lethargy, loss of appetite, depression and anxiety.
Hamzeh et al. (59)	Patient group with different cancer types (n=120)	RCT	Lavender oil, peppermint oil	Aromatherapy groups inhalation for 20 minutes by dripping 3 drops of essential oil on cotton for 7 days. The control group likewise inhaled aromatic distilled water.	Sleep quality	Inhalation aromatherapy with lavender and peppermint essential oils improved the sleep quality of cancer patients.
Kawabata et al. (60)	Cancer patients receiving palliative care (n=74)	RCT	Lavender oil, orange oil	Aromatherapy massage with essential oils in a single session (30 minutes) at night.	Sleep quality and fatigue	Aromatherapy massage had no positive effect on sleep quality and fatigue.
Yayla and Ozdemir (66)	Cancer patients planned to receive chemotherapy (n=123)	quasi-RCT	Lavender oil, eucalyptus oil	Inhalation of 3 drops of essential oil for 3 minutes before inserting a needle into the implantable venous port catheter.	Pain and anxiety	Only aromatherapy with lavender essential oil has an effect on pain. It had no effect on anxiety.

Table 1. Continued

Literature	Sample	Research design	Essential oil	Method of application	Symptom	Result
İlter et al. (67)	Patient group with different cancer types (n=60)	Semi-experimental	Blend of orange, chamomile and lavender essential oil (1:1:1)	During the post-catheterization process, inhalation of the aromatic mixture by dripping on the pillow for 15 minutes.	Pain and vital signs	Inhalation aromatherapy reduced the pain experienced during the procedure and had no effect on vital signs and saturation.
Babashahi Kohanestani et al. (68)	Patients with acute myeloid leukemia (AML) (n=70)	Semi-experimental	Lavender oil	Inhalation of 2 drops of essential oil 1 time per day for 3 days.	Pain	Aromatherapy application with lavender oil reduced the intensity of pain.
Ovayolu et al. (69)	Patient group diagnosed as having breast cancer (n=280)	RCT	Essential oil blend of lavender, mint, chamomile, jasmine, violet, rosemary and eucalyptus	- Aromatherapy massage group: 3 times a week for 1 month, 35 minutes of aromatherapy massage. - Classic massage group: Massage with olive oil for 35 minutes, 3 times a week for 1 month. - Inhalation group: Inhalation of aromatic mixture for 5 minutes, 3 times a week for 1 month. - Control group: no application.	Quality of life, physical and psychological symptoms	Inhalation aromatherapy and aromatherapy massage increased the quality of life and reduced the physical and psychological symptoms experienced by patients.

CINV: Chemotherapy-induced nausea and vomiting, RCT: Randomized controlled trial

purposes in palliative care patients. However, there is a need for well-designed randomized controlled clinical studies with a large sample group that evaluate the effect of aromatherapy on symptoms with standard measurement tools.

Ethics

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: D.E., M.K., A.A., Design: D.E., M.K., A.A., Data Collection or Processing: D.E., M.K., A.A., Analysis or Interpretation: D.E., M.K., A.A., Literature Search: D.E., M.K., A.A., Writing: D.E., M.K., A.A.

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