

The Effect of Aromatherapy Massage on Sleep Quality of Patients with Cancer

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Abstract - The inability to have a good quality sleep could increase the risk of cancer to become more aggressive. This condition occurred because the immune system was disturbed so that the ability of the immune system to take control or control cancer cells reduced. This research aimed to determine the effect of aromatherapy massage on the sleep quality of patients with cancer. Moreover, this research was a quantitative research with a quasi experiment design using pre and post test method without control group. The sample of this research consisted of 15 respondents and the sample taking employed a consecutive sampling technique. The sleep quality was measured by using a PSQI (Pittsburgh Sleep Quality Index) questionnaire. Hence, the result of this research showed that there was a decrease of sleep quality score after the aromatherapy massage with the probability value of 0.0001 (p value <0.05). The decrease of the sleep quality score showed that there was an increase of sleep quality so that it could be concluded that there was an effect of the aromatherapy massage on the sleep quality of patients with cancer. Based on the result of this research, it was expected that aromatherapy massage to be recommended as an independent nursing intervention in healthcare services in order to enhance the sleep quality of patients with cancer.

Keywords: *aromatherapy massage, cancer, sleep quality*

I. INTRODUCTION

Cancer is a term of disease in which abnormal cells divide in uncontrolled ways and attack other tissues around them [1]. The mortality rate of cancer is 13% (7,4 millions) and 70% of death caused by cancer happens in low and middle income countries [2].

It is estimated that 25-59% of cancer patients have sleep disturbance or insomnia [3]. It is estimated that nearly 45% of cancer patients experienced sleep disturbance, that is almost three times higher than the general population. The physiological sources of sleep disturbance are treatment side effects, tumor development, thermoregulation disorders, and changes in system functions such as the digestive system. In addition, the development of the disease can cause sleep disorders

through the symptoms that may appear throughout the treatment[1].

Failing to get a good quality of sleep at night can make cancer become more aggressive. This condition occurs because the immune system is disturbed so that the ability of the immune system to control cancer cells decreases [4].

The main focus for cancer patients' care who experience symptoms of insomnia is to restore their normal sleep pattern [3]. Therefore, the National Cancer Institute recommends a combination of pharmacological and non-pharmacological approaches. The recommended non-pharmacological interventions are cognitive behavioral therapies, healing touch, autogenic training, massage, muscle relaxation, mindfulness-based stress reduction, yoga, aromatherapy, music therapy, hypnotherapy, guided imagery, education, and information of sleep, or sports [5].

There are many strategies to improve sleep quality by combining pharmacological and non-pharmacological approaches. Other alternative strategies are acupuncture, exercise, light therapy, music therapy, naturopathy, night care improvement, and aromatherapy [6]. One of the intervention that can be done by nurses to improve patients' comfort and sleep is by providing back massage [7].

II. METHODS

This research was a quantitative research with a quasi experimental design by using pre- and post-test method without control group. The research population was all cancer patients treated in Cempaka and Teratai rooms of Dharmais Cancer Hospital. The research samples were 15 respondents that were chosen by using consecutive sampling technique. The sample inclusion criteria were willing to be respondents, being on stage III or IV of cancer, being compos mentis, and being on GCS 15. Sample exclusion criteria were having comorbidities that is contraindicated by aromatherapy massage (such as open wounds in the back area, blood disorders, fever, the presence of a tumor in the back area and bone metastasis), experiencing a critical condition (such as: severe shortness of breath, moderate/severe pain, unstable vital signs), being allergic to aromatherapy oil, and undergoing chemotherapy.

This research was conducted in Cempaka and Teratai rooms of Dharmais Cancer Hospital. The data was collected in July 2014 after receiving a letter of ethical review approval from Dharmais Cancer Hospital. This research applied four main principles in the ethics of nursing research, such as respect for human dignity, respect for privacy and confidentiality, respect for justice inclusiveness, and respect for balancing harm and benefits.

The instrument that was used in this research to measure sleep quality was the Pittsburg Sleep Quality Index (PSQI)

The data collection was carried out through the following stages: (1) provided an explanation of the research that would be applied to the respondent, (2) provided an informed consent to be filled and signed by the respondent who was willing to participate, (3) conducted an allergy or sensitivity test and monitored the reaction after 24 hours, (4) Respondents filled out the PSQI questionnaire before the aromatherapy massage applied, (5) The researcher measured blood pressure, temperature, pulse, and respiration before the intervention was given, (6) Applied aromatherapy, in this matter lavender on patients' back. Performed effluage, a series of light touch on patients back, in circular motion made with the palm of the hand. Continued with tapotemen, rapid and repeated striking on patients back. Then, closed with another effluage. Performed for 10 minutes in three consecutive days. (7) Respondents filled out the PSQI questionnaire on the fourth day after the aromatherapy massage applied.

The data was processed by computers through the stages of data editing, data coding, data entry, and data cleaning. The data analysis employed univariate analysis to explain the characteristics of respondents. Univariate analysis employed average (mean), amount of variation (standard deviation), confident interval (CI) 95%, and percentage or proportion. Additionally, bivariate analysis was used to analyze the independent variables such as aromatherapy massage and confounding variables (age, weight, type of cancer, and anxiety) on quality of sleep. The bivariate analysis employed Paired T-Test, Pearson Correlation, and Independent T-Test.

III. RESULT

The following tables will clarify about the results of univariate analysis of the characteristics of the respondents (consisting of age, weight, type of cancer, and anxiety level) and the results of bivariate analysis; aromatherapy massage and confounding variables (such as age, weight, cancer type, and anxiety) on the quality of sleep.

TABLE 1. RESPONDENTS' CHARACTERISTICS BASED ON AGE AND WEIGHT (N:15)

Variabel	Mean	SD	Min-Max	CI 95%
Age (years)	44.33	10.04	21-56	38.77-49.89
Weight (Kg)	43.27	8.697	30-60	38.45-48.08

Table 1 showed that the mean age of the respondents was 44.33 years (SD 10.04) with a range of 21-56 years. Meanwhile, the average weight of the respondents was 43.27 kg (SD 8.697) with a range of 30-60 kg. Moreover, the average body weight of the respondents was 43.27 kg (SD 8.697) with a range of 30-60 kg.

TABLE 2. RESPONDENTS' CHARACTERISTICS BASED ON TYPE OF CANCER, AND ANXIETY (N:15)

Category	Frequency	Percentage
Type of Cancer:		
Non Solid	3	20
Solid	12	80
Level of Anxiety:		
No Anxiety	7	46.7
Anxiety	8	53.3

Table 2 showed the distribution of the respondents by the type of cancer. Most of them were with solid cancers such as patellar, cervix, nasopharynx, liver, colon, lung, and tongue cancers as much as 80%, and the rest of 20% were with non-solid cancer patients. Whereas based on the anxiety level, the highest distribution of the respondents was on the anxiety category (53.3%), while the rest were without anxiety (46.7%).

TABLE 3. DIFFERENCES ON SLEEP QUALITY (PSQI) SCORE BEFORE AND AFTER AROMATHERAPY MASSAGE (N:15)

variable	Mean	SD	CI 95%	p Value*
Sleep Quality before aromatherapy massage	11.73	2.84	10.16-13.31	0.0001
Sleep Quality after aromatherapy massage	6.13	1.846	5.11-7.16	

**Paired t-test*

Table 3 showed that the mean score of sleep quality before aromatherapy massage was at 11.73 (SD 2.84), while after aromatherapy massage it became 6.13 (SD 1.846). The decrease in PSQI mean score showed an increase in respondents' sleep quality. The analysis of the mean difference in sleep quality scores before and after aromatherapy massage using paired t-test resulted in a probability value of 0.0001 (p value <0.05). These results indicated a significant difference in the sleep quality scores between before and after aromatherapy massage.

TABLE 4. ANALYSIS OF AGE AND WEIGHT WITH SLEEP QUALITY (N:15)

Confounding Variable	Dependent Variable	r Value	p Value*
Age	Sleep Quality	0.360	188
Weight	Sleep Quality	-0.149	596

**Pearson Correlation test*

Table 4 showed the relationship between age and sleep quality of cancer patients with a correlation coefficient of 0.360 and a probability value of 0.188 ($p > 0.05$). This analysis showed that age was not significantly associated with sleep quality in cancer patients, while the relationship between body weight and sleep quality of cancer patients had a correlation coefficient of -0.149. The negative correlation coefficient showed the negative relationship, which meant that the heavier the patient is, the lower the cancer patients' sleep quality is. Nevertheless, the Pearson correlation test showed a probability value of 0.596 ($p > 0.05$) which showed that body weight was not significantly related to the sleep quality of cancer patients.

TABLE 5. ANALYSIS OF THE RELATIONSHIP BETWEEN TYPE OF CANCER AND ANXIETY WITH SLEEP QUALITY (N:15)

Confounding Variable	Sleep Quality			SE Mean	p Value*
	n	Mean	SD		
Type of Cancer					
Non solid	3	5.00	1.000	0.577	0.249
Solid	12	6.42	1.929	0.557	
Level of Anxiety					
No Anxiety	7	6.86	2.478	0.937	0.206
Anxiety	8	5.50	0.756	0.267	

*Independent t-test

Table 5 showed that the average score of sleep quality for respondents in non-solid cancer types group was 5.00 (SD 1.000) smaller than the sleep quality score in solid cancer respondents group with the score of 6.42 (SD 1.929). This data showed that the average sleep quality of respondents with non-solid cancer types was better than respondents with solid cancer types.

However, the analysis using independent t-test resulted in a probability value of 0.249 ($p > 0.05$) which showed that the type of cancer was not significantly related to the sleep quality of cancer patients.

The average sleep quality score in respondents without anxiety was 6.86 (SD 2.478), while the average sleep quality score in respondents with anxiety was 5.50 (SD 0.756). Analysis using independent t-test resulted in a probability value of 0.206 ($p > 0.05$) which showed that anxiety was not significantly related to the sleep quality of cancer patients. Anxiety experienced by respondents in this research was included in the category of mild anxiety.

The overall bivariate analysis proved that there was no confounding variable that was significantly related to the sleep quality of cancer patients. This finding proved that the difference in sleep quality (PSQI score) of cancer patients between the two measurements (pre-test and post-test) was caused by the intervention given, which was aromatherapy massage. Therefore, it could be concluded that aromatherapy massage could improve the sleep quality of cancer patients.

IV. DISCUSSION

Age and Sleep Quality

In this research, the average age of respondents was 44.33 years. This data showed that respondents in this research were in the category of middle-aged adults. Furthermore, the relationship between age and sleep quality of cancer patients had a correlation coefficient of 0.360 and a probability value of 0.188 ($p > 0.05$). Thus, this analysis showed that age was not significantly associated with the sleep quality of cancer patients.

Sleep quality is related to changes in age. Older adults report getting up early, often waking up at night, and decreasing total sleep compared to young adults. The underlying reasons for very complex elderly sleep disorders include health problems, psychiatric conditions, and the use of drugs. Hormonal changes in women after menopause also become some of the factors of sleep disturbance [8].

In Grandner research with the title 'Age and Sleep Disturbances among American Men and Women' with 155,877 respondents using Cross-sectional analysis method, it was found that an increase of age was not associated with an increase in sleep disturbances, sleep problems were more influenced by other factors than physiological aging [9].

According to the researchers' assumption, the average age of the respondents in this research were in the category of middle-aged adults and the majority of them had not experienced menopause or, sleep disturbances as a result of changes in physical conditions. Middle-aged adults usually maintain sleep patterns that are formed at a younger age. Middle-aged adults usually sleep for 6 to 8 hours per night [7].

Weight and Sleep Quality

In this research, the average body weight of the respondents was 43.27 kg. Furthermore, the relationship between body weight and sleep quality of cancer patients had a correlation coefficient of -0.149 and a probability value of 0.596 ($p > 0.05$) which showed that body weight was not significantly associated with sleep quality in cancer patients.

In fact good food consumption can help a person to have a good quality of sleep. Eating in a large quantity and eating, spicy food will cause, difficulties in digesting the food that will inevitably interfere the sleep. Loss or increase in body weight affects sleep patterns [10]. In Grandner research with the title 'Dietary Nutrients Associated with Short and Long Sleep Duration,' it was shown that there was a significant relationship between the duration of sleep and the nutrition with a value of $p = 0.001$. Short sleep duration is associated with weight gain and obesity. The period of sleep is related to the amount of food intake (calories) and variations in the content of food (protein, carbohydrates, vitamins and minerals) [9].

The intake of high carbohydrate with a high glycemic index food will cause drowsiness. Consumption of high-energy foods, especially those from carbohydrates, can increase the concentration of tryptophan in the brain which is a precursor of serotonin, the hormone that causes sleep,

which causes a person to fall asleep faster [11]. However, the sufficient iron content in food can improve sleep quality because iron affects the formation of tyrosine hydroxylase enzymes that is needed for dopamine synthesis. Dopamine is one of the neurotransmitters for sleep promoters. Melatonin has an important role in regulating human circadian rhythms and also affects the sleep process. The balance of melatonin in the human body is related to the intake of magnesium micronutrients [12].

The results of this research are different from the results of Grandner research. According to the researchers, patients with cancer tend to experience weight loss because of the lack of food intake due to nausea, vomit, and the presence of the cancer cells themselves. In the initial assessment, the sleep quality data of respondents was included in the bad category, although through statistical tests it was found that body weight was not significantly related to the sleep quality of cancer patients. According to the researchers, poor sleep quality in the pre-assessment was probably due to the respondents' lack of nutritious intake resulting in a production decrease of hormones that caused sleep.

Types of Cancer and Sleep Quality

The results showed that based on the type of cancer, the highest number was in solid cancer patients (80%), including patellar, cervix, nasopharynx, liver, colon, lung, and tongue cancer, the remaining 20% were in non-solid cancer patients. The average sleep quality score for non-solid cancer respondents was 5.00 (SD 1.000) smaller than the sleep quality score in solid cancer respondents, which was 6.42 (SD 1.929). It showed that the average sleep quality of the respondents of non-solid cancer types was better than the respondents of solid cancer types. Nevertheless, the analysis using independent t-test resulted in a probability value of 0.249 ($p > 0.05$) which showed that the type of cancer was not significantly related to the sleep quality of cancer patients.

It is estimated that nearly 45% of oncology patients experience sleep disturbance, almost three times higher than the general population. The physiological sources of sleep disturbance are treatment side effects, tumor development, thermoregulation disorders, and changes in system function, such as the digestive and genitourinary systems. In addition, the development of the disease can cause sleep disorders through some symptoms that may appear. For example, lung cancer can cause respiratory problems such as airway obstruction and dyspnea, whereas tumor development in prostate cancer can result in genitourinary changes that lead to sleep-wake patterns due to frequent urination [5].

Secondary sources of sleep disturbance associated with cancer symptoms are pain, related treatment side effects, such as nausea and diarrhea, environmental factors and lifestyle, and also emotional and mood status. Pain is one of the most common sources of sleep disturbance in cancer patients. The two main sources of pain are the development of the disease and the side effects of treatment. The development of the disease can cause bone and nerve pain, while treatment-related side effects such as

mucositis and peripheral neuropathy can cause pain [13]. Sleep-wake problem is a common problem affecting patients with cancer, with incidence rates ranging from 30% - 75% [14].

According to the researchers' assumption, the difference result in this research occurred because there was no respondents who had breast cancer and only one respondent had lung cancer. In this research, no respondents reported about pain associated with the disease, because pain was one of the most common sources of sleep disturbance of cancer patients. According to the researchers' assumption, it was because the respondents in this research received a routine analgesic therapy to control the pain. Thus, there was no significant relationship between the type of cancer and the sleep quality of cancer patients.

Anxiety and Sleep Quality

The results showed that based on anxiety, the highest distribution of respondents (53.3%) was in the anxiety category, while the rest was in the category of without anxiety (46.7%). The average sleep quality score in respondents without anxiety was 6.86 (SD 2.478), while the average sleep quality score in respondents with anxiety was 5.50 (SD 0.756) with a probability value of 0.206 ($p > 0.05$) which showed that anxiety was not significantly related to the sleep quality of cancer patients.

Emotional status and mood play an important role in changing sleep patterns in patients with cancer. There is a strong correlation between sleep disorders, depression, and pain. Pain and depression are associated with poor sleep, while a decrease in sleep can lead to worsening depression and pain. The relationship between increased stress, the incidence of depression, and disturbed sleep has been determined which has a significant effect on the quality of cancer patients [13]. Significant clinical symptoms of depression were found in cancer patients during the course of their illness, but only 5% -6% of cancer patients were treated with antidepressant drugs. Sleep disturbance is one of the symptoms in depression. Anxiety is also common in cancer patients, with some significant symptoms. The American Psychiatric Association states that cancer is a traumatic event that can cause symptoms of post-traumatic stress disorder. The form of anxiety disorders is usually associated with difficulties in starting and maintaining sleep and nightmares [15].

According to the researchers, subjects of this research have been able to adapt and accept their disease problem, thus only half of the subjects experience anxiety. This condition occurred because all subjects in this study were advanced cancer patients who had undergone various methods of cancer treatment for a long time, so that anxiety was not significantly related to the quality of sleep for cancer patients.

Aromatherapy Massage and Sleep Quality

The results showed that there was a decrease in the average score of sleep quality of the respondents before and after the intervention. These data indicated an increase in sleep quality for cancer patients. The analysis of the

mean difference in sleep quality scores before and after aromatherapy massage had a probability value of 0.0001 (p value <0.05). These results indicated a significant difference in the quality of sleep scores between before and after aromatherapy massage which meant that there was a significant decrease in sleep quality scores after aromatherapy massage. The decrease in sleep quality scores indicated an increase in the quality of sleep.

Massage therapy is beneficial for cancer patients to overcome pain by closing the 'door' on the posterior end of the spinal cord and blocking stimuli to the central nervous system. Massage therapy also has a positive effect on the mood of the patients by increasing dopamine level, thereby it could reduce the stress levels [16]. Relaxing (not anxious) conditions increase BSR activity to release serotonin and cause sleep [10].

According to the researchers, the results of this research are in line with the theories presented by experts where massage with lavender aromatherapy oil can improve sleep quality. The improvement of sleep quality occurs through the mechanism of blood vessel vasodilation due to massage which can increase the relaxation effect and increase the penetration of lavender aromatherapy oil containing linalool and a monoterpene into the circulatory system to the brain so that it can stimulate serotonin production which can improve sleep quality.

V. CONCLUSION AND RECOMMENDATION

The average age of respondents was 44.33 years old. The average weight of respondents was 43.27 kg. Based on the type of cancer, the majority of respondents (80%) have solid cancer. Whereas based on anxiety level, the highest distribution of respondents was in the anxiety category (53.3%).

The average PSQI score before aromatherapy massage was 11.73, which decreased after the aromatherapy massage and became 6.13. The decrease in average PSQI score showed that there was an increase in the quality of sleep experienced by cancer patients after the aromatherapy massage.

The relationship between age and weight with sleep quality of cancer patients showed that age and weight were not significantly associated with sleep quality in cancer patients. The results of the analysis between cancer types and anxiety with sleep quality showed that cancer types and anxiety were not significantly associated with sleep quality in cancer patients.

The analysis of the mean differences in sleep quality scores before and after aromatherapy massage showed a significant difference in sleep quality scores between before and after the aromatherapy massage. The decrease in sleep quality scores showed a significant increase in sleep quality after the aromatherapy massage.

Recommendation that can be given is that nurses in providing nursing care to cancer patients who have decreased sleep quality can do aromatherapy massage as one of the independent nursing intervention which can be done by all nurses to help improve their sleep quality.

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