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The Effect of Lavender Aromatherapy on The Quality of Sleep Among Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Insulin resistance in the pancreas is a characteristic of diabetes mellitus, a chronic metabolic and inflammatory disease. People with diabetes mellitus may experience foot pain and tingling at night, which are common symptoms. The main components in lavender aromatherapy, especially linalool acetate, can improve sleep quality. This research aims to find out how lavender aromatherapy affects the sleep quality of individuals with type 2 diabetes.

Methods: With a quasi-experimental design and pre and post test procedures in one group without controls, the methodology used is quantitative. Purposive sampling was used to select 19 respondents suffering from type 2 diabetes mellitus in the Payung Sekaki Health Center Work Area, Pekanbaru City. Data was collected and the respondents' sleep quality was evaluated using a diffuser and lavender essential oil using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. For five days, the intervention was carried out every night thirty minutes before bedtime. Paired T Test was used for bivariate data analysis.

Results: The average sleep quality score of respondents was 13.05 with a standard deviation of 2.46 before the intervention, and 4.78 with a standard deviation of 1.31 after the intervention. Results showed by a statistical analysis p value of 0.000 which shows that the use of lavender aromatherapy greatly improves the sleep quality of people with type II diabetes mellitus.

Conclusion: Research participants learned about the benefits of lavender aromatherapy to improve sleep quality for people with type 2 diabetes.

Keywords:

Lavender Aromatherapy;
Diabetes Mellitus Type 2;
Sleep Quality

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Introduction

One type of non-communicable disease (NCD) that affects communities locally, nationally, and regionally around the world is diabetes mellitus (DM) (Laubo et al, 2022). Insulin resistance, hyperglycaemia and decreased pancreatic insulin production are the hallmarks of diabetes mellitus, a chronic metabolic and inflammatory disease. Worldwide,

diabetes mellitus is becoming more common. The World Health Organisation (WHO) estimates that 422 million people worldwide will have diabetes mellitus by 2022, which translates to an increase of 8.5% in the adult population. Furthermore, the disease is estimated to cause 2.2 million deaths this year (WHO, 2022). Many people with diabetes wake up at night for various reasons, including



the urge to urinate, neuropathy-related pain, or overeating due to constant urination, feeling thirsty, and experiencing tingling. According to Sekar Trifa and Sri Purwanti in 2024, referring to a study by Pfannkuche (2020), the prevalence of diabetic neuropathy among individuals with type 2 diabetes reached 19% in those who have had the disease for five to ten years, and 36% in those who have had the disease for more than ten years. (Pfannkuche et al., 2020).

One of the most common effects of diabetes mellitus caused by diabetic neuropathy is sleep disturbance. The patient's ability to independently control blood sugar levels and diabetes mellitus will be affected if their sleep needs are disturbed. (Wahyuni et al., 2024). Insulin sensitivity and glucose elimination rate can be reduced by 29% when sleep time is reduced.

As an alternative to pharmacological treatment, complementary therapy can be used to help people with diabetes mellitus sleep better. Aromatherapy is one type of complementary therapy that can be used. Aromatherapy scents come in a wide variety, and each offers unique benefits. Lavender aromatherapy, for example, is said to reduce stress and alleviate sleep-related problems. The Lamiaceae family includes lavender (*Lavandula angustifolia*) which is commonly used to relieve headaches, burns, and abrasions, as well as relax muscles and improve sleep (Sayilan et al., 2022)

According to research by Yu and Chiou

(2018) In all groups, measurements taken before and after the application of aromatherapy revealed substantial variations in average sleep duration, effectiveness and overall sleep quality ($P < 0.05$). The average sleep time of respondents increased from 6 hours 15 minutes to 7 hours 55 minutes.

Although there has not been much research on how lavender aromatherapy can help people with diabetes mellitus sleep better, an initial survey conducted by the author on 6 November 2024, through short interviews with ten people based on information from the Payung Sekaki Puskesmas Working Area, Pekanbaru City, there were seven (70%) people with diabetes mellitus who reported having difficulty sleeping, one of which was caused by symptoms of pain in the legs, tingling, numbness, and nocturia, 3 (30%) people with diabetes mellitus did not have sleep disorders. Of the 10 people who have been interviewed by the author, the community does not know that lavender aromatherapy can help overcome the problem of sleep disorders, the community only massages the feet to reduce pain or discomfort in the feet and the community more often plays mural to sleep better.

Methods

This study is a quasi-experiment that uses a single group pre and post test technique without control, which is included in the quantitative research category with a quasi-experimental design. One group in this study received

lavender aromatherapy as an intervention to improve their sleep quality; the effect of this treatment will be assessed by comparing pre-test and post-test results. Purposive sampling, which is a sample selection strategy based on specific objectives or criteria set by the researcher, was the sampling approach used. Nineteen people who met the inclusion criteria, namely, those with type 2 diabetes who have symptoms of diabetic neuropathy, poor sleep, and a history of DM for more than five years

were sampled for this study. Respondents who did not fulfil the requirements of the inclusion criteria were excluded from the study. The PSQI (Pittsburgh Sleep Quality Index) questionnaire was the instrument used in this study and this study used an aromatherapy diffuser containing lavender essential oil which was dripped as much as 4-5 drops in a diffuser that already contained 30-40ml of water which would be given 30 minutes before bedtime to the respondents.

Results

Table 1. Characteristics of Respondents

Variable	Frequency (f)	Frequency (100%)
Age		
Early Adulthood (26-35 years)	1	5
Late Adulthood (35-45 years)	2	11
Early Elderly (46-55 years)	8	42
Late Elderly (56-65 years)	8	42
Gender		
Male	8	42
Female	11	58
Level Of Education		
Elementary School	3	16
Junior High School	3	16
Senior High School	6	32
College	7	36
Work		
Self-employed	4	21
Businessman	6	33
Civil Servants	1	5
Retired	3	16
Doesn't Work	5	25
Long Suffering		
≤ 5 years	4	21
≥ 5 years	15	79
Total	19	100

Based on the table above, it shows that more respondents fall into the category of early elderly (46-55 years) and late elderly (56-65 years) totaling 8 people (42%). Meanwhile, more than half of the total respondents were female, with a total of 11 people (58%), 7 respondents,

or 37% of the total respondents, had higher education. more respondents had entrepreneurial jobs as many as 6 people (32%), and more than respondents had a long suffering ≥ 5 years as many as 15 people (79%).

Table 2. The effect of lavender aromatherapy on the quality of sleep of patients with DM type 2

	N	Mean	SD	SE	Δ Mean	P Value
Pre-test	19	13,05	2,46	0,564		
Post-test	19	4,78	1,31	0,301	8,263	0,000

Based on the table above shows that the average value of sleep quality at the time of the pre-test is 13.05 with a standard deviation of 2.46 while the average value at the time of the post-test is 4.78 with a standard deviation of 1.31. The statistical test results obtained a p value value of 0.000. This means that the p value obtained is <0.05 , so H_a is accepted, which means that there is an effect of lavender aromatherapy on sleep quality in patients with type 2 diabetes mellitus in the working area of the *Umbung Sekaki Health Centre* in Pekanbaru city.

Discussion

A. Age of Respondents

The results showed that out of 19 respondents, 8 respondents (42%) were in the early elderly (46-55 years), and 8 respondents (42%) were in the late elderly (56-65 years). As insulin affects

the entry of glucose into cells, aging results in changes in insulin release and changes in carbohydrate metabolism. When examining the age at which respondents first developed diabetes mellitus, we found that the incidence of type 2 diabetes mellitus increases with age (Rosita et al., 2022). Humans often experience physiological decline more rapidly after the age of 40. After the age of forty, DM becomes increasingly prevalent, especially in those over 45 who are overweight or obese. In Indonesia, 25.3% of DM patients are between 38 and 47 years old. As age increases, the chance of developing DM increases. (Pangestika et al., 2022).

b. Gender of Respondents

The results showed that out of 19 respondents, 11 (58%), or more than half of the respondents were female. Blood insulin response can be increased by

progesterone and estrogen hormones. Low levels of progesterone and estrogen hormones during menopause cause a decrease in insulin response. Due to the decrease in estrogen hormones, especially after menopause, women are more prone to developing type 2 diabetes mellitus than men. Women's body weight, which is often below optimal, is another determining factor that can reduce the sensitivity of the insulin response (Arania et al., 2021). Because they are more likely to have an increased body mass index, women are more susceptible to developing type 2 diabetes mellitus. Women are more susceptible to developing type 2 diabetes due to a collection of monthly cyclical symptoms after menopause that facilitate the accumulation of body fat due to hormonal changes (Oktavia et al., 2022).

c. Respondent Education

The results of the study from 19 respondents showed that more respondents had 6 respondents (32%) had high school education, while 7 respondents (37%) had university education. The prevalence of Type II Diabetes Mellitus is influenced by the level of education. Highly educated people are usually experienced in health-related topics. People will be more aware of maintaining their health after knowing this (Oktavia et al., 2022). People with higher education usually work in offices that have limited opportunities for physical activity, while people with lower education tend to be

labourers or farmers who have many opportunities for physical activity (Arania et al., 2021).

d. Respondents' Occupation

The results of the study from 19 respondents showed that more respondents had jobs as entrepreneurs as many as 6 respondents (32%) and did not work as many as 5 respondents (26%). Research conducted by Oktavia et al., (2022) Work has been shown to have a major impact on the occurrence of type 2 diabetes, and people who are retired or unemployed have a higher chance of developing this disease. The risk of developing diabetes mellitus is influenced by whether or not a person works; jobs that require less physical activity can result in insufficient energy expenditure, which can lead to weight gain and an increased risk of diabetes mellitus. Ainul et al (2023).

e. Duration of Suffering of Respondents

The results of the study from 19 respondents showed that more than respondents had a long time suffering, namely > 5 years as many as 15 respondents (79%). Because the symptoms of DM are frequent urination at night, hunger and thirst at night, and the most common symptom is discomfort, hyperglycaemic conditions in patients with DM can make it difficult to focus and sleep well. This often results in patients waking up frequently at night, increasing the number of awakenings and making it difficult for patients to fall back asleep, thus reducing their sleep

quality (Luselya Tubalawony & Parinussa, 2023)

f. Bivariate Analysis

The results of the statistical analysis showed a p value of 0.000. This indicates that since the p value is smaller than 0.05, the null hypothesis (Ho) cannot be accepted. There was a 46.31% difference between the mean scores before and after the test. Before the test was conducted, the average sleep quality score was recorded at 13.05 with a standard deviation of 0.564; after the test, the average score was 4.78 with a standard deviation of 0.301. lavender aromatherapy has a sedative effect which when we inhale or inhale the aroma can provide a relaxing effect that is able to relax the veins and nerves and give a feeling of relaxation or calm to the respondent so that it can help the respondent's sleep quality increase or improve.

The findings of this study are in line with the research of Hartati et al. (2023), which showed that lavender also helps hemodialysis patients sleep better. In Hartati et al.'s study, (2023) lavender aromatherapy intervention was given for four weeks, and the results showed a significant difference between the groups that received aromatherapy and those that did not (p-value = 0.0001). These findings reinforce that lavender has a relaxing effect that can help improve sleep quality, both in diabetics and patients with other chronic diseases. Although the two studies have different subjects, the diabetes mellitus patients

in the thesis and the hemodialysis patients in the journal both show that lavender aromatherapy can reduce sleep disturbances caused by metabolic factors, pain, and psychological stress. In diabetics, sleep disturbances are often triggered by diabetic neuropathy, frequent urination at night, and imbalances in blood sugar levels, while in hemodialysis patients, sleep disturbances are mostly caused by fatigue, fluid and electrolyte imbalances, and stress due to repeated medical procedures.

Research by Maryanti et al. (2024) confirms the results of this study by showing that lavender greatly improves the sleep quality of older adults. The journal's statistical test findings showed a p value of 0.000, indicating a significant improvement in sleep quality after lavender aromatherapy. Although the two studies had different subjects this study examined people with type II diabetes mellitus, while the study (Maryanti et al., 2024) focused on older adults with sleep disorders due to aging both showed that lavender has a calming effect that helps improve sleep patterns. In diabetics, sleep disturbances are often caused by diabetic neuropathy, frequent urination at night, and fluctuations in blood sugar levels, while in the elderly it is more influenced by hormonal changes and anxiety.

Research conducted by Lucena et al., (2024) is in line with the results of this study, although both studies have different populations and factors causing

sleep disorders, both provide evidence that lavender can help improve sleep patterns. In the study, sleep disturbances in diabetics were caused by diabetic neuropathy, pain, nighttime urination, while writing a journal, insomnia in postmenopausal women was more influenced by hormonal changes and hot flashes. Research shows that the combination of lavender aromatherapy and sleep hygiene helps to improve sleep quality, while the research in the thesis makes a new contribution by proving that lavender is also effective for people with diabetes, who have more complex sleep disturbance factors.

IMPLICATION AND LIMITATIONS

This research certainly does not escape the limitations and obstacles in research. The limitations when conducting this research are the ineffectiveness of researchers in controlling the intervention for respondents when intervening at night. In addition, there were limitations during the intervention implementation process, namely that the researcher could not directly ensure the distance between the respondent and the diffuser that the researcher had instructed the respondent, and also the researcher could not ensure that the room used by the respondent during the intervention was all closed due to air ventilation so that aromatherapy was at risk of not filling the room.

Conclusion

Type 2 diabetes mellitus suffered by 19 people in the service area of Payung Sekaki Health Centre, Pekanbaru City participated in this study, finding that the use of lavender aromatherapy has a beneficial effect on sleep quality. The average sleep quality score decreased from 13.05 (SD 2.46) before the intervention to 4.78 (SD 1.31) after the use of lavender aromatherapy. The statistical data showed a p value of 0.000, which supports the alternative hypothesis (H_a) that lavender aromatherapy significantly affects patients' sleep quality.

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