Journal of Scientific Research in Medical and Biological Sciences
ISSN 2709-0159(print) and ISSN 2709-1511 (online)
Volume 6, Issue 1 Article 3
DOI: https://doi.org/10.47631/jsrmbs.v6i1.888

LAVENDER AROMATHERAPY INTERVENTION IN SUGAR LEVEL MANAGEMENT BLOOD IN ELDERLY PEOPLE WITH TYPE II DIABETES MELLITUS: CASE STUDY

Nur Indah Lestari[1], Mufatihaturrahmah[1], Muhlis[1]

Master of Public Health Study Program, Faculty of Health Sciences, Mandala Waluya University

ARTICLE INFO

Recieved: 21 Nov 2024
Revised: 19 Dec 2024
Accepted: 15 Jan 2025

Keywords:
Lavender Aromatherapy, Diabetes Mellitus, Elderly

Corresponding Author:

Nur Indah Lestari

Email: muftihaturrahmah@umkendari.ac.id

ABSTRACT

Background:Elderly with high blood sugar levels can affect metabolic performance and cause hyperglycemia resulting from unhealthy lifestyles of the elderly. This aromatherapy can help the elderly reduce stress and anxiety levels which can ultimately offer a positive effect on minimizing blood sugar.ObjectiveThis case study is to determine the application of lavender aromatherapy to minimize blood sugar in elderly people with diabetes mellitus. Method:The case study in this study utilized a descriptive study design and applied a nursing care approach that implemented lavender aromatherapy interventions. The subjects in this case study were 3 case study subjects whose inclusion criteria were elderly aged 60 years and above, elderly who had blood sugar ≥200 mg/dl, and elderly who were ready to be respondents. Exclusion criteria were elderly with complications, elderly with diabetes mellitus wounds.Resultsobtained before the administration of lavender aromatherapy to the three research subjects, blood glucose levels in subject I reached 376 mg/dL, subject II reached 276 mg/dL, and subject III reached 280 mg/dL. After administration of lavender aromatherapy once a day for 7 days with a duration of 15 minutes, there was a decrease in random blood sugar levels. On the 7th day, subject I's blood glucose levels decreased to 190 mg/dL, subject II 192 mg/dL, and subject III 194 mg/dL.Conclusion Elderly people suffering from diabetes mellitus before being given lavender aromatherapy obtained high blood glucose levels reaching 376 mg/dL. After being given lavender aromatherapy once a day and carried out for 7 days, the results of checking blood glucose levels on the 7th day showed a decrease in blood sugar levels reaching 190 mg/dL.

INTRODUCTION

Diabetes mellitus in the elderly population often arises from various factors, including genetic predisposition, aging, and gender differences. However, aside from these factors, there are also a variety of other triggers that can lead to diabetes mellitus in the elderly. These include an unhealthy lifestyle, lack of physical activity, insufficient rest, an unbalanced diet, and psychological pressures such as stress, anxiety, and sleep disorders. Therefore, for elderly individuals with diabetes mellitus, maintaining stable blood glucose levels is crucial (Nuraini, 2022). High blood glucose levels can lead to various serious complications, including vascular disorders affecting both large and small blood vessels, as well as damage to the nervous system (neuropathy) (Iradukunda et al., 2021).

In Indonesia, the percentage of elderly individuals recorded in the last five decades has reached 8.97%, or approximately 23.4 million people (Semarang, 2023). The elderly population living in Indonesia was estimated at 20.24 million, equivalent to 8.03% of the total population in 2014. The World Health Organization (WHO) has predicted that by 2025, there will be a 41.4% increase in the elderly population in Indonesia, marking the highest increase in the world. Furthermore, the United Nations (UN) has projected that by 2050, the elderly population in Indonesia will surge to 60 million people. This projection places Indonesia in the 41st rank globally (Semarang, 2023).

In Indonesia, the prevalence of diabetes mellitus among the elderly has shown a continuous increase, rising from 7.56% (approximately 18 million people) to 9.7% (approximately 25.9 million people) in 2019. This figure is further projected to increase to 15.77% by 2034, which would amount to approximately 48.2 million people (Windra Doni et al., 2020).

Central Java Province has a prevalence rate of 1.9%. In Central Java alone, in 2015, the total number of type 2 diabetes mellitus (DM) cases reached 99,646. This data contrasts with the figures from three years earlier, where in 2014 the total number of type 2 diabetes mellitus cases was 96,431 (0.29%). In Central Java, in 2013, the number of type 2 diabetes mellitus cases was 142,925 (0.43%), while in 2012, it was 181,543 (0.55%) cases (Kemenkes RI, 2019).

According to a statement issued by the Head of the Semarang City Health Department, in 2023, there were 5,991 cases of diabetes mellitus recorded in the area. The majority of cases occurred in the age range of 46 to 65 years, which included 3,869 cases that did not require insulin and 128 cases that required insulin. Meanwhile, there were also 1,528 cases of diabetes mellitus in the elderly population, aged over 65 years (Semarang, 2023).

The high incidence of diabetes mellitus in the elderly is caused by many factors, including the low awareness and compliance of the elderly in following treatment programs, such as maintaining a proper diet, exercising, taking prescribed medications, and their lack of adherence to diabetes management and non-pharmacological methods that help stabilize blood sugar levels (Yunita Sari et al., 2023). Many elderly individuals experience this phenomenon with diabetes mellitus. They are unable to control their blood sugar, which then affects metabolic function and leads to hyperglycemia (Yunita Sari et al., 2023). Several factors that can contribute to an increase in blood sugar include excessive food intake, frequent stress, unhealthy eating habits, disturbed sleep patterns, emotional instability, aging, weight gain, and infrequent exercise (Ratnawati et al., 2018).

Management of blood sugar control can be carried out using pharmacological and non-pharmacological approaches. Blood sugar control through pharmacology involves the intake of oral medications and insulin injections. Meanwhile, non-pharmacological blood sugar control includes participation in complementary therapies such as dhikr therapy, foot exercises, massage therapy, Buerger Allen exercises, and the use of aromatherapy. Lavender aromatherapy, in particular, is used to help reduce blood sugar levels. Lavender aromatherapy offers a calming effect for elderly individuals with diabetes mellitus (Yuanto et al., 2018). It is a therapy that utilizes essential oils and is considered effective in alleviating or managing discomfort, such as depression, anxiety, stress, and other negative emotions (Cahyati et al., 2020).

Aromatherapy refers to a treatment approach that utilizes the aroma produced by essential oils extracted from various plant parts such as flowers, leaves, or bark, each possessing unique therapeutic properties. One example is essential oil derived from lavender flowers (*Lavandula angustifolia*), renowned for its sedative effects. These effects can be attributed to the primary component of the oil, linalool (*C10H18O*). The positive effects of its application include reducing anxiety, fatigue, sleep disturbances, and neuropathic pain. The active ingredients, linalool and linalyl acetate, contribute differently: linalool weakens the activity of tense nerves and muscles, while linalyl acetate induces relaxation. Relaxation techniques can help patients reduce stress and

anxiety levels, ultimately having a positive impact on lowering blood sugar levels (Cahyati et al., 2020).

Elderly individuals with high blood sugar levels often experience anxiety and sleep disturbances, and the linalyl content in lavender aromatherapy provides a relaxation effect (Rivaz et al., 2021). In the context of lowering blood sugar levels, lavender aromatherapy works by reducing antioxidant enzyme activity and inducing a decrease in lipid peroxidation (Soebandi et al., 2022).

A study conducted in 2023 revealed that before the intervention of lavender aromatherapy, the majority of elderly individuals with Type 2 Diabetes Mellitus had high blood sugar levels, exceeding 400 mg/dL. However, after undergoing the intervention for one week, from the first to the seventh day, the average blood sugar level decreased by 128 mg/dL. The results of the Paired T-Test showed statistical significance with a p-value of 0.000, confirming that lavender aromatherapy has a significant effect on reducing blood sugar levels in elderly individuals with Type 2 Diabetes Mellitus.

Thus, aromatherapy can be considered a viable intervention option for community health centers to maintain stable blood sugar levels, ensuring that the health status of diabetes mellitus patients is well-maintained. This demonstrates that the elderly can adopt non-pharmacological methods taught to them to maintain their health (Yunita Sari et al., 2023).

The objective of this case study is to examine the application of lavender aromatherapy interventions in reducing blood sugar levels among elderly individuals with Type 2 Diabetes Mellitus.

METHODOLOGY

This case study utilized a descriptive study design and a nursing care approach that implemented the intervention of lavender aromatherapy. The study was conducted from January 22 to January 28, 2024, in Plamongansari Village, Semarang City. The case study subjects included three elderly respondents, selected based on inclusion and exclusion criteria.

The inclusion criteria were as follows: elderly individuals aged 60 years and above, those with a history of diabetes mellitus within the last year, elderly individuals with blood sugar levels of ≥ 200 mg/dL, and those willing to participate as respondents. The exclusion criteria were elderly individuals unwilling to participate, those with diabetes-related wounds, and those with complications.

This case study focused on measuring the variable of random blood sugar levels in elderly individuals with Type 2 Diabetes Mellitus.

The approach used in this case study involved nursing care, starting with assessment, data analysis, nursing diagnosis, nursing intervention, nursing implementation, and nursing evaluation. Data were obtained through direct assessment of the elderly respondents.

Lavender aromatherapy was administered for 15 minutes during each session, with a total of seven sessions conducted over one week. Before administering lavender aromatherapy, respondents' random blood sugar levels were checked. If the inclusion criterion of blood sugar levels ≥ 200 mg/dL was met, lavender aromatherapy was provided for 15 minutes. During the administration of aromatherapy, respondents were required to remain relaxed and were not allowed to eat, drink, or engage in other activities to ensure the effectiveness of the therapy.

Ten minutes after the completion of the aromatherapy session, the respondents' blood sugar levels were rechecked to determine whether lavender aromatherapy had an impact on reducing blood

sugar levels in elderly individuals with Type 2 Diabetes Mellitus. The findings were recorded on a data sheet.

RESULTS AND DISCUSSION

This case study was conducted from January 22 to January 28, 2024. The assessment results revealed the following:

- **Subject I**: A 60-year-old female, with an elementary school education and of Javanese ethnicity. She has a one-year history of diabetes mellitus, which is attributed to hereditary factors and a lack of control over consuming high-sugar foods. The subject frequently experiences dizziness and difficulty initiating sleep at night.
- **Subject II**: A 62-year-old female, with incomplete elementary school education and of Javanese ethnicity. She has a one-year history of diabetes mellitus. The increase in her blood sugar levels is due to poor control over her diet, often consuming sugary foods. Subject II frequently experiences dizziness, blurred vision, excessive anxiety about her condition, and difficulty initiating sleep at night.
- **Subject III**: A 66-year-old female, with an elementary school education and of Javanese ethnicity. She has a one-year history of diabetes mellitus, attributed to hereditary factors and lack of dietary control. She regularly consumes high-sugar foods or sweet foods. Subject III often experiences dizziness, excessive stress, and occasional difficulty initiating sleep at night.

The daily habits of all three study subjects indicate a tendency to consume foods with high sugar content.

Further assessment results revealed that over approximately one year, the three subjects had uncontrolled blood sugar levels. None of the three subjects routinely monitored their blood sugar levels or took blood sugar-lowering medications. They believed that their blood sugar levels would decrease naturally without the need for medication.

During the initial assessment, blood sugar levels were checked for each subject:

- **Subject I**: Blood sugar level of 367 mg/dL, with complaints of dizziness and fatigue. Subject I's daily activity involves working as a farmer.
- **Subject II**: Blood sugar level of 276 mg/dL. Subject II spends most of her time at home watching TV and occasionally cleaning the yard. She often experiences fatigue and dizziness.
- **Subject III**: Blood sugar level of 280 mg/dL. Subject III spends her daily activities alternating between staying at home and working in the garden.

The assessment results indicate that the primary nursing diagnosis for the issues identified is Blood Glucose Level Instability (D.0027) (PPNI, 2017a). The data shows elevated blood sugar levels exceeding normal limits, accompanied by complaints of dizziness and fatigue. Based on the data and blood sugar level measurements, the nursing diagnosis of Blood Glucose Level Instability was determined.

The intervention plan involves providing education on diabetes management, including the use of insulin, oral medications, and carbohydrate intake regulation. Additionally, non-pharmacological therapy using lavender aromatherapy is introduced. Lavender aromatherapy is administered once a day for 15 minutes over seven days.

Interventions for this case include: Management of Hyperglycemia (PPNI, 2017b). This management plan encompasses several stages:

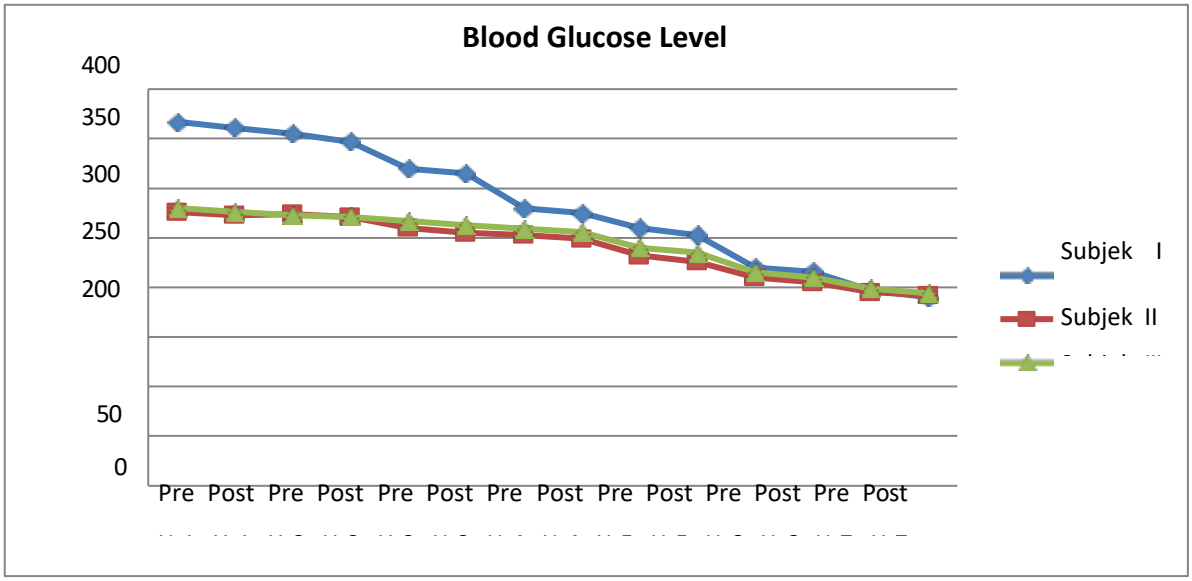
1. Identifying potential triggers of hyperglycemia.
2. Regularly monitoring blood glucose levels.
3. Observing symptoms of hyperglycemia, such as polyuria, weakness, blurred vision, and headaches.

If signs and symptoms of hyperglycemia persist or worsen, consultation with medical professionals is advised. Adhering to a healthy diet and engaging in a regular exercise program are also recommended.

Implementation during the first session included:

- Identifying potential triggers of hyperglycemia.
- Monitoring blood sugar levels.
- Observing hyperglycemia symptoms (e.g., polyuria, weakness, blurred vision, headaches).
- Teaching non-pharmacological therapy through the administration of lavender aromatherapy.

Graph 1. Observation Results of Blood Glucose Level Measurements Before and After Lavender Aromatherapy Administration Over 7 Days



From Graph 1 above, it shows that all three subjects experienced a decrease in blood glucose levels from the first day of treatment to the last day. The evaluation was conducted by examining the final results obtained after 7 days of lavender aromatherapy administration. Graph 1 demonstrates a reduction in blood glucose levels from the first day to the last day.

Based on the study results, it was found that the blood glucose level in the elderly before the lavender aromatherapy intervention was 367 mg/dL. The data showed that, in addition to the elevated blood glucose level of 367 mg/dL, the subject frequently experienced dizziness and fatigue. These findings are consistent with a study conducted in Surabaya, which revealed a decrease in blood glucose levels. The results showed that prior to the lavender aromatherapy intervention, nearly all subjects had high blood glucose levels above 400 mg/dL. After one week of intervention, from day 1 to day 7, a decrease in blood glucose levels was observed, with an average of 128 mg/dL (Yunita Sari et al., 2023).

The results of this case study indicate that all three subjects experienced a decrease in blood glucose levels. Subject I showed a decrease from day one to day seven with a total reduction of 48%, Subject II showed a decrease in blood glucose levels from day one to day seven with a total reduction of 30%, and Subject III showed a decrease in blood glucose levels from day one to day seven with a total reduction of 31%. Of the three subjects, Subject I experienced the most significant reduction in blood glucose levels. This was due to Subject I's habit of reducing the consumption of foods that increase blood glucose levels. While Subjects II and III also experienced a decrease, it was not as significant as Subject I's reduction, as they continued to consume foods that could raise their blood glucose levels.

The post-intervention results from day one to day seven showed that blood glucose levels in the elderly decreased with an average reduction of 48% after lavender aromatherapy was administered. The responses given by the elderly, as revealed in the respondent report, included feelings of happiness, excitement, and calmness. One non-pharmacological therapeutic approach used to reduce blood glucose levels in elderly individuals with Diabetes Mellitus is the administration of lavender aromatherapy during relaxation sessions. Through the inhalation of lavender essential oil, which contains linalyl acetate, this therapy is known to have sedative and anti-neurodegenerative effects, capable of relaxing tense muscles and the nervous system, thus bringing a sense of peace. The impacts include increased blood flow and maintenance of physical balance, ultimately resulting in a decrease in blood glucose levels in elderly individuals with Diabetes Mellitus (Ratnawati & Hanani, 2020).

From Subject I to Subject III, the daily blood glucose levels showed varying degrees of decline. The total decrease in blood glucose levels was obtained by comparing the measurements before and after the aromatherapy intervention from day one to day seven. The total reductions were then summed to clearly determine the extent of blood glucose reduction in each respondent.

The nose inhales particles and molecules present in lavender aromatherapy, which are then received by the nerves as a signal with beneficial effects, providing a calming sensation. This sensory aroma enters and affects the limbic system, the center for emotions. Consequently, blood vessels and nerves relax. When inhaling the aromatherapy, the hypothalamus is activated by the active compounds, with the hypothalamus being a gland that releases endorphins, creating a sense of relaxation and calm (Nasiri Lari et al., 2020). The relaxing effects on blood glucose reduction in diabetes mellitus patients have also been studied. Research findings show a significant decrease in blood glucose levels in diabetes mellitus patients after receiving relaxation therapy (Cahyati et al., 2020).

CONCLUSION

The conclusion of this study is that elderly individuals with diabetes mellitus, before receiving lavender aromatherapy, had high blood glucose levels. After being given lavender aromatherapy for 15 minutes over 7 days, the results of blood glucose measurements on day 7 showed an average reduction of 48%. Therefore, lavender aromatherapy can be applied as a non-pharmacological intervention to help reduce blood glucose levels in individuals with diabetes mellitus. Lavender aromatherapy, when inhaled or used with an inhalation device containing linalyl acetate, has sedative properties that can provide calming effects and relax the central nervous system. This can enhance blood flow and maintain physical balance, ultimately minimizing blood glucose levels in elderly individuals with diabetes mellitus.

Acknowledgment

The author would like to express gratitude to the elderly individuals who have kindly agreed to be respondents.

REFERENCES

Cahyati, Y., Rosdiana, I., Elengoe, A., & Podder, S. (2020). Effect of benson relaxation and aromatherapy on blood glucose levels in patients with type II diabetes mellitus. Malaysian Journal of Medicine and Health Sciences, 16(February), 43–49.

CAN ÇİÇEK, S., & GENÇER ŞENDUR,E. (2021). Use of Aromatherapy in DiabetesManagement. International Journal of Traditional and Complementary Medicine Research, 02(02), 115–120. https://doi.org/10.53811/ijtcmr.9596 42

Iradukunda, A.,Kembabazi, S., Ssewante, N.,Kazibwe,A.,& Kabakambira, J. D. (2021). Diabetic Complications and Associated Factors: A 5-Year Facility-Based Retrospective Study at a Tertiary Hospital in Rwanda. Diabetes, Metabolic Syndrome and Obesity, 14(November),4801–4810. https://doi.org/10.2147/DMSO.S34 3974

Kemenkes RI, K. K. (2019). Kementrian Kesehatan Republik Indonesia. Nasiri Lari, Z., Hajimonfarednejad, M., Riasatian, M., Abolhassanzadeh, Z., Iraji, A., Vojoud, M., Heydari, M., & Shams, M. (2020). Efficacy of inhaled Lavandula angustifolia Mill. Essential oil on sleep quality, quality of life and metabolic control in patients with diabetes mellitus type II and insomnia. Journal of Ethnopharmacology, 251(July 2019), 112560. https://doi.org/10.1016/j.jep.2020. 112560

Nuraini, et. a. (2022). Kepatuhan Diet Dengan Kadar Glukosa Darah Pada Lansia Diabetes Mellitus Di Puskesmas Sangkrah Kota Surakarta. *Indonesian Journal of Nutrition Science and Food*, *1*(1), 9–16.

PPNI. (2017). *Standar Diagnosa keperawatan Indonesi*. PPNI. PPNI. (2017b). *Standar Intervensi Keperawatan Indenesia*. PPNI.

Ratnawati, D., & Hanani, T. A. (2020). Efek Kombinasi Relaksasi Autogenik dan Aromaterapi Lavender Terhadap Kadar Glukosa Darah Pada Pasien DM Tipe 2. Jurnal Kebidanan Dan Kesehatan Tradisional,5(2),67–74. https://doi.org/10.37341/jkkt.v5i2.16 0

Ratnawati, D., Siregar, T., & Wahyudi, C.T. (2018). Terapi Relaksasi Benson Termodifikasi Efektif Mengontrol Gula Darah pada Lansia dengan Diabetes Mellitus. *Jurnal Kedokteran Dan Kesehatan*, *14*, 84. https://jurnal.umj.ac.id/index.php/JKK/article/view/2527

Rivaz, M., Rahpeima, M., Khademian, Z., & Dabbaghmanesh, M. H. (2021). The effects of aromatherapy massage with lavender essential oil on neuropathic pain and quality of life in diabetic patients: A randomized clinical trial. *Complementary Therapies in Clinical Practice*, *44*(March), 101430. https://doi.org/10.1016/j.ctcp.2021. 101430

Semarang, D. K. (2023). *Dinkes Kota Semarang Kasus Diabetes Melitus Bisa Serang Siapapun*. https://doi.org/10.21070/midwiferia.v

Soebandi, J. K., Tursina, H. M., Purwaningrum, Y., & Febrianti, E. A. (2022). Jurnal Kesehatan dr. Soebandi. 7(1).

Windra Doni, A., Yusefni, E., Susanti, D., & Kartika Wulandari, P. (2020). Hubungan Panjang Badan Lahir dan Riwayat Imunisasi Dasar dengan Kejadian Stunting Balita. Jurnal Kesehatan, 13(2), 118–131. https://doi.org/10.32763/juke.v13i2. 267

Yuanto, H. H., Bakar, A., & Astuti, P. (2018). Pengaruh Kombinasi Senam Kaki Dan Aromaterapi Terhadap Abi Dan Tingkat Stres Pada Penderita Dm Di Puskesmas Jajag. Jurnal Ilmiah Keperawatan (Scientific Journal of Nursing), 4(2), 131–140. https://doi.org/10.33023/jikep.v4i2.192

Yunita Sari, R., Suherman, A., Nadatien, I., Kamariyah, N., Nur Hasina Siti, Nahdlatul Ulama Surabaya, U., & Raya Jemursari No, J. (2023). *Pengaruh Aromaterapi Lavender Terhadap Kadar Gula Darah Pada Lansia Diabetes Mellitus Tipe-2*. *16*,147–156. http://journal.stikeskendal.ac.id/index.php/Keperawatan