

Overview of the Influence of Lavender Aroma Therapy on Decreasing Blood Pressure in Hypertension Patients

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Abstract- Finding out how lavender aromatherapy affected patients with hypertension blood pressure was the aim of this study. A quasi-experimental design and quantitative methodology were used in the study. There were 32 patients in the samples, who were either in the treatment group or the nontreatment group. The use of a successive sampling method chose them. The study's findings indicated that the treatment group's systolic and diastolic blood pressure decreased by 9.7299 mmHg and 4.3237 mmHg, respectively, compared to the control group's 7.0461 mmHg and 3.51152 mmHg. According to the results of the paired t-test, the likelihood of diastolic blood pressure was (0.000) <0.05, and the probability of systolic blood pressure was (0.000) <0.05. It is possible to conclude that the reduction in both systolic and diastolic blood pressure was influenced by lavender aromatherapy. One nursing technique that may be used to lower blood pressure in patients with hypertension is the inhalation of lavender aromatherapy. It might be a supplement to therapy as an alternative to drugs.

Keywords: Aromatherapy, Blood pressure, Lavender.

INTRODUCTION

The study employed a quantitative methodology, utilizing a quasi-experiment and equal-subject design. A serial design known as "subject equal design" involves subjecting all samples to two distinct periods and activities. The samples get the intervention during the first phase, which lasts for two weeks (14 days). After that, there is an interval known as the "Washing out Period," which is designed to reverse the impact of the previous action on the subsequent one. The washing-out period lasts for three days. The samples were not provided any intervention during the second phase, which is the control period, for two weeks (14 days). The study was carried out in Binjai at UPT Pelayanan Sosial Lanjut Usia. The choice of the research site was influenced by the fact that the senior population was present, which would facilitate the investigation. The study was carried out in 2015 between May and June. Based on the preliminary survey, the population consisted of 40 senior individuals who underwent hypertension at the UPT Pelayanan Sosial Lanjut Usia, Binjai. For the paired-group t-test, formulation sampling was used to obtain the samples. Using the consecutive sampling technique, 32 elderly patients with hypertension served as the samples. The following were the requirements for the sample population in this study: the participants had to be elderly, able to communicate in fluent Indonesian, have full awareness and not experience place, time, or human disorientation, and be willing to participate in the research process all the way through.



Fig: lavender plant

The following is how the data was collected:

- 1) The researchers informed the prospective respondents of the benefits of the study and its methodology during the data collection process. The respondents agreed to participate by signing an informed consent form.
- 2) They completed their bio-data, which included their age and sex, and had been provided by the researchers, and agreed to comply with the research protocol and criteria.
- 3) During the first session, participants received a pretest utilizing a Littmann brand stethoscope and Nova brand sphygmomanometer to record their blood pressure, which would be recorded in the observation sheets. They also inhaled lavender oil. The respondents were requested to sit comfortably, place their right hands open on the flat surfaces, and align the center of the mercury manometer scale with the researchers' eyes before the blood pressure was taken. Five drops of lavender oil were provided to the respondents after their blood pressure was taken. Before that, students were instructed to practice inhaling deeply for five counts, holding their breath for five counts, and expelling for five counts. Following their completion of the task, individuals were given lavender oil on a cotton swab placed 3 cm from their nostrils and instructed to take a breath within 10 minutes. The post-test was subsequently conducted by taking their blood pressure with a Littmann brand stethoscope, Riester Nova brand sphygmomanometer, and stethoscope; the results were recorded on the observation sheet. This task required two weeks or fourteen days.
- 4) The time frame for removing the effects of the prior intervention is known as the "Washing out Period" (WOP). It took three days to complete, and no blood pressure readings were taken throughout that time.
- 5) The responders received a pre-test and post-test in the second session, together with a Littmann brand stethoscope and a Riester Nova brand sphygmomanometer to measure blood pressure. This would record the outcome in the observation sheets without allowing the inhalation of lavender oil. Ten minutes were passed between the pre-and post-test blood pressure measurements. This task required fourteen days or two weeks. A ratio scale was employed in the blood pressure measurement process. The difference between systolic and diastolic blood pressure was evaluated using paired t-test data analysis.

Information

NAME	<i>Levendula angustifolia</i>
SYNONYMS	Fabrica Adans Styphonia Medik
KINGDOM	Plantae
CLADE	Angiosperms
CLADE	Eudicots
CLADE	Asteroids
CLADE	Tracheophytes
ORDER	Lamiales
FAMILY	Lamiales
SUBFAMILY	Nepetoideae
TRIBE	Ocimeae
GENUS	<i>Lavendula</i> (L)

Plants and Leaves:

The genus includes annual or short-lived herbaceous perennial plants, and shrub-like perennials, subshrubs, or small shrubs [22].

Leaf shape is diverse across the genus. They are simple in some commonly cultivated species; in other species, they are pinnately toothed, or pinnate, sometimes multiple pinnate and dissected. In most species, the leaves are covered in fine hairs or indumentum, which normally contain essential oils [22].

Flower:

Whorls of flowers are carried aloft on spikes that rise above the leaves; certain species' spikes are branching. At the tips of their inflorescences, certain species generate colorful bracts. In the wild species, the flowers can be blue, violet, or lilac; they can also infrequently be yellowish or blackish-purple. There is a tubular sepal calyx. The corolla is similarly tubular and typically has five lobes (the lower lip has two clefts and the upper lip is frequently cleft) [23].

Nomenclature and Taxonomy:

Dorothy Chaytor's 1937 classification at Kew was one of the first significant contemporary classifications. She suggested six groups for 28 species, although several intermediates remained difficult to identify. *Stoechas*, *Spica*, *Subnuda*, *Pterostoechas*, *Chaetostachys*, and *Dentatae* were among her sections. Nonetheless, the *Stoechas* and *Spica* divisions were home to all of the major cultivated and commercial forms. While *Spica* contained three species

(*Lavandula officinalis* (now *L. angustifolia*), *L. latifolia*, and *L. lanata*), *Stoechas* contained four (*Lavandula stoechas*, *L. dentata*, *L. viridis*, and *L. pedunculata*). She thought the garden cultivars were crossbreds between spike lavender (*L. latifolia*) and true lavender (*L. angustifolia*)[24].

The majority of the woody shrubs in the subgenus Lavender have whole leaves. It includes the main species that are produced for their oils and as attractive plants. They can be found in western Arabia and northeastern Africa in the Mediterranean region. Shrubs and plants make up the subgenus *Fabricia*, which is widely distributed from the Atlantic to India. There are some decorative plants in there.

The two species that make up the subgenus *Sabaudia* are found in Eritrea and the southwest Arabian Peninsula. They are somewhat different from the other species and are occasionally grouped in their genus *Sabaudia*. There are also a lot of hybrids and cultivars used in horticulture and commerce [22].

Cultivation:

Lavandula angustifolia, commonly known as English lavender or common lavender (previously designated *L. officinalis*), is the most commonly grown kind. There are many different cultivars available. *L. multifida* (Egyptian lavender), *L. stoechas*, and *L. dentata* are other attractive species that are frequently planted.

The cultivated versions are discovered growing wild as the garden escapes, well outside their natural range, because they are planted in gardens all over the world. Although this kind of unplanned growth is mostly benign, certain *Lavandula* species have started to spread. For instance, *L. stoechas*, which is widely distributed over the continent and has been designated as a noxious plant in Victoria since 1920, has been a source of concern in Australia [25]. In some areas of Spain, it is considered a weed [26].

Full sun, sandy, or gravelly soils that are well-drained are ideal for lavender growth [27]. English lavender takes a long time to germinate (14–28 days), and it takes 100–110 days to develop.[Reference required] All varieties require adequate air circulation and little to no fertilizer. Fungal infections can cause root rot in high-humidity environments. Organic mulches have the potential to retain moisture at plant bases, which can lead to root rot. Better outcomes are obtained with gravelly materials, such as crushed rocks [28]. It thrives in soils that range in pH from 6 to 8 [29]. Harvesting lavender is a manual process that varies based on the intended application [29].

Lavender Oil:

The primary purpose of the plant's commercial growth is the extraction of lavender essential oil. English lavender, or *Lavandula angustifolia*, produces a sweet-toned oil that is useful for topical treatments, salves, fragrances, and cosmetics [30]. *Lavandin*, or Dutch lavender, is another name for *Lavandula × intermedia*, a hybrid of *Lavandula angustifolia* and *Lavandula latifolia* [31] are frequently grown for commercial purposes since they typically have larger flowers than English lavender and are simpler to pluck from the plants [32]. Their essential oil output is similar, but it contains more terpenes, such as camphor, which give the aroma a harsher overtone and are thought by some to be of inferior quality than English lavender. Lavender is regarded by the US Food and Drug Administration as generally recognized as safe (GRAS) for ingestion by humans [33]. During World War I, the essential oil was employed in hospitals [27].

The Phytochemicals:

Lavender oil contains about 100 different phytochemicals, with the main components being linalyl acetate (30–55%), linalool (20–35%), tannins (5–10%), and caryophyllene (8%). Lesser concentrations of sesquiterpenoids, perillyl alcohols, esters, oxides, ketones, cineole, camphor, beta-ocimene, limonene, caproic acid, and caryophyllene oxide have also been identified with lavender oil [30][33][34]. The proportions of these chemicals differ significantly between species of lavender [30].

Uses:

Culinary lavender is usually English lavender, the most commonly used species in cooking (*L. angustifolia* 'Munstead'). As an aromatic, it has a sweet fragrance with lemon or citrus notes [35]. It is used as a spice or condiment in pastas, salads dressings, and desserts [36] [37]. Their buds and greens are used in teas, and their buds, processed by bees, are the essential ingredient of monofloral honey [38].

For dried flower arrangements, flower spikes are utilized. Potpourris are made from the fragrant, light purple flowers and flower buds. Additionally, lavender is utilized as a herbal filler in sachets that are used to freshen linens. Lavender blossoms are dried, packed in pouches, and arranged among clothes that are being stored to give them a new scent and keep moths away [39]. You might use dried lavender flowers as bridal confetti. Sachets and scented liquids also include lavender.

Adverse Effect:

When lavender oil is applied topically, some persons get allergic eczema, contact dermatitis, or face dermatitis [30][40].

According to estimates, in 2010 hypertension, or elevated blood pressure, contributed to 9.4 million deaths and 7% of the disease burden (measured in DALYs). The lack of proper detection, treatment, and control of hypertension is a global issue caused by flaws in health systems, especially in primary care [1]. Anti-hypertensive medications can have unfavorable side effects, albeit most of them are minor and include headaches, rashes, or dizziness. The severity of the side effects, such as arrhythmias or renal impairment, increases with patient age [2]. Due to its heart-sedative properties, lavender has been shown to lower blood pressure and lessen palpitations [3]. An excessive increase in blood pressure known as hypertension happens when the arterioles narrow, which lessens blood flow and requires more effort from the heart. Approximately 17 million fatalities worldwide are attributed to cardiovascular disease each year, making up nearly one-third of all deaths. Of them, hypertension-related problems kill 9.4 million people globally each year. At least 45% of heart disease deaths and 51% of stroke deaths are attributable to hypertension [4]. The American Heart Association [5] estimates that 77.9 million persons in the country suffer from excessive blood pressure. Of individuals who had their blood pressure checked, 81.5 percent knew they had it, 74.9 percent were receiving treatment at the time, 52.5 percent had it under control, and 47.5% had it uncontrolled. 61,762 Americans died in 2009 with high blood pressure recorded as their primary cause of death on their death certificates [5]. Because medications have inherent danger, it is necessary to use both pharmaceutical and non-pharmacological therapy. The goal of pharmacological hypertension therapy is to minimize the need for medication while reducing or regulating blood pressure [6]. While not all patients with hypertension need medication, those with medium-to-high risk will require one or more of the following eight essential medications to reduce their risk of cardiovascular disease: aspirin, metformin, insulin, beta-blockers, thiazide diuretics, angiotensin-converting enzyme inhibitors, long-acting calcium channel blockers, and beta blockers [4]. Antihypertensive medications are useful in lowering mortality and morbidity in the elderly. Though most of the symptoms are mild, like headaches, dizziness, and rash or small red spots on the skin, the British National Health Care Center for Review and Dissemination at the University of New York (1999) found that all of the major classes of hypertension medications are linked to the extra side effect. Serious adverse effects that worsen with aging include renal impairment and arrhythmia [2]. Kaplan emphasizes that hypertension medications may not always be necessary because nondrug therapy may have sufficient antihypertensive effects to bring blood pressure down to a safe level. Nondrug therapy includes behaviors such as biofeedback, progressive relaxation, cognitive restructuring, and anger regulation; changes in lifestyle habits (smoking, drinking, physical activity), weight loss; and food modification (sodium, calcium, potassium, and cholesterol) [6]. Certain essential oils are hypothesized to help lower borderline hypertension, and aromatherapy can be helpful as an additional calming therapy [2]. Certain essential oils are more compatible with particular organs or systems than others, and depending on where in the circulation cycle, they are, they will affect those organs or systems differently. Whatever portion of the essential oil remains after it has completed its healing effect on the body will be eliminated through some means. It can be eliminated from the body by perspiration, urine, or feces, or it can be brought back into the lungs and exhaled with the breath [3]. Sage, rosemary, and lavender are a few types of aromatherapies that can be used to lower blood pressure [2]. According to Tisserand (1988), real lavender, or *Lavender Augustifolia*, may lessen the impact of outside emotional stimuli by raising GABA levels. It is acknowledged as a relaxant and is one of the most utilized and studied essential oils [7]. Lavender, according to Westwood (1991), balances the emotions and cognition. Conversely, it induces a parasympathetic general response by lowering blood pressure or heartbeat and triggers the apneic reflex by closing the larynx [2–3], [7]. Aromatherapy using oil of lavender can be used topically and massaged into the skin. On the other hand, inhalation is the most straightforward, quick, and traditional way [2]. Essential oils do not build up to high concentrations (as long as a sensible proportion is maintained) since the respiratory system is the method by which they are absorbed into the bloodstream, and it does so more slowly and diffusely than any other application method. Essential oils will not accumulate to high concentrations (as long as reasonable proportions are used) because they are continuously eliminated from the bloodstream by one or more exit pathways. The absorption of essential oils into the bloodstream via the respiratory system is slower and more diffusive than any other form of application [3]. The following is the mechanism by which lavender aromatherapy lowers blood pressure: the essential oil's readily evaporated particles evaporate when they come into contact with air. Essential oil scent particles enter the nasal cavity through the mucosa, where they disintegrate after receptor stimulation. Cilia that extend from the olfactory receptor removes the bound aromatic compounds. The olfactory cell receptor is made up of a long nerve called an axon, and the olfactory nerve fuses with the receptor cell's axon to deliver an aroma electric chemical message. Olfactory nerve tissue travels to the olfactory bulb, where an aroma signal is chemically altered, after passing through a plate where the ethmoid bone is kept in the nasal roof. The impulse of the olfactory cell travels down the olfactory canal and straight to the cerebral cortex, where the scent is detected, as soon as the message reaches the olfactory bulbs. The major olfactory area and the limbic area/system are closely related to the temporal lobes of the brain [2–3]. The

cerebral cortex's entire ring of brain structure is known as the limbic system. The amygdala, septum, hippocampal regions, anterior thalamus, and hypothalamus are the principal limbic system structures. There are numerous complicated pathways connecting these structures. When processing smells, the amygdala and hippocampal regions are mostly involved. The amygdala organizes emotional reactions in this instance absorbs scent and creates emotional memory. The limbic system has direct connections to the brain regions that regulate blood pressure, breathing, heart rate, stress level, and hormone content. It also interacts with the cerebral cortex and contributes to the relationship between thinking and sensation [7]. Several chemicals from inhaled particles will pass through the lungs, where they will directly influence respiration and can be absorbed into the circulatory system, even though essential oil inhalation is typically associated with olfactory [7].

According to Sayorwan et al.'s study on the effects of inhaling lavender oil on emotional states, the autonomic nervous system, and brain electrical activity, lavender oil can significantly lower blood pressure, heart rate, and skin temperature, which suggests the existence of an autonomous reduction system [8]. Lavender oil infused with marjoram, ylang-ylang, and neroli has been shown to significantly lower home blood pressure and immediate office blood pressure before and after the intervention, as well as improve sleep quality, in a study by Myeong-Sook Ju et al. on the effects of aroma massage on home blood pressure, ambulatory blood pressure, and sleep quality in middle-aged women with hypertension [9]. There were 180 senior individuals at the UPT Pelayanan Sosial Lanjut Usia (Technical Service Unit of Social Service for senior individuals), Binjai, according to a preliminary survey, and 40 of those persons were. They experienced hypertension. The preliminary survey conducted at Posyandu Lanjut Usia Mekar 2, Puskesmas Pembantu Selayang, found that the mean difference in post- and pre-systolic blood pressure was 18 mmHg, and the mean difference in pre- and post-diastolic blood pressure was 8 mmHg. The elderly individuals were given lavender aromatherapy for 10 minutes before and after receiving treatment. According to the justification given, the research questions might be phrased as follows: "Did lavender aromatherapy at UPT Pelayanan Sosial Lanjut Usia, Binjai have an impact on the drop in blood pressure of hypertension patients?" The study's goal was to examine how lavender aromatherapy affects hypertension patients' blood pressure reduction. The study's premise was that patients with hypertension would experience a drop in blood pressure as a result of lavender aromatherapy. This study is beneficial to UPT Pelayanan Sosial Lanjut Usia, Binjai, where the findings are anticipated to contribute to improving nursing care for patients with hypertension by raising blood pressure. It is also useful to educational institutions, as it could serve as a source of information for research development programs and education, and it can assist researchers in applying their knowledge of science and experience to the teaching process of surgical medical nursing and gerontic

Discussion

The study's findings indicated that 16 respondents were older than 70 years old, while the majority of those with hypertension were between the ages of 60 and 70. The results of this study indicated that there was no correlation between the age of respondents who had hypertension and their level of hypertension.

Additionally, it was discovered that the sex distribution of the responders with hypertension did not differ significantly. Fifteen male respondents had hypertension and seventeen female respondents had the same condition. It was shown that the proportion of men with high blood pressure who did not get treatment until they were 45 years old was higher than that of women. The percentage of males and females suffering from hypertension was equivalent between the ages of 45 and 54 and 55 and 64. After that, however, the percentage of females suffering from hypertension was higher than that of males [5], [10].

The study's findings demonstrated that, before the lavender aromatherapy intervention, the respondents' systolic blood pressure was 165.592 mmHg, with a minimum mean value of 141.6 mmHg and a maximum mean value of 211.9 mmHg. In an industrial society, growing older can be quantified as a cause of elevated blood pressure, with a high prevalence of hypertension among the elderly population. The phenomenon of elevated systolic blood pressure, typically measured between 160 and 219 mmHg, is typically observed in the elderly [11]. The study's findings demonstrated that, before the lavender aromatherapy intervention, the respondents' diastolic blood pressure had a mean value of 90.112 mmHg, with a minimum mean value of 73.6 mmHg and a maximum mean value of around 122.8 mmHg. Because it was less than 90 mmHg, it was evident that the minimum mean diastolic blood pressure in the pre-lavender aromatherapy intervention was a normal value. Nevertheless, when compared to the pre-lavender aromatherapy intervention minimal mean value of systolic blood pressure, was 141.6 mmHg, indicating that systolic blood pressure may be classified as potentially hypertensive. Lloyd-Jones et al. (1999) reported that of the 4.962 older respondents whose blood pressure standards were evaluated, 94% saw an increase in systolic blood pressure while only 33% experienced an increase in diastolic blood pressure [12].

It was also discovered that the participants received a lavender aromatherapy intervention for ten minutes. Following this, the participant's blood pressure was measured, and the results indicated that the mean systolic blood pressure in the post-intervention period was 155.862 mmHg, with the lowest mean value being 134.9 mmHg and the highest mean value being 197.0 mmHg. This meant that the mean difference between the pre-and post-intervention systolic

blood pressure was 9.7299 mmHg. The diastolic blood pressure mean of the respondents was 85.788 mmHg after the lavender aromatherapy intervention, with a minimum mean value of 69.1 mmHg and a maximum mean value of 128.6 mmHg. As a result, the mean difference between the diastolic blood pressures before and after the lavender aromatherapy intervention was 4.3237 mmHg. This suggests that after ten minutes of lavender aromatherapy, there was a drop in both the systolic and diastolic blood pressure. This is consistent with the view that aromatherapy using lavender oil might reduce motoric spontaneous activity and promote a more relaxed mood. Its impact on the autonomous system included a calming and anxiety-reducing effect [7], [13]. According to Jia-xiii's research on the effects of inhaling various concentrations of lavender essential oil on blood pressure in hypertension patients, providing respondents with three types of different concentrations can lower high blood pressure in elderly patients [14]. This idea is supported by this research.

Using a paired t-test, the hypothesis evidence in this study regarding the mean disparity in systolic and diastolic blood pressure in the pre and post-lavender aromatherapy intervention revealed that the probability values for diastolic and systolic blood pressure were, respectively, $\alpha (0.000) < 0.05$ and $\alpha (0.000) < 0.05$. Based on the study's findings, it can be said that lavender aromatherapy has an impact on the reduction of both systolic and diastolic blood pressure. This was in line with the belief that lavender, one of the essential oils used in aromatherapy, may assist reduce cardiac excitement and was useful in lowering blood pressure and palpitations [2], [15]. Lavender has calming properties that calm the heart, lower blood pressure, and lessen palpitations, or discomfort in the chest [3]. Sayorwan et al.'s study on the effects of lavender oil inhalation on emotional states, the autonomic nervous system, and brain electrical activity corroborated the research's findings and demonstrated that lavender oil could significantly lower blood pressure, heart rate, and skin temperature, all of which pointed to a decrease in the autonomous system [8]. In addition, Hur and Bae's (2013) study demonstrated the effects of inhaling essential oils for aromatherapy on blood pressure, peripheral resistance, and cerebral serum in healthy persons with normotension following intense exposure to white noise and an arithmetic subtraction stressor while utilizing lavender aromatherapy. Additionally, ylanglang demonstrated a noteworthy impact on the reduction of both systolic and diastolic blood pressure when inhaled over 10 minutes [16]. Within 14 days of receiving the lavender aromatherapy intervention, the respondents might have a three-day washout period to undo the effects of the first activity and get ready for another. Action. The blood pressure readings of the participants were monitored for an additional fourteen days without any lavender aromatherapy intervention. Pre- and post-observations were conducted twice for this observation in 10 minutes. The findings indicated that, before the non-lavender aromatherapy intervention, the respondents' systolic blood pressure had a mean value of 162.281 mmHg, with a minimum mean value of 135.7 mmHg and a maximum mean value of 206.4 mmHg. The average difference in the systolic blood pressure of the participants before and after the non-lavender aromatherapy intervention was 7.046 mmHg. Before the non-lavender aromatherapy intervention, the mean diastolic blood pressure of the responders was 86.774 mmHg, with a minimum mean value of 75.0 mmHg and a maximum mean value of 106.4 mmHg. Pre- and post-non-lavender aromatherapy intervention diastolic blood pressure mean discrepancy values for the respondents were -3.51152.

The mean difference between the respondents' systolic blood pressure before and after the intervention and that before and after the non-intervention showed that both of them declined. The mean discrepancy value of the respondents' systolic blood pressure decreased more in the pre-intervention period than it did in the post-intervention period, though. Given that the group receiving lavender aromatherapy intervention experienced a more substantial drop in blood pressure than the group not receiving any lavender aromatherapy intervention, this suggested that lavender aromatherapy was beneficial in lowering blood pressure. The study by Cho et al. (2013) on the impact of aromatherapy using a blend of lavender, roman chamomile, and neroli oil on patients undergoing percutaneous coronary intervention's anxiety, vital signs, and quality of sleep provided support for this. Aromatherapy using a blend of lavender, Roman chamomile, and Neroli oil was found to lower blood pressure in patients with coronary artery disease in intensive care units (t-test, $p = 0.011$) [17]. Although it was not as great as the intervention group's decline in systolic blood pressure, the difference in systolic blood pressure between pre- and post-intervention periods decreased in the non-intervention group as well. The rest of the factors—dieting, exercise, reducing stress—and medications made this possible. Medication for hypertension can be administered in two ways: pharmaceutically and non-pharmacologically [6]. Drugs such as thiazide diuretics, angiotensin-converting enzyme inhibitors, long-acting calcium channel blockers, beta-blockers, metformin, insulin, statins, and aspirin are frequently taken in combination with pharmaceutical therapy for hypertension [4]. Dietary changes (sodium, calcium, potassium, cholesterol), weight loss, lifestyle modifications (smoking, alcohol, physical activity), and behavioral modifications (e.g., biofeedback, progressive relaxation, cognitive restructuring, and anger modulation) are examples of non-pharmacological medication [6].

According to Pinto (2007), managing blood pressure in the elderly involved medications, and a lifestyle change that included consuming less salt, and engaging in physical activity [18].

The group that received lavender aromatherapy intervention experienced a different amount of systolic blood pressure reduction (7.0641 mmHg) than the group that did not receive lavender aromatherapy intervention. The decrease in

systolic blood pressure from 5.0 mmHg (significance level of 95%: 3.1-7) to 4.6 mmHg (significance level of 95%: 2.0-7.1) to 3.8 mmHg (significance level of 95%: 1.4-6.1) to 3.6 mmHg (significance level of 95%: 2.5-4.6) to 2.3 mmHg (significance level of 95%: 0.2-4.3) was corroborated by a systematic review of randomized controlled trials conducted in 2006 by Dickinson et al. This systematic review of lifestyle interventions to lower raised blood pressure was conducted in support of this [19]. The decrease in systolic blood pressure from 5.0 mmHg (significance level of 95%: 3.1-7) to 4.6 mmHg (significance level of 95%: 2.0-7.1) to 3.8 mmHg (significance level of 95%: 1.4-6.1) to 3.6 mmHg (significance level of 95%: 2.5-4.6) to 2.3 mmHg (significance level of 95%: 0.2-4.3) was corroborated by a systematic review of randomized controlled trials conducted in 2006 by Dickinson et al. This systematic review of lifestyle interventions to lower raised blood pressure was conducted in support of this [19]. Two of the three people over 60 and three of the four people over 75 who had isolated systolic blood pressure were examples of this type of hypertension, which is more common in the elderly and whose prevalence rises with age. The first step in taking medication and changing one's lifestyle to keep blood pressure below 140/90 mmHg is to change [20]. The administration of lavender aromatherapy to research participants demonstrated a noteworthy impact, indicating its potential utility as a nursing intervention for lowering blood pressure in patients with hypertension. Basch et al. (2003) noted that aromatherapy might be administered once daily if necessary and intermittently [21].

Blood pressure control requires a patient's strong willingness combined with a generalized, user-friendly, and cost-effective method. In addition to standard medicine, lavender aromatherapy is one of the nursing interventions offered at UPT Pelayanan Sosial Lanjut Usia, Binjai, that can be used to lower blood pressure in hypertension patients.

This research has certain drawbacks. These included minimizing confounding factors that could influence respondents' blood pressure-lowering behavior, such as the fact that some respondents took antihypertensive medications during the research, the variation in food intake in terms of salt and animal fat because respondents may have access to foods high in these nutrients outside of the UPT, the respondents' varied and regular exercise regimens, and each respondent's unique stress-reduction strategy. In addition, the research methodology, which employed a quasi-experimental design with the same subjects but a random technique on the subjects or responders, was another factor contributing to the study's weaknesses.

Conclusion

Utilizing a paired t-test, the study's findings demonstrated that the probability of the mean discrepancy value of systolic blood pressure before (during the initial measurement) and after (during the subsequent 10-minute period) a non-lavender aromatherapy intervention was $\alpha (0.000) < 0.05$. This showed a mean difference in systolic blood pressure between the pre- (during the first measurement) and post- (during the next 10 minutes) non-lavender aromatherapy intervention. The study's results also demonstrated that using a paired t-test, there was a probability value of $\alpha (0.000) < 0.05$ for the mean difference in diastolic blood pressure between pre (during the first measurement) and post (during the next 10 minutes) non-lavender aromatherapy interventions. This showed that the diastolic blood pressure mean discrepancy value existed between pre (during the first measurement) and post (during the next 10 minutes) non-lavender aromatherapy intervention. The elements that contributed to the drop in blood pressure in the non-intervention group included physical activity, avoiding stress, varying diets, and the use of anti-hypertension medications by some of the respondents, according to the researchers' observations made during the study. This finding indicated that there were additional options for lowering blood pressure in addition to lavender aromatherapy. Other options that older individuals can frequently use include changing their diets to include less salt and animal fat, exercising frequently, managing their stress levels, and taking medication. However, further research is required to determine its effectiveness.

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