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Combination of slow deep breathing with rose aromatherapy and progressive muscle relaxation on blood pressure among hypertensive patients in Manado City

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ABSTRACT

Hypertension is one of the major health problems in Manado City, with an increasing prevalence and the potential to cause serious complications if left uncontrolled. Non-pharmacological interventions, such as the combination of slow deep breathing (SDB) with rose aromatherapy and progressive muscle relaxation (PMR), may serve as alternative therapies to support blood pressure management by increasing parasympathetic nervous system activity. This study aimed to evaluate the effectiveness of SDB combined with rose aromatherapy and PMR in reducing blood pressure among patients with hypertension. This study employed a quantitative pre-experimental design with a two-group pretest-posttest approach. A total of 32 patients with hypertension were allocated into two intervention groups: the SDB combined with rose aromatherapy group and the PMR group. Both interventions were conducted for four weeks. Systolic and diastolic blood pressure measurements were recorded before and after the interventions. The results showed that the SDB combined with rose aromatherapy group experienced a reduction in systolic blood pressure of 10 mmHg (p=0.001) and diastolic blood pressure of 5.43 mmHg (p=0.001). Meanwhile, the PMR group demonstrated a reduction in systolic blood pressure of 13.4 mmHg (p=0.001) and diastolic blood pressure of 5.3 mmHg (p=0.001). The Independent Samples T-Test revealed significant differences in post-intervention blood pressure between the two groups for both systolic blood pressure (mean difference=-18.33; 95% CI: -19.18 to -0.85; p=0.015) and diastolic blood pressure (mean difference=-9.02; 95% CI: -9.57 to -0.55; p=0.014). Conclusion: Both SDB combined with rose aromatherapy and PMR significantly reduced blood pressure among patients with hypertension. Slow Deep Breathing (SDB) combined with rose aromatherapy showed greater reductions in post-intervention systolic and diastolic blood pressure compared with Progressive Muscle Relaxation (PMR), supporting its potential role as a non-pharmacological approach for hypertension management.

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INTRODUCTION

Hypertension or high blood pressure is defined as abnormally elevated blood pressure in the arteries that persists over a period of time. According to the WHO, hypertension is diagnosed when systolic blood pressure is ≥140 mmHg or diastolic blood pressure is ≥90 mmHg. Many factors contribute to increased blood pressure with aging, but the main contributors are lifestyle-related risk factors such as high sodium and low potassium diet, obesity, alcohol consumption, smoking, and lack of physical activity (WHO, 2024).

Hypertension is one of the most common chronic diseases and has the potential to cause serious complications such as heart disease and stroke. According to World Health Organization data in 2021 (WHO, 2024), hypertension affects more than 1.13 billion people worldwide. In Indonesia, its prevalence continues to rise, reaching 34.1% in 2018 (Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI, 2018). In Manado City, the prevalence of hypertension also shows significant figures, demanding more effective and efficient management strategies (Sumajow et al., 2020). In addition to pharmacological therapy in the form of prescribed medication, non-pharmacological interventions are also needed (Suwanti et al., 2025). Non-pharmacological therapies believed to reduce blood pressure include relaxation techniques such as slow deep breathing (Suranata et al., 2019), progressive muscle relaxation (Suranata & Katuuk, 2022), and rose aromatherapy inhalation (Kadek et al., 2022). Previous studies, including our own, have shown positive effects of these methods in lowering blood pressure.

Slow deep breathing (SDB) is a breathing technique that helps lower stress and blood pressure by enhancing parasympathetic nervous system activity (Brown, 2013). Aromatherapy, particularly rose essential oil, is known to promote relaxation, improve mood, and reduce blood pressure (Koulivand, 2013). Its effectiveness increases when combined with rose essential oil, which has demonstrated anxiolytic and hypotensive effects through stimulation of the limbic system (Hongratanaworakit, 2022). On the other hand, progressive muscle relaxation (PMR) is a relaxation technique that lowers heart rate and blood pressure, controls pain, and reduces muscle tension. PMR involves a gradual process of tensing and relaxing skeletal muscles, leading to a relaxation response (Alisia et al., 2024). Although both SDB with rose aromatherapy and PMR aim to lower blood pressure, they operate through different physiological and psychological mechanisms. While several studies have evaluated each method individually, the main research gap is the absence of direct comparisons between the effectiveness of SDB combined with rose aromatherapy and PMR in lowering blood pressure among hypertensive patients, particularly in Manado City. In addition, cultural context and community acceptance of these relaxation techniques have not been widely explored, underscoring the need for research targeting the local population to ensure relevant and applicable interventions.

Previous research conducted by the author, along with several previous studies, has demonstrated that slow deep breathing (SDB) (Suranata et al., 2019) and progressive muscle relaxation (PMR) (Suranata & Katuuk, 2022) are individually effective in reducing blood pressure among patients with hypertension. However, the combination of slow deep breathing with rose aromatherapy has not yet been investigated by the author. Based on the findings of (Kadek et al., n.d.), rose aromatherapy has been reported to provide relaxation effects and contribute to blood pressure reduction among older adults with hypertension. Nevertheless, most previous studies have focused only on a single intervention method or a combination of two therapies, and no studies have directly compared two different therapeutic approaches within the same population. The combination of SDB and rose aromatherapy is considered important to investigate because it can be easily performed independently, does not require extensive physical space, and may

provide immediate psychological effects through aromatic stimulation and controlled breathing rhythms.

Through this study, it is expected that the more effective method for reducing blood pressure can be identified, allowing it to be implemented as an independent nursing intervention or incorporated into community health education programs, particularly in Manado City. The findings of this study may also contribute to enriching scientific literature regarding non-pharmacological interventions based on local cultural approaches and community preferences. Furthermore, research combining SDB with rose aromatherapy and comparing its effects with PMR on blood pressure among patients with hypertension, specifically in Manado City, has not yet been conducted. Therefore, the novelty of this study lies in the integration of rose aromatherapy, which has been shown to contribute to blood pressure reduction, with SDB, as well as the comparative analysis of these two therapeutic approaches to determine which intervention is more effective in reducing blood pressure among patients with hypertension.

The research questions are: (1) Is the combination of SDB with rose aromatherapy effective in reducing blood pressure? (2) Is PMR effective in lowering blood pressure? (3) Which intervention is more effective in reducing blood pressure among hypertensive patients in Manado City? The urgency of this study lies in the high prevalence of hypertension in Manado City and the need to develop applicable and culturally relevant non-pharmacological interventions.

RESEARCH METHOD

This study was a quantitative study using a pre-experimental design with a one-group pretest–posttest design without a control group involving two intervention groups. The variables in this study consisted of two independent variables, namely the combination of slow deep breathing (SDB) with rose aromatherapy and progressive muscle relaxation (PMR), while the dependent variable was blood pressure (systolic and diastolic) among patients with hypertension.

The study population consisted of patients with hypertension residing in Manado City. The sample size was determined using power analysis, resulting in a total of 60 participants, consisting of 30 participants in the intervention group receiving the combination of slow deep breathing and rose aromatherapy and 30 participants in the intervention group receiving progressive muscle relaxation. The inclusion criteria were patients diagnosed with primary/essential hypertension, aged >18 years, and having compos mentis consciousness. Meanwhile, the exclusion criteria included patients with secondary hypertension and those with comorbidities such as diabetes mellitus, neurological disorders, severe respiratory disorders, and severe musculoskeletal disorders that could interfere with the implementation of the interventions.

The study was conducted by dividing participants into two intervention groups. The first intervention group received a combination of SDB and rose aromatherapy, while the second intervention group received PMR. Participants in both groups received the intervention three times per week for four weeks, performed in the morning before starting daily activities. The interventions were conducted at participants' homes, and the research team ensured that the home environment was comfortable, quiet, and free from distractions before starting the intervention to allow participants to focus on the relaxation therapy. Both interventions were administered according to the established Standard Operating Procedures (SOPs). This study measured systolic and diastolic blood pressure before and after the implementation of both interventions. Pre- and post-intervention blood pressure data were recorded on observation sheets and subsequently analyzed to determine the mean values between the SDB combined with rose aromatherapy group and the PMR group. Data analysis was performed using the Wilcoxon test, followed by a comparison between the two interventions using the Independent Samples T-Test with a 95% confidence interval. The research procedures were conducted through the following stages: Stage 1: Identification, an initial survey was conducted to identify data on 60 patients with hypertension. Subsequently, the research background and problems were formulated after conducting a

comprehensive review of various literature sources, including field studies, previous research, books, scientific articles, and both national and international journals. Stage 2: Data Collection, at this stage, participants were selected using accidental sampling and subsequently assigned to intervention groups. Baseline data collection (pre-test) was conducted before the implementation of the interventions, consisting of a combination of slow deep breathing (SDB) with rose aromatherapy (intervention group 1) and progressive muscle relaxation (PMR) (intervention group 2). After the interventions were completed, post-test data were collected by measuring systolic and diastolic blood pressure, and the results were recorded on observation sheets. Stage 3: Data Processing and Analysis, after obtaining pre-test and post-test systolic and diastolic blood pressure data from both intervention groups, the collected data were processed and subsequently analyzed according to the predetermined statistical procedures. Stage 4: Report Preparation and Publication, at this stage, the researchers prepared the progress report, final report and scientific manuscript for publication based on the research findings.

RESULTS AND DISCUSSIONS

Table 1. Characteristic of respondents

Characteristic	The Combination of Slow Deep Breathing and Rose Aromatherapy / Intervention Group 1		Progressive Muscle Relaxation/ Intervention Group 2		Total	
	Frequency(f)	Percent (%)	Frequency (f)	Percent (%)	Frequency (f)	Percent (%)
Gender						
Male	8	26,7	6	20,0	14	23,3
Female	22	73,3	24	80,0	46	76,7
Age						
Early adulthood (26-35 tahun)	2	6,7	0	0	2	3,33
Late adulthood (36-45 tahun)	2	6,7	5	16,7	7	11,7
Young-old adults (46-55 tahun)	10	33,3	13	43,3	23	38,3
Old-old adults (56-65 tahun)	6	20,0	8	26,7	14	23,3
Oldest-old adult (>65 tahun)	10	33,3	4	13,3	14	23,4
Last education						
No Schooling	1	3,3	0	0	1	1,67
ElementarySchool	4	13,3	5	16,7	9	15
Junior High School	2	6,7	4	13,3	23	38,4
Senior High School	20	56,7	21	70,0	24	40
Bachelor's Degree	3	10,0	0	0	3	5
Total	30	100	30	100	60	100

The characteristics of respondents in both groups showed that the majority were female. In the first intervention group, which received the combination of slow deep breathing with rose aromatherapy, 22 participants (73.3%) were women, while in the second intervention group, which received progressive muscle relaxation, 24 participants (80%) were women. In terms of age, the distribution in the first intervention group was equally divided between early elderly and advanced elderly, with 10 participants (33.3%) in each category. Meanwhile, in the second intervention group, most respondents were categorized as early elderly, comprising 13 participants (43.3%). Regarding educational background, the majority of respondents in both groups were high school graduates, with 20 participants (56.7%) in the first intervention group and 21 participants (70%) in the second intervention group.

Table 2. Univariate analysis

Intervention Group	Time of Measurement	Systolic Blood Pressure				Diastolic Blood Pressure			
		n	Mean	SD	Min-Max	n	Mean	SD	Min-Max
The Combination of Slow Deep Breathing and Rose Aromatherapy	Pre Test	30	147,3	15,268	121-185	30	85,5	10,395	64-105
	Post Test	30	137,1	13,755	112-176	30	80,07	9,191	61-97
Progressive Muscle Relaxation	Pre Test	30	158,8	14,324	141-210	30	90,7	8,81	74-110
	Post Test	30	145.4	14,898	120-187	30	85,1	8,24	66-101

The results presented in the table indicate differences in the mean values of pre-test systolic and diastolic blood pressure, as well as post-test systolic and diastolic blood pressure, between the two intervention groups.

Bivariate Analysis

a. Effectiveness Slow Deep Breathing (SDB) with Rose Aromatherapy in Manado City (n=30).

Table 3. Effectiveness slow deep breathing (SDB) with rose aromatherapy in Manado City

Intervention Group	Variable	Mean	Mean Difference	Min-Max	*p-value*
The Combination of Slow Deep Breathing and Rose Aromatherapy	Systolic Blood Pressure Pre Test	147,3	10,2	121-185	0,001
	Systolic Blood Pressure Post Test	137,1		112-176	
	Diastolic Blood Pressure Pre Test	85,5	5,43	64-105	0,001
	Diastolic Blood Pressure Post Test	80,07		61-97	

Wilcoxon Test α=0,05

Based on the table, the results of systolic blood pressure pre-test and post-test using the paired t-test showed a p-value of 0.001, which is smaller than α = 0.05. Therefore, Ha was accepted and H0 was rejected, indicating that there was a significant difference and that the combination of slow deep breathing with rose aromatherapy had an effect on systolic blood pressure among hypertensive patients in Manado City. Similarly, the analysis of diastolic blood pressure pre-test and post-test using the paired t-test also produced a p-value of 0.001, which is smaller than α = 0.05. Thus, Ha was accepted and H0 was rejected, indicating that there was a significant difference and that the combination of slow deep breathing with rose aromatherapy had an effect on diastolic blood pressure among hypertensive patients in Manado City.

b. Effectiveness Progressive Muscle Relaxation (PMR) in Manado City (n=30).

Table 4. Effectiveness progressive muscle relaxation (PMR) in Manado City

Intervention Group	Variable	Mean	Mean Difference	Min-Max	*p value*
Progressive Muscle Relaxation (PMR)	Systolic Blood Pressure Pre Test	158,8	13,4	141-210	0,001
	Systolic Blood Pressure Post Test	145,4		120-187	
	Diastolic Blood Pressure Pre Test	90,7	5,3	74-110	0,001
	Diastolic Blood Pressure Post Test	85,1		66-101	

Wilcoxon Test α=0,05

Based on the table, the results of the systolic blood pressure pre-test and post-test using the nonparametric Wilcoxon test showed a p-value of 0.001, which is smaller than α = 0.05. Therefore, Ha was accepted and H0 was rejected, indicating a significant difference and that Progressive Muscle Relaxation (PMR) had an effect on systolic blood pressure among hypertensive patients in Manado City. For diastolic blood pressure, the pre-test and post-test analysis using the paired t-test also showed a p-value of 0.001, which is smaller than α = 0.05. Thus, Ha was accepted and H0 was rejected, indicating a significant difference and that Progressive Muscle Relaxation (PMR) had an effect on diastolic blood pressure among hypertensive patients in Manado City.

c. Effectiveness of the Combination of Slow Deep Breathing (SDB) with Rose Aromatherapy and Progressive Muscle Relaxation (PMR) in Manado City (n=30)

Table 4. Comparison of post intervention mean systolic blood pressure between slow deep breathing (SDB) with rose aromatherapy and progressive muscle relaxation (PMR) using indpendent samples t-test

Intervention Groups	n	Means ± s.b.	Difference in Means (CI95%)	P value
Slow Deep Breathing (SDB) with Rose Aromatherapy	30	137,3 ± 13,75	-18,33 ((-19.18) – (-0,85))	0,015
Progressive Muscle Relaxation (PMR)	30	145,4 ± 14,89		

The comparison of post-intervention systolic blood pressure between the Slow Deep Breathing (SDB) with rose aromatherapy group and the Progressive Muscle Relaxation (PMR) group is presented in Table 4. The results showed that the mean systolic blood pressure after intervention was lower in the SDB with rose aromatherapy group (137.3 ± 13.75 mmHg) compared with the PMR group (145.4 ± 14.89 mmHg). The Independent Samples T-Test indicated a statistically significant difference in post-intervention systolic blood pressure between the two groups (mean difference = -18.33; 95% CI: -19.18 to -0.85; p = 0.015).

Table 5. Comparison of post intervention mean diastolic blood pressure between slow deep breathing (SDB) with rose aromatherapy and progressive muscle relaxation (PMR) using indpendent samples t-test

Intervention Groups	n	Means ± s.b.	Difference in Means (CI95%)	P value
Slow Deep Breathing (SDB) with Rose Aromatherapy	30	80,06 ± 9,19	-9,02 ((-9,57) – (-0,55))	0,014
Progressive Muscle Relaxation (PMR)	30	85,13 ± 8,24		

Table 5 presents the comparison of post-intervention diastolic blood pressure between the two intervention groups. The mean diastolic blood pressure after intervention was lower in the SDB with rose aromatherapy group (80.06 ± 9.19 mmHg) than in the PMR group (85.13 ± 8.24 mmHg). The Independent Samples T-Test demonstrated a statistically significant difference in post-intervention diastolic blood pressure between the groups (mean difference = -9.02; 95% CI: -9.57 to -0.55; p = 0.014). Based on the second bivariate analysis table of the two groups, the largest mean reduction in systolic blood pressure was observed in the PMR group (13.4 mmHg), compared to the combination of SDB with rose aromatherapy (10.2 mmHg). The mean reduction in diastolic blood pressure was nearly equivalent, with a slightly greater decrease in the PMR intervention group (5.6 vs. 5.43 mmHg). Both interventions demonstrated the same p-value (0.001), indicating that each was significantly effective in lowering blood pressure. Accordingly, it can be concluded that numerically, PMR appeared to be slightly superior to the combination of SDB with rose aromatherapy in reducing both systolic and diastolic blood pressure, although the difference in effectiveness between the two methods was not statistically significant in several supporting studies. A study conducted by Ikhwan and Utomo (2019) directly compared PMR and SDB, and found that although both interventions effectively reduced blood pressure, no statistically significant difference was observed (p=0.273). Reductions in blood pressure are strongly influenced by additional factors such as age, stress level, and the duration of hypertension. Therefore, both methods are considered effective; however, PMR demonstrates a greater potential for reducing systolic blood pressure, as corroborated by the findings of the present study.

Discussion

This study involved 60 respondents, the majority of whom were women (76.7%), with the largest age group being late adulthood to early elderly (36–55 years; ±61.6%). The respondents'

educational background was predominantly high school graduates (40.0%) and undergraduates (38.4%). This demographic composition is relevant in the context of hypertension in Indonesia, which tends to increase among middle-aged and older adults, and varies according to sex and socioeconomic factors. The predominance of female respondents is consistent with national analyses showing a relatively higher prevalence of hypertension among adult and elderly women in Indonesia, even though global patterns may differ depending on age and hormonal phase. Analyses based on the Indonesian National Basic Health Survey (RISKESDAS) revealed that districts and cities in Indonesia recorded the highest prevalence among women (36.0%) and in those aged ≥60 years, underscoring the unequal burden across demographic groups. This highlights the importance of gender-sensitive approaches in hypertension prevention and control (Oktamianti, 2022). Epidemiologically, hypertension tends to be more prevalent among men during early to middle adulthood, but after menopause, the prevalence in women rises sharply, equaling or surpassing that of men. The mechanism is associated with the loss of estrogen's protective effects on the renin–angiotensin–aldosterone system (RAAS), endothelial function, baroreflex control, and adipometabolic regulation. Following estrogen decline, arterial stiffness and systolic pressure increase more rapidly in women. The findings of this study, where women constituted the majority of respondents, align with the clinical profile in which middle-aged to elderly women are more frequently detected or seek treatment for hypertension (Connelly PJ, 2022). Furthermore, in Indonesia, recent health profiles also report a substantial number of hypertensive patients among adults and the elderly, with a persistent gap in awareness and diagnosis. Since women are more likely to interact with healthcare services, they are often overrepresented in both community- and clinic-based samples (Kementerian Kesehatan RI, 2024).

Most respondents in this study were aged 36–55 years. Physiologically, vascular aging leads to arterial stiffness, accelerating the rise in systolic pressure and the widening of pulse pressure. Processes such as elastolysis, collagen remodeling, and changes in arterial wave reflections make isolated systolic hypertension more common in older adults. Thus, the predominance of middle-to-late adulthood age groups in this study is consistent with the biological processes underlying age-related hypertension (Herzog, 2025). Recent findings by Watanabe et al. (2025) further demonstrated age- and sex-specific differences in blood pressure regulation through vascular baroreflex, which declines with age, as well as the role of hormone therapy in postmenopausal women. This emphasizes the need to consider age groups when evaluating the response to relaxation and deep-breathing interventions (Watanabe DK, 2025).

The majority of respondents had completed only junior or senior high school (±78.4%), with a smaller proportion holding undergraduate degrees. Large-scale population studies consistently demonstrate a strong association between lower educational attainment and both higher risk of hypertension and poorer blood pressure control. These associations are mediated by differences in health literacy, income, occupational exposure, diet, physical activity, and treatment adherence. Recent national cohort studies in East Asia and contemporary cardiovascular research reaffirm this educational gradient in relation to hypertension risk and the "ideal cardiovascular health score" (Li X, 2023). Among young adults (26–35 years), analyses of RISKESDAS 2018 indicated that low educational attainment is a factor associated with hypertension, suggesting that health literacy gaps emerge early in the productive age. This finding is particularly relevant for lifestyle education, adherence to interventions, and self-monitoring of blood pressure (Putri LR, 2023).

a. The Effect of the Combination of Slow Deep Breathing (SDB) with Rose Aromatherapy in Manado City

In the intervention group that received a combination of slow deep breathing (SDB) with rose aromatherapy, systolic blood pressure (SBP) decreased by an average of 10.2 mmHg (from 147.3 mmHg to 137.1 mmHg; p=0.001) and diastolic blood pressure (DBP) decreased by 5.43 mmHg (p=0.001). Clinically, these values are comparable, and in fact slightly greater for SBP, than

the findings from meta-analyses of breathing exercises, which reported reductions of up to 7 mmHg in SBP and 3–4 mmHg in DBP. This is consistent with the study of Garg et al. (2023), which demonstrated that relaxation interventions (including breathing and stress management techniques) can induce a meaningful short-term reduction in blood pressure, although the long-term duration of the effect remains debated and requires further investigation (Garg P, 2023).

Blood pressure reduction following SDB is mediated by increased heart rate variability, enhanced baroreflex sensitivity, and reduced sympathetic activity, thereby lowering peripheral resistance and afterload. Shao et al. (2024), in a recent meta-analysis, confirmed that SDB significantly reduces both blood pressure and heart rate, particularly when the breathing frequency approaches 0.1 Hz (six breaths per minute) (Shao, 2024).

Suranata et al. (2019) explained that SDB lowers blood pressure because prolonged exhalation during this breathing technique increases intrathoracic pressure, thereby improving tissue oxygenation. This activates chemoreceptors located in the carotid body, aortic body, and partially in the thoracic cavity and lungs, which then transmit neural signals to the respiratory center in the medulla oblongata. Consequently, parasympathetic nervous activity is enhanced, sympathetic activity is suppressed, and blood pressure decreases. Increased intrathoracic pressure also reduces central venous pressure, facilitating venous return and increasing left ventricular stroke volume. Baroreceptors in the aortic arch and carotid sinus are stimulated, transmitting impulses to the tractus solitarius in the medulla, where sympathetic output is inhibited through α1 receptor modulation. This leads to venous and arteriolar vasodilation, decreased peripheral resistance, and lowered blood pressure. Furthermore, parasympathetic vagal activation induces systemic vasodilation, reduced heart rate, and decreased ventricular contractility, ultimately reducing cardiac output and blood pressure (Suranata et al., 2019).

Faridah et al. (2024) also reported that 15 minutes of SDB significantly lowered blood pressure among elderly hypertensive patients (Faridah VN, 2024). These findings are supported by Al-Yazidi (2021), who confirmed through meta-analysis that breathing techniques such as SDB produce significant antihypertensive effects when consistently practiced (Al-Yazidi S, 2021). In addition, the combination of SDB with rose aromatherapy reduces blood pressure and anxiety through modulation of the olfactory-limbic system and autonomic nervous system (enhancing parasympathetic activity and suppressing sympathetic activity) (Mohamadinasab S, 2019). Rose essential oil (Rosa damascena) acts through the olfactory system, which is directly connected to the brain's limbic structures, particularly the amygdala and hypothalamus, responsible for emotion regulation and autonomic control. Active compounds in roses, such as citronellol and geraniol, are known to exert sedative and relaxing effects. Astuti and Nugrahwati (2018) demonstrated that 15 minutes of rose aromatherapy inhalation significantly reduced blood pressure among elderly hypertensive patients (Astuti R, 2018). Similarly, Liu et al. (2024), in a meta-analysis on patients with acute coronary syndrome, showed that aromatherapy—including rose oil—was effective in reducing both blood pressure and anxiety (Liu L, 2024).

The combination of these two interventions produces synergistic effects. SDB exerts direct physiological modulation of the autonomic nervous system, while rose aromatherapy acts psychosensorially by reducing stress and anxiety, both of which contribute to elevated blood pressure. Friskia et al. (2024) found that SDB combined with rose aromatherapy significantly lowered both SBP and DBP in hypertensive pregnant women compared with the control group (Friskia ARD, 2024). Similarly, Nyna (2024) reported that this combination was safe, feasible, and effective as a complementary therapy in hypertensive patients (Nyna KN, 2024). Non-pharmacological interventions such as SDB and aromatherapy are particularly valuable for mild to moderate hypertension, especially among vulnerable groups such as the elderly, pregnant women, and cardiac patients. These interventions can be practiced independently at home, with high flexibility and minimal risks. Hongratanaworakit (2009) also showed that rose oil not only reduces blood pressure but also enhances comfort and decreases tension (Hongratanaworakit T, 2009).

Kim & Kim (2024), in a meta-analysis, concluded that aromatherapy (including rose oil), when combined with relaxation breathing techniques, produced significant reductions in both blood pressure and anxiety among hypertensive and cardiovascular patients (Kim RW, 2024). Liu et al. (2024) further emphasized that inhaled aromatherapy combined with slow breathing exerts faster sedative effects than when used alone (Liu L, 2024). This integrative approach provides not only physiological benefits but also enhances patient adherence in hypertension management due to its simplicity, safety, and ease of application. In community settings, this combination can serve as a preventive health promotion strategy, particularly for elderly populations, pregnant women, or high-risk patients. Since blood pressure is influenced not only by physiological factors but also psychological conditions such as stress, anxiety, and poor sleep, rose aromatherapy—with its anxiolytic effects—combined with SDB—which improves cerebral oxygenation and reduces the "fight or flight" response—offers a comprehensive complementary strategy for hypertension control.

b. The Effect of Progressive Muscle Relaxation (PMR) in Manado City (n=30)

This study demonstrated that Progressive Muscle Relaxation (PMR) significantly reduced blood pressure among hypertensive patients. Based on pre–post testing, mean SBP decreased from 158.8 mmHg to 145.4 mmHg (a reduction of 13.4 mmHg; p=0.001), while mean DBP decreased from 90.7 mmHg to 85.1 mmHg (a reduction of 5.3 mmHg; p=0.001).

PMR is a relaxation technique that involves systematically contracting and relaxing muscle groups from head to toe. Physiologically, this technique decreases sympathetic nervous system stimulation while enhancing parasympathetic activity, resulting in reductions in heart rate, blood pressure, and respiratory rate. According to McCallie et al., PMR reduces the production of stress hormones such as adrenaline and cortisol, indirectly contributing to blood pressure reduction (Callie MS, 2006). Additionally, muscle relaxation increases endorphin release and reduces vascular tension, making PMR a highly relevant non-pharmacological therapy for hypertension.

Several studies support these findings. Budiarti et al. (2022) reported that PMR reduced SBP by up to 12 mmHg among elderly hypertensive patients after seven days of intervention (Budiarti I, 2022). An experimental study by Putri and Zainuddin (2023) yielded similar results among outpatients in community health centers, showing that PMR not only lowered blood pressure but also improved sleep quality (Putri M, 2023). A clinical trial by Suranata et al. (2022) further demonstrated that PMR significantly reduced SBP in hypertensive patients (Suranata & Katuuk, 2022). Beyond Indonesia, Alqahtani et al. (2021), in a randomized controlled trial, found that PMR significantly decreased both blood pressure and anxiety in hypertensive patients in Saudi Arabia after two weeks of regular practice (Alqahtani J, 2021). This indicates that PMR is effective across diverse cultural settings. The effectiveness of PMR makes it a promising non-pharmacological therapy in hypertension management. In addition to its direct impact on blood pressure, PMR improves sleep quality and reduces anxiety—both of which are additional risk factors in hypertensive patients. In community settings, PMR can be widely applied because it requires no equipment, can be practiced independently, and is safe for at-risk populations such as the elderly, pregnant women, and patients with cardiovascular disease (Suwanti et al., 2025).

c. The Effect of the Combination of Slow Deep Breathing (SDB) with Rose Aromatherapy and Progressive Muscle Relaxation (PMR) in Manado City

The results of this study showed a significant difference in post-intervention blood pressure between the Slow Deep Breathing (SDB) with rose aromatherapy group and the Progressive Muscle Relaxation (PMR) group. The mean systolic blood pressure after intervention in the SDB with rose aromatherapy group was lower (137.3 ± 13.75 mmHg) compared with the PMR group (145.4 ± 14.89 mmHg), with a statistically significant difference (p = 0.015). Similarly, the mean diastolic blood pressure was lower in the SDB with rose aromatherapy group (80.06 ± 9.19 mmHg) compared with the PMR group (85.13 ± 8.24 mmHg), and the difference was statistically significant (p = 0.014). These findings indicate that both interventions have potential

benefits in blood pressure management, with SDB combined with rose aromatherapy showing lower post-intervention blood pressure values.

The lower blood pressure observed in the SDB with rose aromatherapy group may be related to the combined physiological and psychological effects produced by controlled breathing techniques and aromatherapy stimulation. Slow Deep Breathing involves slow and regular breathing patterns that can stimulate the parasympathetic nervous system and increase vagal activity. This mechanism helps reduce sympathetic nervous system activity, decrease heart rate, improve baroreceptor sensitivity, and promote vascular relaxation. As a result, peripheral vascular resistance decreases, contributing to reductions in systolic and diastolic blood pressure.

The addition of rose aromatherapy may provide further relaxation effects through olfactory stimulation. Aromatic compounds from rose essential oil are transmitted through the olfactory pathway to the limbic system, particularly areas associated with emotional regulation, stress response, and autonomic nervous system activity. This stimulation can create a calming effect, reduce anxiety and psychological stress, and suppress excessive sympathetic activation. Reduced stress responses may decrease the release of stress-related hormones such as cortisol and catecholamines, which are associated with increased vascular resistance and elevated blood pressure. In patients with hypertension, persistent activation of the sympathetic nervous system is one of the contributing factors to increased blood pressure. Conditions such as psychological stress, anxiety, poor relaxation response, and lifestyle factors can maintain vascular tension and increase cardiac workload. Therefore, relaxation-based interventions such as Slow Deep Breathing with rose aromatherapy may help create a more balanced autonomic response by improving relaxation and reducing physiological stress.

Progressive Muscle Relaxation (PMR) also showed beneficial effects as a non-pharmacological intervention for hypertension management. PMR works by systematically contracting and relaxing muscle groups, reducing muscle tension, improving relaxation responses, and decreasing sympathetic nervous activity. Through decreased physical and psychological tension, PMR may contribute to lower heart rate, reduced vascular resistance, and improved blood pressure regulation.

However, the lower mean systolic and diastolic blood pressure observed in the SDB with rose aromatherapy group suggests that combining breathing regulation with sensory relaxation through aromatherapy may provide additional benefits. The simultaneous activation of respiratory control and olfactory relaxation pathways may enhance the body's relaxation response compared with muscle relaxation techniques alone. These findings support the importance of complementary and non-pharmacological approaches in hypertension management. Slow Deep Breathing combined with rose aromatherapy is a simple, low-cost, and easily implemented intervention that can be applied independently by patients as a supportive strategy alongside standard hypertension treatment. Nevertheless, further studies considering baseline blood pressure values, duration of hypertension, medication use, lifestyle factors, and long-term follow-up are needed to confirm the effectiveness and sustainability of this intervention.

CONCLUSION

The findings of this study showed a significant difference in post-intervention systolic and diastolic blood pressure between the Slow Deep Breathing (SDB) with rose aromatherapy group and the Progressive Muscle Relaxation (PMR) group. Participants who received SDB combined with rose aromatherapy demonstrated lower mean systolic and diastolic blood pressure after the intervention compared with those who received PMR. These results suggest that SDB combined with rose aromatherapy may be a beneficial non-pharmacological intervention for supporting blood pressure reduction among patients with hypertension. Further studies with additional comparative analyses and larger sample sizes are recommended to confirm its clinical effectiveness.

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