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Comparative Effectiveness of Benson Relaxation and Mindfulness Breathing on Blood Pressure Reduction in Hypertensive Patients

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ABSTRACT

Hypertension is a major public health problem and one of the leading risk factors for cardiovascular morbidity and mortality worldwide. Non-pharmacological interventions, such as relaxation and breathing techniques, have been widely explored to complement medical treatment in controlling blood pressure. Benson relaxation and mindfulness breathing are two techniques that may effectively reduce stress and blood pressure through physiological and psychological mechanisms. This study aimed to compare the effectiveness of Benson relaxation and mindfulness breathing interventions in reducing blood pressure among hypertensive patients. A quasi-experimental study was conducted at RSUD Sungai Lilin from February to April 2025. A total of 140 hypertensive patients were selected using total sampling and randomly assigned into two intervention groups: Benson relaxation (n = 70) and mindfulness breathing (n = 70). Interventions were administered regularly for four weeks. Blood pressure was measured before and after the intervention using a standardized sphygmomanometer. Data were analyzed using paired and independent t-tests. Both Benson relaxation and mindfulness breathing significantly reduced systolic and diastolic blood pressure in hypertensive patients ($p < 0.05$). However, the mindfulness breathing group demonstrated a greater mean reduction in both systolic and diastolic blood pressure compared to the Benson relaxation group ($p < 0.05$). Both interventions are effective in reducing blood pressure, but mindfulness breathing shows superior effectiveness compared to Benson relaxation. These findings suggest that mindfulness breathing can be recommended as a complementary non-pharmacological therapy for hypertension management.

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1. INTRODUCTION

Hypertension, often referred to as the "silent killer," remains one of the most pressing global health challenges. According to the World Health Organization (WHO), more than 1.28 billion adults aged 30–79 years are living with hypertension, yet fewer than 20% of them have their condition adequately controlled. Uncontrolled hypertension substantially increases the risk of cardiovascular morbidity and mortality, including stroke, heart failure, ischemic heart disease, and chronic kidney disease [1]. This global burden underscores the urgent need for effective and accessible interventions that go beyond conventional pharmacological management.

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In Asia, the prevalence of hypertension is equally alarming. Studies report that nearly half of adult men (49.4%) and over two-fifths of adult women (43.6%) in the region are hypertensive [2]. Indonesia mirrors this trend, with national surveys showing a prevalence of 34.1% in 2018, and more recent data indicating that hypertension continues to affect around 30.8% of adults in 2023 [3]. Despite its high prevalence, awareness, treatment, and control rates remain critically low, with many patients remaining undiagnosed or non-adherent to therapy [4]. These findings highlight the importance of integrating complementary approaches to strengthen hypertension management in Indonesia.

Hypertension is characterized by persistently elevated systolic and/or diastolic blood pressure, driven by multifactorial causes such as genetic predisposition, unhealthy diet, sedentary lifestyle, obesity, stress, and aging [5]. While pharmacological therapy plays a central role in treatment, non-pharmacological strategies particularly lifestyle modification, relaxation, and stress reduction are essential adjuncts in preventing complications and improving patient outcomes [6]. Therefore, exploring effective behavioral interventions is a critical step in advancing holistic and sustainable hypertension care.

Among such interventions, Benson relaxation and mindfulness breathing have gained attention for their effectiveness in reducing stress and lowering blood pressure. Benson relaxation induces the "relaxation response," characterized by reduced sympathetic activity, lower oxygen consumption, and improved cardiovascular regulation [7]. Meanwhile, mindfulness breathing, a form of mindfulness-based intervention, enhances awareness of breathing patterns, reduces anxiety, and promotes autonomic balance, which in turn contributes to blood pressure reduction [8]. Both techniques are simple, cost-effective, and feasible for clinical as well as community settings, making them valuable complementary therapies for hypertension management.

A preliminary assessment at RSUD Sungai Lilin revealed that hypertensive patients practicing relaxation techniques experienced reductions in both systolic and diastolic blood pressure. These findings motivated a structured comparative investigation of Benson relaxation and mindfulness breathing within this population. Understanding which method yields superior outcomes will provide evidence-based recommendations for incorporating non-pharmacological interventions into hypertension care in Indonesian hospitals, particularly in resource-limited settings.

2. METHOD

2.1 Study Design

This study employed a quasi-experimental design with a pretest–posttest control group approach to evaluate the comparative effectiveness of Benson relaxation and mindfulness breathing interventions on blood pressure reduction in hypertensive patients. This design was chosen because it allows researchers to examine both within-group changes (pre–post intervention) and between-group differences, thereby improving the robustness of findings compared with a single-group design. Quasi-experimental approaches are widely used in clinical nursing and behavioral research where full randomization and blinding are not always feasible, yet valid comparisons are still achievable [9],[10].

2.2 Setting and Duration

The study was conducted at RSUD Sungai Lilin, Musi Banyuasin Regency, South Sumatra, Indonesia**,** from February to April 2025. This hospital was selected as the research site because of its high patient load of hypertension cases, accessibility for implementing structured non-pharmacological interventions, and supportive management environment for clinical research. The duration of three months was considered sufficient to recruit participants, deliver interventions, and collect outcome data.

2.3 Participants

The study population consisted of all patients with hypertension attending the outpatient clinic of RSUD Sungai Lilin during the study period. Inclusion criteria were: (1) diagnosed with hypertension by a physician, (2) aged between 30 and 65 years, (3) baseline systolic blood pressure ≥140 mmHg and/or diastolic ≥90 mmHg, (4) on stable antihypertensive medication for at least two weeks prior to enrollment, and (5) willingness to participate, as indicated by signing an informed consent form. Exclusion criteria included: (1) presence of severe complications such as heart failure, stroke, or chronic kidney disease, (2) cognitive, psychiatric, or hearing impairments that could hinder comprehension of the intervention, and (3) concurrent participation in other relaxation or mindfulness programs.

A total sampling technique was used, whereby all eligible patients meeting the criteria during the study period were invited to participate, resulting in 140 participants. Random allocation into two intervention groups Benson relaxation (n = 70) and mindfulness breathing (n = 70) was performed using a computer-generated randomization list. Randomization ensured balance in baseline characteristics and minimized selection bias.

2.4 Interventions

Participants in the Benson relaxation group were instructed to perform relaxation sessions based on the original protocol developed by Herbert Benson [11]. The procedure involved sitting comfortably, closing the eyes, progressively relaxing muscles, breathing slowly and naturally, and silently repeating a calming word such as "peace" with each exhalation. Each session lasted 20 minutes, performed once daily for four weeks. The first week was supervised directly by trained research staff, after which participants continued independently at home with weekly follow-up monitoring.

The mindfulness breathing group received instruction based on mindfulness-based stress reduction (MBSR) techniques described by [12],[13]. Participants were guided to focus attention on their breathing, observing the natural rhythm of inhalation and exhalation, acknowledging distractions non-judgmentally, and gently returning focus to the breath. Each session lasted 20 minutes, conducted daily for four weeks, with the first week supervised and the remaining sessions practiced independently at home under weekly monitoring. Both groups continued receiving routine pharmacological treatment prescribed by their physicians, ensuring that the interventions were evaluated as complementary rather than alternative therapies.

2.5 Instruments and Measurement

The primary outcome variable was blood pressure, measured using a calibrated standardized digital sphygmomanometer, which is widely validated for clinical and research use. Measurements were performed at two time points: before the start of the intervention (pretest) and after the four-week intervention period (posttest). To ensure reliability, blood pressure was measured in the morning after at least five minutes of rest, in a sitting position, with the arm supported at heart level. Two consecutive readings were taken, and the average was recorded as the final measurement. In addition to blood pressure, demographic and clinical characteristics such as age, sex, body mass index (BMI), duration of hypertension, and medication use were collected at baseline to describe the study sample.

2.6 Data Collection Procedure

At enrollment, eligible participants were screened, and baseline data including demographic and clinical profiles were obtained. Pretest blood pressure measurements were then taken prior to the first intervention session. Participants subsequently underwent their assigned intervention (Benson relaxation or mindfulness breathing) for four consecutive weeks, practicing daily as instructed. Compliance was encouraged through weekly monitoring by the research team, which included home visits and phone reminders. At the conclusion of the intervention period, posttest blood pressure was measured following the same standardized procedure used at baseline.

2.7 Data Analysis

All statistical analyses were performed using statistical software. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize baseline demographic and clinical characteristics. To assess within-group changes in blood pressure (pretest vs. posttest), the paired t-test was applied. Between-group differences in mean blood pressure reduction (Benson relaxation vs. mindfulness breathing) were analyzed using the independent t-test**.** A p-value < 0.05 was considered statistically significant. The choice of parametric tests was justified by the continuous nature of the outcome variables and the normal distribution of the data, which was verified using the Shapiro-Wilk test [14],[15].

2.8 Ethical Considerations

The research has obtained ethical approval from the Medical and Health Research Ethics Commission, Faculty of Medicine, Sriwijaya University, based on ethical certificate 093-2025. Throughout the research process, the researcher adhered to the principles of information ethics, including consent, respect for human rights, beneficence, and non-maleficence.

3. RESULTS AND DISCUSSION

3.1 RESULT

3.1.1. Sociodemographic Characteristics

Table 1. Baseline Characteristics of Participants (N = 140)

Variable	Benson Relaxation (n = 70)	Mindfulness Breathing (n = 70)	p-value
Age (years), mean ± SD	52.6 ± 7.8	53.1 ± 8.2	0.68
Gender (Male), n (%)	32 (45.7)	30 (42.9)	0.72
BMI (kg/m²), mean ± SD	26.4 ± 3.1	26.1 ± 3.3	0.55
Duration of HTN (years)	6.2 ± 3.4	6.5 ± 3.6	0.60
Medication use (%)	70 (100)	70 (100)	–

Table 1 presents the sociodemographic and clinical characteristics of hypertensive patients in both groups. A total of 140 participants were enrolled, equally divided between the Benson relaxation group (n = 70) and the mindfulness breathing group (n = 70). Both groups were comparable in terms of age, gender, body mass index (BMI), and duration of hypertension, with no statistically significant differences observed ($p > 0.05$).

3.1.2. Effect of Benson Relaxation on Blood Pressure

Table 2. Pretest and Posttest Blood Pressure in the Benson Relaxation Group (n = 70)

Blood Pressure	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Mean Reduction ± SD	p-value
Systolic (mmHg)	152.8 ± 10.2	142.6 ± 9.5	10.2 ± 4.1	<0.001
Diastolic (mmHg)	94.3 ± 6.8	87.5 ± 6.2	6.8 ± 3.6	<0.001

Table 2 presents the pretest and posttest blood pressure values in the Benson relaxation group. After four weeks of intervention, both systolic and diastolic blood pressure decreased significantly compared to baseline ($p < 0.001$).

3.1.3. Effect of Mindfulness Breathing on Blood Pressure

Table 3. Pretest and Posttest Blood Pressure in the Mindfulness Breathing Group (n = 70)

Blood Pressure	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Mean Reduction ± SD	p-value
Systolic (mmHg)	153.1 ± 9.8	140.1 ± 8.7	13.0 ± 4.5	<0.001
Diastolic (mmHg)	94.5 ± 7.0	85.8 ± 6.1	8.7 ± 3.8	<0.001

Table 3 shows the blood pressure changes in the mindfulness breathing group. After four weeks, both systolic and diastolic blood pressure significantly decreased compared to pretest values ($p < 0.001$).

3.1.4. Comparative Effectiveness between Benson Relaxation and Mindfulness Breathing

Table 4. Comparison of Mean Blood Pressure Reduction between Groups

Blood Pressure	Benson Relaxation (Mean ± SD)	Mindfulness Breathing (Mean ± SD)	p-value
Systolic (mmHg)	10.2 ± 4.1	13.0 ± 4.5	0.002
Diastolic (mmHg)	6.8 ± 3.6	8.7 ± 3.8	0.005

Table 4 shows that the mindfulness breathing group achieved significantly greater reductions in both systolic and diastolic blood pressure compared to the Benson relaxation group ($p < 0.05$). This suggests that although both techniques were effective, mindfulness breathing provided superior benefits in regulating blood pressure through enhanced autonomic and stress response control.

3.2 DISCUSSION

The findings of this study demonstrate that both Benson relaxation and mindfulness breathing interventions significantly reduced systolic and diastolic blood pressure in hypertensive patients after four weeks of practice. Participants in the Benson relaxation group experienced mean reductions of 10.2 mmHg in systolic and 6.8 mmHg in diastolic blood pressure, while the mindfulness breathing group achieved even greater reductions of 13.0 mmHg and 8.7 mmHg, respectively. These results indicate that although both techniques are effective, mindfulness breathing provides superior benefits in lowering blood pressure ($p < 0.05$). The comparable baseline characteristics between groups strengthen the validity of this comparative effectiveness finding.

The observed reduction in blood pressure following Benson relaxation can be explained by its mechanism of activating the relaxation response, which reduces sympathetic nervous system activity and enhances parasympathetic dominance, leading to vasodilation and lowered peripheral resistance [16],[17,][18]. Similarly, mindfulness breathing works by fostering present-moment awareness and intentional focus on breathing, thereby reducing stress, regulating autonomic nervous system activity, and improving cardiovascular function [19],[20]. These mechanisms suggest that both techniques operate through modulation of stress-related physiological responses, which are strongly implicated in the pathophysiology of hypertension.

Previous studies support these findings. A randomized trial by [21]. reported significant reductions in blood pressure among hypertensive patients practicing relaxation techniques, aligning with the present study's Benson relaxation results. Likewise, [22].found that mindfulness-based interventions, particularly breathing-focused practices, were associated with greater blood pressure reductions and improved heart rate variability, consistent with the superior effect of mindfulness breathing in this study. Furthermore, a systematic review by [23]. confirmed that mindfulness practices not only reduce blood pressure but also improve stress resilience and psychological well-being, which may indirectly contribute to better cardiovascular outcomes.

The superior effect of mindfulness breathing compared to Benson relaxation in this study may be attributed to its dual impact on both physiological and psychological pathways. While Benson relaxation primarily targets the physiological relaxation response, mindfulness breathing incorporates cognitive regulation by cultivating nonjudgmental awareness and reducing maladaptive stress reactivity [8]. This comprehensive regulation likely enhances blood pressure control more effectively. Moreover, mindfulness breathing may improve adherence and engagement because it can be integrated into daily activities, unlike Benson relaxation which often requires a structured environment.

From a clinical perspective, the findings suggest that mindfulness breathing may be considered a more effective complementary intervention for hypertension management. However, both techniques remain valuable, especially in low-resource settings where pharmacological adherence is inconsistent. The study assumes that consistent practice was maintained during the four-week intervention, although variations in individual adherence and lifestyle factors could have influenced outcomes. Future research should examine long-term effects, explore combinations with other lifestyle modifications, and assess feasibility in community-based settings to enhance generalizability.

4. STRENGTHS AND LIMITATIONS

The present study has several strengths and limitations. A major strength is its comparative design, which allowed direct evaluation of the effectiveness of Benson relaxation and mindfulness breathing in reducing blood pressure, providing valuable insights into non-pharmacological interventions for hypertension management. The randomized allocation and equal sample size in both groups (n = 70 each) enhanced comparability and minimized selection bias, while the use of standardized procedures increased the reliability of findings. Additionally, the significant results highlight the potential of simple, low-cost, and accessible relaxation techniques as adjuncts to conventional hypertension therapy. However, this study also has limitations. The relatively short intervention period of four weeks may not fully capture long-term sustainability of blood pressure reduction. The reliance on a single hospital setting (RSUD Sungai Lilin) limits generalizability to broader populations. Furthermore, all participants were on antihypertensive medication, making it difficult to isolate the pure effects of the interventions. Self-reported adherence to the techniques also introduces the possibility of reporting bias. Despite these limitations, the findings provide strong preliminary evidence supporting the integration of relaxation and mindfulness-based interventions into holistic hypertension care.

5. CONCLUSION AND SUGGESTIONS

This study concluded that both Benson relaxation and mindfulness breathing effectively reduced systolic and diastolic blood pressure in hypertensive patients, with mindfulness breathing demonstrating significantly greater reductions, likely due to its stronger impact on autonomic regulation and stress response. These findings highlight the potential of relaxation-based interventions as complementary, non-pharmacological strategies to support standard hypertension management. It is therefore suggested that healthcare providers integrate these techniques, particularly mindfulness breathing, into nursing care and patient education programs, while future studies should investigate long-term effects, broader populations, and patient adherence to ensure sustainability and maximize clinical benefits.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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