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An Interventional Study to assess the effectiveness of Diaphragmatic Breathing Exercise to Blood Pressure, and improves Quality of life among Elderly Hypertensive Patients at Selected Hospital.

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Abstract: *Hypertension and stress are common among elderly individuals and contribute significantly to morbidity and mortality. Diaphragmatic breathing exercise, a simple and cost-effective non-pharmacological intervention, is known to promote relaxation and autonomic balance. The present study aimed to assess the effectiveness of diaphragmatic breathing exercise on blood pressure and stress among elderly hypertensive patients. A total of 50 elderly hypertensive patients participated in the study, and data on demographic variables, clinical characteristics, blood pressure, and stress levels were collected using structured tools. The participants underwent a four-week diaphragmatic breathing exercise programme, after which post-test blood pressure and stress levels were assessed. The collected data were computerized and analysed using SPSS version 25, employing descriptive statistics such as frequency, mean, and standard deviation, along with inferential statistics including paired t-test and chi-square test. The results revealed a significant reduction in systolic blood pressure (mean difference = 4.48, p = 0.000), diastolic blood pressure (mean difference = 0.60, p = 0.013), and stress scores (mean difference = 22.98, p = 0.000). High stress levels reduced from 90% in the pre-test to 0% in the post-test, and Stage 1 hypertension declined from 44% to 38% following the intervention. Significant associations were observed between pre-test blood pressure and selected demographic and clinical variables, while stress levels were significantly associated with gender and body mass index (p < 0.05). The findings conclude that diaphragmatic breathing exercise is an effective non-pharmacological intervention for reducing blood pressure and stress among elderly hypertensive patients.*

Keywords: *Hypertension, Stress, Diaphragmatic Breathing exercise, Elderly Hypertensive Patients, South India.*

1. INTRODUCTION:

Hypertension is a major public health problem affecting elderly populations across the globe and remains one of the leading causes of cardiovascular morbidity and mortality. It is clinically defined as a systolic blood pressure (SBP) of ≥140 mmHg and/or a diastolic blood pressure (DBP) of ≥90 mmHg among individuals aged 60 years and above [(1).] Hypertension is often termed the "silent killer" because it frequently remains asymptomatic for long periods, leading to delayed diagnosis and treatment. When left uncontrolled, it significantly increases the risk of severe complications such as stroke, coronary artery disease, myocardial infarction, chronic kidney disease, and premature death [(2).]

The prevalence of hypertension increases markedly with advancing age due to age-related physiological and structural changes within the cardiovascular system. These changes include reduced vascular elasticity, increased arterial stiffness, endothelial dysfunction, and diminished baroreceptor sensitivity, all of which impair the body's ability to regulate blood pressure effectively [(3).] Additionally, the elderly often experience multiple comorbidities and polypharmacy, further complicating hypertension management and increasing the risk of adverse outcomes.

In India, hypertension among the elderly has emerged as a growing public health concern, largely attributed to rapid urbanization, changing dietary habits, reduced physical activity, obesity, and psychosocial stress [(4).] States such as Tamil Nadu have reported a steadily increasing prevalence of hypertension among older adults, particularly in semi-urban and rural areas where access to preventive healthcare services, regular screening, and lifestyle counseling remains limited

[5]. This rising burden places a significant strain on healthcare systems and highlights the urgent need for cost-effective and easily implementable interventions.

Chronic stress is recognized as an important modifiable risk factor for hypertension, especially among the elderly. Persistent stress activates the hypothalamic–pituitary–adrenal axis and the sympathetic nervous system, leading to increased secretion of cortisol and catecholamines such as adrenaline and noradrenaline. These hormonal responses result in vasoconstriction, increased heart rate, and sustained elevation of blood pressure, thereby worsening hypertensive status and cardiovascular risk [6].

Diaphragmatic breathing is a simple, non-pharmacological relaxation technique that involves slow, deep breathing with an emphasis on abdominal movement. This technique has been shown to modulate autonomic nervous system activity by reducing sympathetic tone and enhancing parasympathetic activity, leading to decreased heart rate, reduced blood pressure, and improved emotional regulation [7,8]. Regular practice of diaphragmatic breathing has also been associated with reductions in stress, anxiety, and fatigue, along with improvements in sleep quality and overall quality of life among individuals with hypertension [9].

Given the increasing prevalence of hypertension and stress among the elderly, particularly in resource-limited settings, there is a growing need to explore safe, effective, and non-invasive interventions that can complement pharmacological management. Diaphragmatic breathing exercises are easy to learn, inexpensive, and can be practiced independently, making them especially suitable for elderly populations. Therefore, the present study was undertaken to evaluate the effectiveness of diaphragmatic breathing exercise in blood pressure and improves quality of life among elderly hypertensive patients.

2. MATERIALS & METHODS:

Design: A Pre - Experimental design with one group pre and posttest research design was adapted for the present study.

Sample Size: 50 Elderly Hypertensive Patients were selected for the study.

Sampling Technique: Convenient sampling technique was used to select the samples.

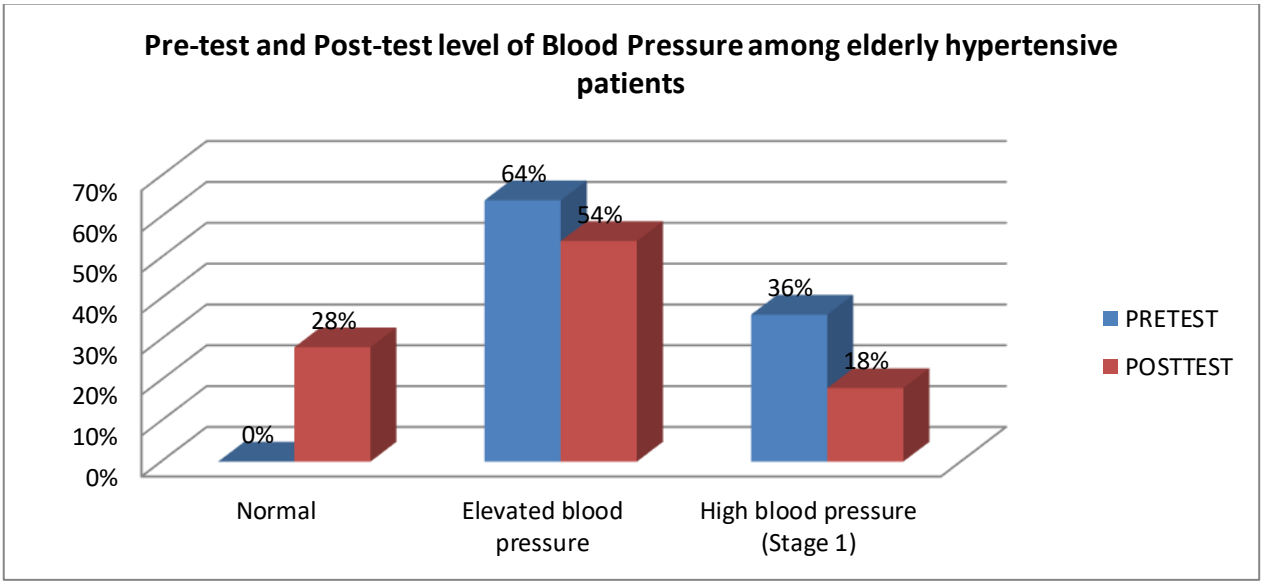
Data collection Procedure: The research proposal was submitted to the IEC for ethical clearances. Before the collection of data formal consent and permission was obtained from Head of the institution. Prior to data collection, participant information sheets were provided, and written informed consent was obtained from all elderly hypertensive patients. Baseline (pretest) blood pressure was assessed using the American Heart Association blood pressure classification, and quality of life was measured using the World Health Organization Quality of Life–BREF (WHOQOL-BREF) scale. The intervention consisted of diaphragmatic breathing exercise, and its role in reducing blood pressure and improving quality of life was explained to the participants. The investigator taught and demonstrated the diaphragmatic breathing technique and supervised the participants while they practiced the exercise for 30 minutes each morning. Participants were also instructed to perform the same exercise independently in the evening, making it a total of 30 minutes twice daily for a duration of one month. A post-test assessment was conducted on the 30th day following the completion of the diaphragmatic breathing exercise programme. After the intervention, blood pressure and quality of life levels were reassessed using the same standardized tools. The collected data were computerized and analyzed using SPSS version 25, employing descriptive statistics such as frequency distribution, mean, and standard deviation, along with inferential statistics including paired t-test and chi-square test.

3. RESULTS:

The demographic analysis revealed that the most elderly hypertensive patients were aged 60–65 years (36.0%), with a slightly higher proportion of females (52.0%) than males. The majority had primary school education (42.0%) and were unemployed (48.0%), indicating lower educational and occupational status. Most participants followed a mixed diet (80.0%) and had long-standing hypertension of more than 20 years (38.0%). A large proportion had no family history of hypertension (76.0%). Notably, 92.0% of the participants reported one or more habits such as smoking, alcohol consumption, or tobacco use, which may contribute to hypertension.

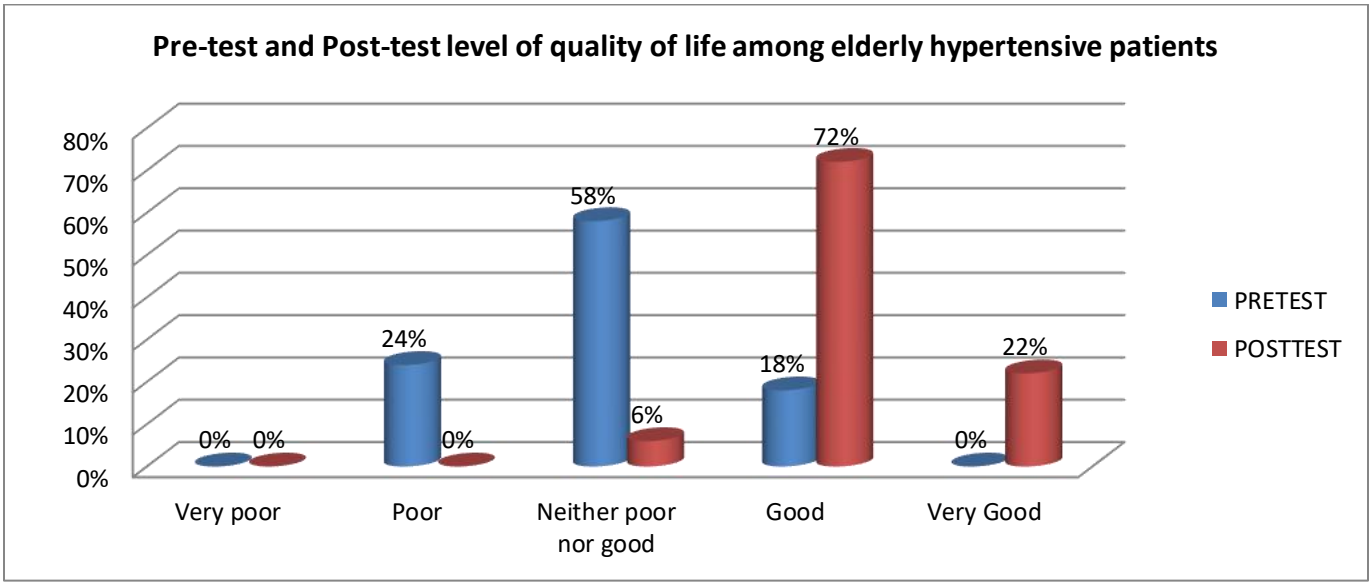
Frequency and percentage distribution of pretest and post test level of Blood Pressure among elderly hypertensive patients. (Figure 1)

Figure 1: Percentage distribution of pretest and post test level of Blood Pressure among elderly hypertensive patients.



Frequency and percentage distribution of pretest and post test level of quality of life among elderly hypertensive patients. (Figure 2)

Figure 2: Percentage distribution of pretest and post test level of quality of life among elderly hypertensive patients.



The statistical analysis showed significant reductions in both systolic and diastolic blood pressure, as well as a remarkable increase in quality of life scores. The highly significant *p*-values ($p < 0.001$) indicate strong evidence that diaphragmatic breathing exercises effectively reduce blood pressure and improve the quality of life. **(Table 1)**

Table no-1: Effectiveness of Diaphragmatic breathing exercise to blood pressure and quality of life among elderly hypertensive patients (N=50)

Measurement	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	t-value	df	p-value
Systolic BP	130.50 ± 8.10	122.60 ± 6.90	7.90	9.420	49	**0.001****
Diastolic BP	83.40 ± 5.70	80.20 ± 4.10	3.20	7.015	49	**0.001****
Quality of Life Score	52.58 ± 18.11	105.04 ± 10.07	52.46	15.760	49	**0.001****

-p < 0.001 highly significant,* p < 0.05 significant

Chi-square analysis showed statistically significant associations between pre-test blood pressure and variables such as age (p = 0.017), gender (p = 0.038), education (p = 0.030), and income (p = 0.009). For quality of life, significant associations were found with gender (p = 0.017) and education (p = 0.050)

4. DISCUSSION:

A Pre - Experimental design with one group pre and post test research design was used to this study. Total of 50 Elderly Hypertensive Patients were selected convenient sampling technique. The pre-test data showed that 64% of participants had elevated blood pressure and 36% had Stage 1 hypertension. Post-intervention, 28% of participants achieved normal blood pressure, 54% remained at the elevated level, and only 18% had Stage 1 hypertension. This notable shift toward normal ranges suggests that diaphragmatic breathing exercises helped regulate blood pressure effectively. These findings are in line with those of Bhavanani et al., who demonstrated that slow breathing techniques like Sukha Pranayama significantly reduced blood pressure and heart rate in hypertensive individuals [7]. In terms of quality of life, the pre-test revealed that 24% of participants rated their life as "poor" and 58% as "neither poor nor good". Post-test findings showed that 72% rated their quality of life as "good", and 22% as "very good", with no participants remaining in the "poor" category. This improvement highlights the psychological and emotional benefits of diaphragmatic breathing in addition to its physiological impact. These results support the work of Srinivasan and Rajkumar, who found that slow breathing techniques significantly enhanced overall well-being in hypertensive patients [9]. The statistical analysis showed significant reductions in both systolic and diastolic blood pressure, as well as a remarkable increase in quality of life scores. The highly significant *p*-values ($p < 0.001$) indicate strong evidence that diaphragmatic breathing exercises effectively reduce blood pressure and improve the quality of life. These findings are supported by Garg et al. [8], who found that breathing exercises modulate the autonomic nervous system, reduce sympathetic activity, and improve baroreflex sensitivity. Chi-square analysis showed statistically significant associations between pre-test blood pressure and variables such as age (p = 0.017), gender (p = 0.038), education (p = 0.030), and income (p = 0.009). For quality of life, significant associations were found with gender (p = 0.017) and education (p = 0.050). These findings align with data from the NFHS-5 [5] and WHO [10], both of which highlight the impact of sociodemographic factors on health outcomes. They also reinforce the idea that individualized non-pharmacological interventions may be more effective when tailored to patients' educational and economic backgrounds.

5. CONCLUSION:

The study concludes that diaphragmatic breathing exercises are an effective non-pharmacological intervention for elderly hypertensive patients. The intervention resulted in a statistically significant reduction in both systolic and diastolic blood pressure. A notable improvement in quality of life scores was also observed, reflecting enhanced physical and psychological well-being. The benefits of the intervention were evident across various demographic variables such as age, gender, and educational status. Overall, diaphragmatic breathing can be safely recommended as a simple, cost-effective strategy for the management of hypertension among the elderly.

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