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A Study to assess the effectiveness of Diaphragmatic Breathing Exercise to Decrease Blood Pressure, and Stress among Elderly Hypertensive Patients at Selected Hospital, South India.

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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 among the elderly is an increasing global public health concern and is now widely prevalent in society. It is defined as a systolic blood pressure of ≥140 mmHg and/or a diastolic blood pressure of ≥90 mmHg in individuals aged 60 years and above. (1)

Often referred to as a "silent killer," hypertension frequently presents without symptoms, leading to delayed diagnosis and treatment until severe complications, such as coronary artery disease, stroke, kidney failure, or even death, occur. The elderly are particularly vulnerable to these complications due to the natural aging process, which causes the body's ability to repair and regenerate tissue to decline. (2)

The global prevalence of hypertension has increased over the past four decades, with urban populations more affected than rural ones. According to the World Health Organization (WHO), approximately 1.13 billion people worldwide are affected, and this figure is expected to reach 1.5 to 1.6 billion by 2025. In Indonesia alone, hypertension prevalence increased from 25.8% to 34.1% between 2013 and 2018.(3)

Several biological, psychological, and social determinants contribute to hypertension in the elderly. These include age, gender, genetics, lifestyle factors such as obesity, alcohol consumption, smoking, stress, high salt intake, and limited physical activity. Stress, in particular, has been found to elevate blood pressure due to the release of hormones like adrenaline and cortisol, which increase heart rate and constrict blood vessels. Prolonged exposure to stress can further disrupt multiple body systems and increase the risk of cardiovascular events.(4)

Age-related physiological changes, such as decreased elasticity of blood vessels, increased sodium sensitivity, and arterial stiffness, also contribute to the development of isolated systolic hypertension in older adults. The prevalence of hypertension increases significantly with age, affecting more than 50% of individuals over 60 years and approximately 93% of those aged 80 years. The elderly living in rural and underserved areas are particularly vulnerable due to limited access to healthcare services, low health literacy, and socio-economic constraints. [5]

Hypertension is a major risk factor for cardiovascular and cerebrovascular diseases, which are the leading causes of morbidity and mortality worldwide. In low- and middle-income countries, deaths from these diseases are up to three times higher than in high-income countries. These outcomes are often preventable through early detection, lifestyle modifications, stress management, and adherence to antihypertensive medications. Non-pharmacological interventions like diaphragmatic or deep breathing exercises have been shown to support cardiovascular health and manage stress. Deep breathing, a simple and low-cost relaxation technique rooted in ancient yoga practices, can improve pulmonary function, respiratory muscle strength, and cardiorespiratory fitness, especially in older patients with cardiopulmonary diseases.[6]

Given the high burden of hypertension among the elderly and its severe consequences, it is crucial to implement preventive and control strategies, including routine blood pressure monitoring, healthy lifestyle promotion, psychological support, and equitable access to healthcare. Hence, the researcher was interested in evaluating the effectiveness of diaphragmatic breathing exercise as an adjunctive therapeutic measure to reduce blood pressure and stress among elderly hypertensive patients.

2. MATERIALS & METHODS:

Design: A Quasi - Experimental design with one group pre and post test research design was adapted for the present study.

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

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

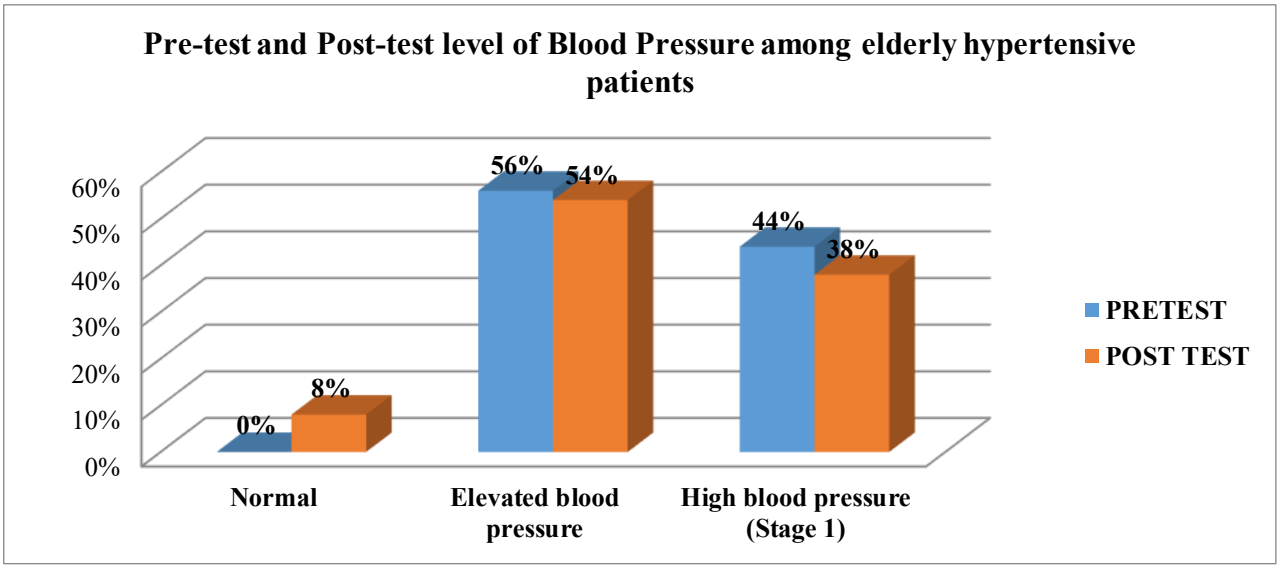
Data collection Procedure: The research proposal was submitted to the IEC for ethical clearances. Before the collection of data formal consent and permission was obtained from Head of the institution. After getting Institutional Research committee and Institutional Ethical committee clearance and written permission from concerned higher authority of the institution a brief introduction about the procedure and purpose of the study was given to the study participants. Individual consent both verbal and written was obtained from Elderly Hypertensive Patients. Demographic and clinical variables were collected using Interview schedule. Pre- test assessment of the level of blood pressure and stress among elderly hypertensive patients. American Heart Association Blood pressure category was used to assess the blood pressure and The Perceived Stress Scale (PSS) is a classic stress assessment instrument was used to assess the level of stress among elderly hypertensive patients.The intervention is Diaphragmatic breathing exercise and its role in reduction of blood pressure and stress was explained to Elderly Hypertensive Patients. Then the investigator taught, demonstrated and made the subjects to practice Diaphragmatic breathing exercise 30 minutes daily in the morning in front of the investigator and asked them to perform this exercise in the evening also, for 1 month duration i.e.30 minutes twice daily. Post test was conducted to them on 30th day after the performance of Diaphragmatic breathing exercise. After intervention Post- test assessment of the level of blood pressure and stress among elderly hypertensive patients were assessed. The collected data were computerized and analyzed using SPSS version 25. The data was analyzed using descriptive statistics (distribution, mean, standard deviation) and inferential statistics (paired t test, and chi-square value test).

3. RESULTS:

The demographic analysis revealed that the majority of participants were between 60–65 years (32%), and a slightly higher proportion were females (52%) than males (48%). Most had primary school education (42%) and were unemployed (48%), indicating a potential lack of health awareness and financial independence, which may contribute to poor hypertension control. Regarding the clinical profile, a significant proportion had hypertension for more than 20 years (38%) and suffered from comorbid illnesses like nephrological (32%) and diabetic conditions (26%). Additionally, lifestyle habits such as tobacco use (30%) and alcohol consumption (22%) were common.

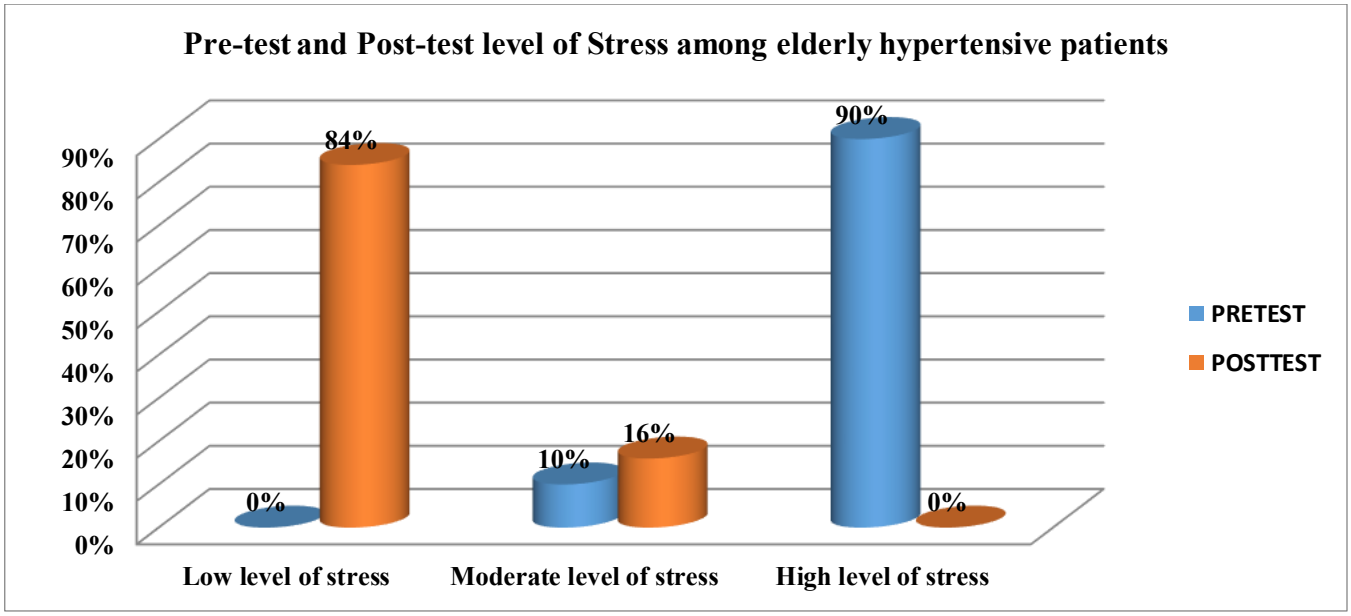
Frequency and percentage distribution of pretest and post test level of Blood Pressure among elderly hypertensive patients. (Figure 1)

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 stress among elderly hypertensive patients. (Figure 2)

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



This reduction in systolic (from 129.92 ± 1.77 to 125.44 ± 4.15) and diastolic pressure (from 80.70 ± 1.75 to 80.10 ± 0.71) was statistically significant ($p < 0.05$). Stress levels significantly declined after the intervention, with 84% reporting low stress levels post-test, compared to 90% experiencing high stress pre-test. The mean stress score dropped from 33.80 ± 6.67 to 10.82 ± 3.15, a substantial and statistically significant difference ($p < 0.001$). **(Table 1)**

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

Measurement	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	t-value	df	p-value
Systolic BP	129.92 ± 1.77	125.44 ± 4.15	4.48	6.672	49	0.001**
Diastolic BP	80.70 ± 1.75	80.10 ± 0.71	0.60	2.585	49	0.013*
Stress Score	33.80 ± 6.67	10.82 ± 3.15	22.98	23.242	49	0.001**

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

The chi-square analysis demonstrated a significant association between pre-test blood pressure and variables such as age, gender, education, occupation, income, diet, duration of hypertension, family history, habits, comorbid illness, BMI, physical activity, sleep, and medication usage ($p < 0.05$).

4. DISCUSSION:

A Quasi - Experimental design with one group pre and post test research design was used to this study. Total of 50 Elderly Hypertensive Patients were selected purposive sampling technique. The pre-test blood pressure readings showed that 56% of the participants were in the "elevated" range, and 44% were in Stage 1 hypertension. Post-intervention, there was a shift toward normalcy, with 8% achieving normal blood pressure levels. This reduction in systolic (from 129.92 ± 1.77 to 125.44 ± 4.15) and diastolic pressure (from 80.70 ± 1.75 to 80.10 ± 0.71) was statistically significant ($p < 0.05$). These findings align with Murniati Muchtar (2023) [7], who reported that slow deep breathing exercises significantly reduced blood pressure in elderly hypertensive patients, with a pre-intervention average of 149/100 mmHg and a post-intervention average of 140/92 mmHg ($p = 0.001$).

Stress levels significantly declined after the intervention, with 84% reporting low stress levels post-test, compared to 90% experiencing high stress pre-test. The mean stress score dropped from 33.80 ± 6.67 to 10.82 ± 3.15, a substantial and statistically significant difference ($p < 0.001$). This aligns with Sapam Debika Devi et al. (2023) [4], who found that in the pre-test experimental group, most respondents experienced severe stress (0.25%), while in the post-test, stress levels reduced, with 0.55% in mild, 0.4% in moderate, and only 0.05% in severe stress levels.

The chi-square analysis demonstrated a significant association between pre-test blood pressure and variables such as age, gender, education, occupation, income, diet, duration of hypertension, family history, habits, comorbid illness, BMI, physical activity, sleep, and medication usage ($p < 0.05$). Conversely, only gender and BMI were significantly associated with pre-test stress levels. This indicates that while multiple factors affect blood pressure, psychological stress in the elderly may be more influenced by individual physiology and gender-based roles or expectations, particularly in traditional or rural communities. Similar findings were reported by Diógenes Alexandre da Costa Lopes et al. (2020) [8], who found that the intervention group was significantly older than the control group ($p < 0.05$).

5. CONCLUSION:

The study concludes that diaphragmatic breathing exercises are effective in significantly reducing blood pressure and stress levels among elderly hypertensive patients. The intervention showed improvement in both systolic and diastolic blood pressure, along with a notable decrease in stress. These findings highlight the importance of incorporating simple, non-pharmacological techniques like breathing exercises in managing hypertension and enhancing mental well-being in the elderly.

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