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## To study immediate effect of slow and fast pranayama on blood pressure in pre hypertensive postmenopausal women

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### Abstract

**Aim:** To study the immediate effect of slow and fast pranayama of blood pressure in prehypertensive postmenopausal women.

**Need of study:** Many studies have shown effect of slow and fast pranayama on blood pressure; hence both the pranayama have different effects on cardiovascular function. Therefore there is need to compare immediate effect of slow and fast pranayama on blood pressure in prehypertensive postmenopausal women.

**Study design:** Experimental study.

**Procedure:** Ethical approval was taken. Patients were divided in two groups with random allocation 6 Group 1 (n=30) patients practiced following group fast pranayama, Kapalbhathi, Bhastrika, Kukkriya Group 2 (n=30) patients practiced following group of slow pranayama Nadishodhana, Pranava, Savitri. After coming to OPD patients were given 10 min of rest either in supine or sitting. Pre vitals were taken (systolic and diastolic BP) Pranayama training was given to the patients in a quiet room. Group 1 and group 2 subjects were given pranayama training. Post vitals were taken.

**Result:** data was analyzed by paired 't' test for intra group comparison and unpaired 't' test was done for inter group comparison. Statistical analysis shows that fast pranayama has more immediate effect on blood pressure in prehypertensive postmenopausal women.

**Conclusion:** The present study concludes that slow pranayama and fast pranayama have significant immediate effect in lowering systolic blood pressure. Also comparatively fast pranayama is more effective than slow pranayama in immediate lowering systolic blood pressure in prehypertensive postmenopausal women. However diastolic blood pressure remains unchanged in slow pranayama whereas it decreases slightly in fast pranayama as rate of breathing increases.

**Keywords:** Pranayama, blood pressure, prehypertensive, postmenopausal

### Introduction

The best way to generate abundant energy and vitality is through practice of Pranayama. Prana refers to vital force pervading the entire universe and representing principle of cosmic energy [1]. In normal breathing, our intake of Prana is very little. The techniques innovated in this regard are called Pranayama [1].

Yama denotes to control and Prana refers to life force. Pranayama is control of bioenergy through the respiratory system [1].

It may be defined as a systemic approach designed to bring about perfect control over flow of Prana throughout body by application of certain methods and techniques achieved through the regulation of physical breathing [1].

Pranayama consists of three phases 'Puraka' means inhalation, 'Kumbhaka' means retention and 'Rechaka' means exhalation. Previous studies have shown both slow and fast pranayama have effect on various components like stress, blood pressure in normal individuals but both slow and fast produces different physiological cardiovascular effects on healthy individuals. Studies done on slow pranayama like Nadishudhi, Pranava and Savitri when practiced alone showed decrease in heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP) and increase in pulse pressure [3].

While some studies done on fast pranayama like Kapalbhathi, Bhastrika showed increase in sympathetic activity thereby increase in HR, SBP, DBP and some studies showed that it decreases sympathetic activity and decrease in HR, SBP and DBP [4].

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After menopause (age group 40-55) the prevalence of hypertension in women is higher. Hypertension is major risk factor for cardiovascular disease in women which has been leading cause of death nowadays.

One of the mechanism by which BP maybe increased in postmenopausal women is activation of renin angiotensin system increases blood pressure. Presence of obesity increases blood pressure [7]. Lack of estrogens' and androgen. Increase in blood pressure due to anxiety and depression. Chicago, IL National guidelines, known as seventh report of Joint National Committee (JNC) on prevention, detection, evaluation and treatment of high blood pressure [2].

In Prehypertension, the systolic blood pressure is 120-139 mmHg and diastolic blood pressure is 80-89 mmHg [2]. Pre hypertension is a warning sign that you may get high blood pressure in the future. High blood pressure increases risk of heart attack, stroke, coronary heart disease, heart failure and kidney failure [2].

### Need of study

Many studies have shown effect of slow and fast pranayama on blood pressure; hence both the pranayama have different effects on cardiovascular function. Therefore, there is need to find whether slow and fast pranayama has greater immediate effect on blood pressure in prehypertensive postmenopausal women.

### Aim

To study the immediate effect of slow and fast pranayama of blood pressure in prehypertensive postmenopausal women.

### Objectives

1. To study the immediate effect of slow pranayama on blood pressure in prehypertensive postmenopausal women.
2. To study the immediate effect of fast pranayama on blood pressure in prehypertensive postmenopausal women.
3. To compare immediate effect of slow and fast pranayama on blood pressure in prehypertensive postmenopausal women.

### Methodology

1. Study design- Experimental
2. Population- postmenopausal women.
3. Sampling method- purposive sampling
4. Sample size- 60
5. Study set up- PCMC, Physiotherapy OPD

### Materials used

Sphygmomanometer, Stethoscope, Stopwatch

### Inclusion criteria

Prehypertensive postmenopausal women

### Exclusion criteria

1. Physical abnormalities affecting pranayama performance.
2. Musculoskeletal disorders,
3. Individuals with cough

4. Cardiac problems.

### Procedure

Ethical approval was taken. Patients were divided in two groups randomly Group 1 (n=30) practiced fast pranayama Kapalbhathi, Bhastrika, Kukkriya Group 2 (n=30) practiced slow pranayama Nadishodhana, Pranava, Savitri. After coming to opd patients were given 10 min of rest either in supine or sitting. Pre vitals were taken (systolic and diastolic BP).

Pranayama training was given to Group 1 and group 2 subjects in a quiet room.

### Techniques used were as follows

- **Fast pranayama-** Each cycle (6min) consisted of: Kapalbhathi (1 min) Kukkriya (1 min), Bhastrika (1min); With one-minute rest in between each pranayama. Total 5 sessions.

**1. Kapalbhathi pranayama:** The subjects were instructed to sit in vajrasana and rapidly breathed out actively and inhaled passively through nostrils.

**2. Bhastrika pranayama:** Subjects were instructed to take deep inspiration followed by rapid expulsion following one another in rapid succession. After 10 expulsion final expulsion is followed by deepest possible slow inhalation.

**3. Kukkriya pranayama:** Subject was sitting in vajrasana with both palms on knees and fingers pointing forward. Mouth is opened wide and tongue pushed out as far as possible. Then breathe in and out at rapid rate with tongue hanging out of mouth. After 10 to 15 rounds relaxed in varjrasana, 3 repetitions.

**Slow pranayama:** Each pranayama (6min) session, consisting of 2 min of practice session of Nadhishodhana, Pranava and Savitri pranayama with 1 min of rest between each pranayama in comfortable posture (Suk asana) nine or more rounds were performed according to their capacity.

**1. Nadishodna pranayama:** slow rhythmic, alternate nostril breathing. One round consists of breathing through one nostril, exhaling through other nostril and repeat same with other nostril.

**2. Savitri pranayama:** It is slow, deep and rhythmic breathing, each cycle have ratio of 2:1:2:1 between inspiration (Purak), held in breath (Kumbhak) and expiration (Rechak) and held out breath (Shunyak) phases of respiratory cycle. 6 counts for inspiration and expiration with three counts of retained breath (6\*3\*6\*3) [16].

**3. Pranava pranayama:** It is slow, deep and rhythmic breathing emphasizing on making aaa, uuu, mmm sound while exhalation for duration of 2-3 times duration of inhalation.

At the end of session both groups were instructed to lie down in shavasana and relax for 10 minutes [16].

**Table 1:** Intra group comparison of systolic and diastolic blood pressure in slow pranayama group

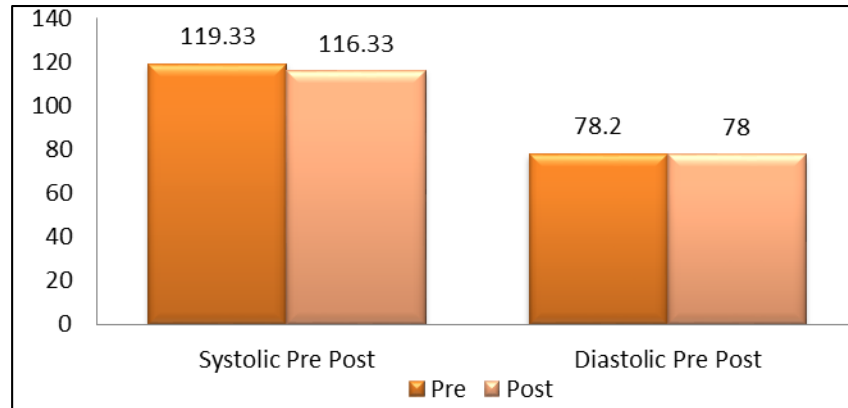
	Systolic Pre	Syst. Post	Dias Pre	Diastolic Post
Mean	119.33	116.33	78.2	78
p value	<0.0026 very significant		0.8569 not significant	
t value	t = 3.302 with 29 degrees of freedom		t = 0.1820 with 29 degrees of freedom	
SD	±9.041	±6.625	±6.155	±5.801

Blood pressure

**Data analysis and interpretation**

All the data analyses were done with graph pad and primer biostatistics software. Pre and post analysis for blood pressure

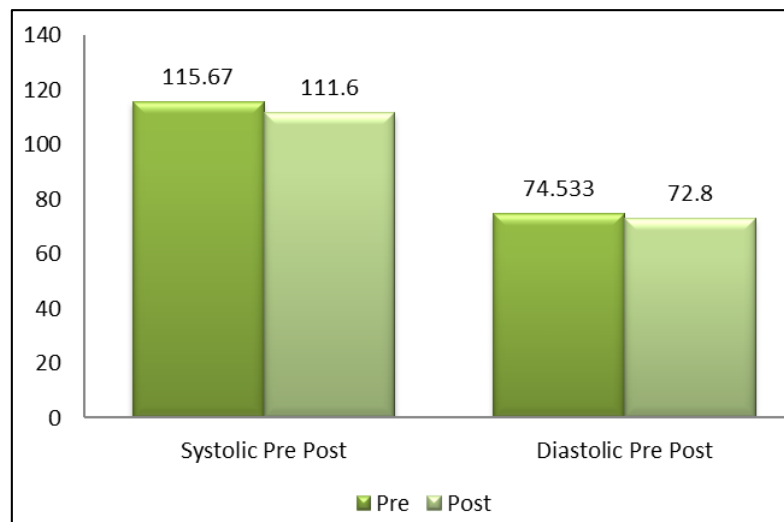
using paired t test was done for both Group A and Group B. Inter group analysis was done using unpaired t test.



**Fig 1:** Intra group comparison of systolic and diastolic blood pressure in slow pranayama group

Above graph depicts mean values of systolic and diastolic blood pressure pre and post slow pranayama. Where mean for systolic blood pressure pre pranayama was Mean= 119.33±9.041 and post pranayama was Mean=

116.33±6.625 with p value= 0.0026, considered very significant. Mean for diastolic blood pressure pre pranayama was Mean= 78.2±6.155 and post pranayama was Mean= 78±6.155 with p value= 0.8569, considered not significant.



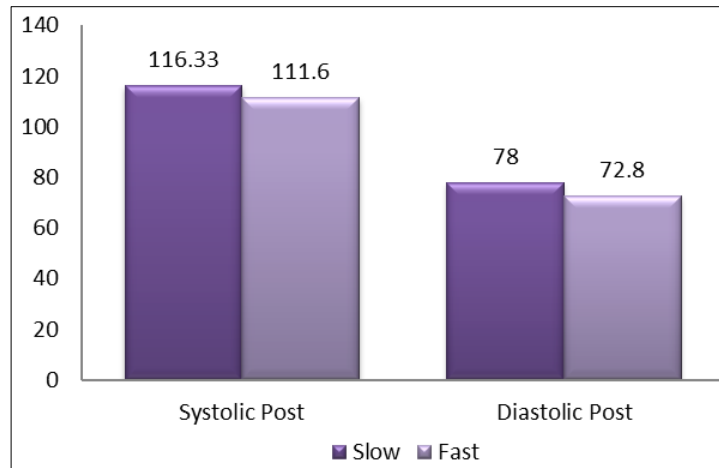
**Fig 2:** Intra group comparison of systolic and diastolic blood pressure in fast pranayama group.

**Table 2:** Intra group comparison of systolic and diastolic blood pressure in fast pranayama group

	Syst. Pre	Syst. Post	Dias. Pre	Dias. Post
Mean	115.67	111.60	74.533	72.8
p value	<0.0001 extremely significant		0.0114, significant	
t value	t = 6.091 with 29 degrees of freedom		t = 2.703 with 29 degrees of freedom	
SD	±1.339	±1.195	±4.167	±3.428

Above graph depicts mean values of systolic and diastolic blood pressure pre and post fast pranayama. Mean for systolic blood pressure pre pranayama was Mean= 115.67±1.339 and post pranayama was Mean=

111.60±1.195 with p value= 0.0001, considered extremely significant. Mean for diastolic blood pressure pre pranayama was Mean= 74.533±4.167 and post pranayama was Mean= 72.8 ±3.428 with p value= 0.0114, considered significant.



**Fig 3:** Inter group comparison of systolic and diastolic blood pressure in slow and fast pranayama.

**Table 3:** Inter group comparison of systolic and diastolic blood pressure in slow and fast pranayama

	Slow syst. Post	Fast syst. Post	Slow dias post	Fast dias. Post
Mean	116.33	111.60	78	72.8
p value	<0.0072, very significant		<0.001, extremely significant	
t value	t = 2.783 with 58 degrees of freedom		t = 4.227 with 58 degrees of freedom	
SD	±6.625	±6.547	±5.801	±3.428

Above graph depicts mean values of systolic and diastolic blood pressure post slow and post fast pranayama. Mean for systolic blood pressure post slow pranayama was Mean=116.33±6.625 and post fast pranayama Mean=111.60±6.547 with p value=<0.0072, considered very significant. Mean for diastolic blood pressure post slow pranayama was Mean=78±5.801 and post fast pranayama was Mean=72.8±3.428 with p value=<0.001, considered extremely significant.

### Discussion

After menopause, the prevalence of hypertension is increased [2]. Vivek Sharma *et al*, found that both slow and fast pranayama were beneficial in reducing perceived stress [3]. Ananda Bal yogi Bhavnani, 2012 studied immediate cardiovascular effects of Pranava pranayama in hypertensive patients were the Pranava pranayama was beneficial in lowering the blood pressure [17].

In the present study we found that both fast pranayama and slow pranayama produces decrease in blood pressure measurements which may be due to reduction in oxygen consumption and metabolic rate. Fast pranayama increases the sympathetic activity thus shows significant effect on blood pressure measurements while slow pranayama increases parasympathetic activity and thereby improvement of autonomic dominance towards parasympathetic dominance. Increase in parasympathetic activity decreases in blood pressure [3].

Regular aerobic physical activity lowers systolic and diastolic blood pressure while more vigorous exercise produces a greater lowering effect on diastolic blood pressure. Increased blood flow during rhythmic, steady rate exercise there is rapid increase in systolic blood pressure during first few minutes of exercise. As exercise continues systolic blood pressure gradually declines because the arterioles in the active muscle continues to dilate, further reducing peripheral resistance to blood flow diastolic blood pressure remains unchanged throughout the exercise [6]. Diastolic blood pressure remains stable or decreases slightly at a higher exercise level. Venous pooling reduces central

blood volume, which in turn decreases atrial filling pressure and lowers the systemic arterial blood pressure [6]. The rise in intraabdominal pressure, increase in Co<sub>2</sub>, due to breath holding leads to rise in blood pressure which in turns leads to rise in heart rate. But due to pressure in carotid sinus which lodges the pressure receptors in blood and heart rate is not allowed to go up [6].

Every time the person inspires, the pressure in thoracic cavity becomes more negative than usual, causing blood vessels in chest to expand. This reduces quantity of blood returning to left side of heart and thereby momentarily decreases cardiac output and arterial pressure [7].

The pressure changes caused in the thoracic vessels by respiration can excite vascular and atrial stretch receptors [7].

### Conclusion

The present study concludes that slow pranayama and fast pranayama have significant immediate effect in lowering systolic blood pressure. Also comparatively fast pranayama is more effective than slow pranayama in immediate lowering systolic blood pressure in prehypertensive postmenopausal women. However diastolic blood pressure remains unchanged in slow pranayama whereas it decreases slightly in fast pranayama as the rate of breathing increases.

### Limitations

1. Study was done with smaller sample size
2. Only immediate effect of slow and fast pranayama on blood pressure was assessed.
3. Only prehypertensive postmenopausal women were included in the study.

### Clinical implication

Due to vasomotor instability and hot flushes in postmenopausal women there is wide fluctuation of blood pressure. Blood pressure increases suddenly. Hence, to control such wide fluctuation in blood pressure fast pranayama and slow pranayama can be practiced for immediate effect on blood pressure.

### Recommendations

Long term effect of slow and fast pranayama on blood pressure and other parameters can be assessed. Comparison between prehypertensives and hypertensives can be done.

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