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### **A Study To Compare The Effect Of Slow Breathing Exercise And Jacobson's Progressive Muscular Relaxation On Blood Pressure , Heart Rate And Respiratory Rate In Patients With Primary Hypertension : An Interventional Study**

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#### **ABSTRACT**

Hypertension means persistent increase in both SBP and DBP. Breathing exercise controlled at 6 rate/min are known as slow breathing exercises .Jacobson's progressive muscle relaxation technique is a relaxation technique in which a person first tenses and releases major muscle of the body in a systematic order, usually beginning at the distal body parts and progressing proximally . To compare the effect of slow breathing exercise and Jacobson's progressive muscular relaxation on HR ,RR and BP in patients with primary hypertension.

30 subjects who fulfilled the selection criteria were selected for the study with age group 35-65 years. Subjects divided into 2 groups Group A - Slow breathing exercise , Group B Jacobson's Progressive Muscular Relaxation Technique for 1 week. Pre and post treatment evaluation of BP, HR and RR were taken and results were compared.

Result of present study shows a significant difference for Pre-Post treatment values of all outcome measures( $p < 0.05$ ) for both groups. Inter group comparison shows no significant difference for HR and RR ,but significant difference ( $p < 0.05$ ) for SBP and DBP .

This study concludes that patient receiving slow breathing exercise has more beneficial effect in SBP and DBP while there is no significant difference in HR and RR between the two groups.

**KEY WORDS:** Slow breathing exercises, Jacobson's progressive muscular relaxation , Essential Hypertension

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## **INTRODUCTION**

Persistent increase in systemic arterial blood pressure is known as hypertension<sup>1</sup>. Hypertension means increase in normal blood pressure both in systolic BP and diastolic BP<sup>2</sup>. It is ranked as fourth top most disease on the basis of its prevalence. Hypertension is a major health problem and biggest of the challenges of the 21<sup>st</sup> century<sup>3</sup>.

It has been well documented as a major risk factor for cardiovascular disease, renal disease, Stroke, heart failure, peripheral artery disease. There are two main types of hypertension, "Primary" hypertension, also known as essential or idiopathic hypertension and "Secondary" hypertension which has some underlying cause. Essential hypertension is the most prevalent type, affecting 90-95% of hypertensive patients. With this type of hypertension, there is no single identifiable cause. The pathogenesis of hypertension is multifactorial and can trigger the risk as genetic factors which play an important role<sup>4</sup>.

Classification of hypertension for adults ages 18 and older has been provided by the Eighth Report of the Joint National Committee of High Blood Pressure (JNC 8 Classification, 2015) i.e. stage 1 hypertension (systolic BP 140-159 or diastolic BP 90-99 mmHg), and stage 2 hypertension (systolic BP  $\geq 160$  or diastolic BP  $\geq 100$  mmHg)<sup>5</sup>

Breathing exercises controlled at 6 rate per minute (rpm) are known as slow controlled breathing exercises and are characterized by increased tidal volume (respiratory amplitude) and decreased respiratory rate<sup>2</sup>. It increases baroreflex sensitivity and reduces sympathetic activity and chemoreflex activation. Slow breathing improves vagal activity and therefore decreases baseline heart rate and blood pressure<sup>4</sup>.

Jacobson's progressive muscular relaxation is a relaxation technique in which a person first tenses and releases major muscle of the body in a systematic order, usually beginning at the distal body parts and progressing proximally<sup>3</sup>. The main rationale for this is when the body is aware of the presence of the tension, it will respond by triggering the muscles to relax, where the rest of the other components of the relaxation response will naturally follow which tends to cause parasympathetic dominance<sup>3</sup>.

## **NEED OF THE STUDY**

Hypertension is a widespread health problem and has no warning signs or symptoms, and many people don't realize they have it. Despite the significance of the problem with respect to overall health; and its undesirable health consequences, high blood pressure is still not adequately controlled and far from being optimal. The side effects and cost of antihypertensive drugs have

stimulated the search for a non-pharmacological approach to control BP either as a first line or adjunctive treatment<sup>4</sup>.

Relaxation and stress-relieving techniques such as yoga, meditation and biofeedback have also been shown capable of lowering BP<sup>4</sup>. Also both the techniques are easy, non-invasive, painless, can be done at any place, less time consuming, cost effective

So the need of the study is to find the better non pharmacological treatment out of the two for the patient with primary hypertension.

## AIMS AND OBJECTIVES

### *Aim of the study:*

- To study and compare the effects of Slow breathing exercise and Jacobson's progressive muscular relaxation technique on HR, RR and B.P. in patients with primary hypertension.

### *Objective of the study:*

- To study the effect of slow breathing exercise on blood pressure, HR and RR in patients with primary hypertension.
- To study the effect of Jacobson's progressive muscular relaxation technique on blood pressure, HR and RR in patients with primary hypertension.
- To compare the effect of Slow breathing exercise and Jacobson's progressive muscular relaxation technique on blood pressure, HR and RR in patients with primary hypertension.

## HYPOTHESIS

- **Null Hypothesis** : There is no statistical significant difference in the effect of Slow breathing exercise and Jacobson's progressive muscular relaxation on B.P., HR and RR in patients with primary hypertension.
- **Experimental Hypothesis** : There is a statistical significant difference in the effect of Slow breathing exercise and Jacobson's progressive muscular relaxation on B.P., HR and RR in patients with primary hypertension.

## METHODOLOGY

- **STUDY DESIGN** : An interventional study
- **METHOD OF COLLECTION OF DATA:**

**Study population:** Subjects with primary hypertension

**Sampling method:** Purposive sampling.

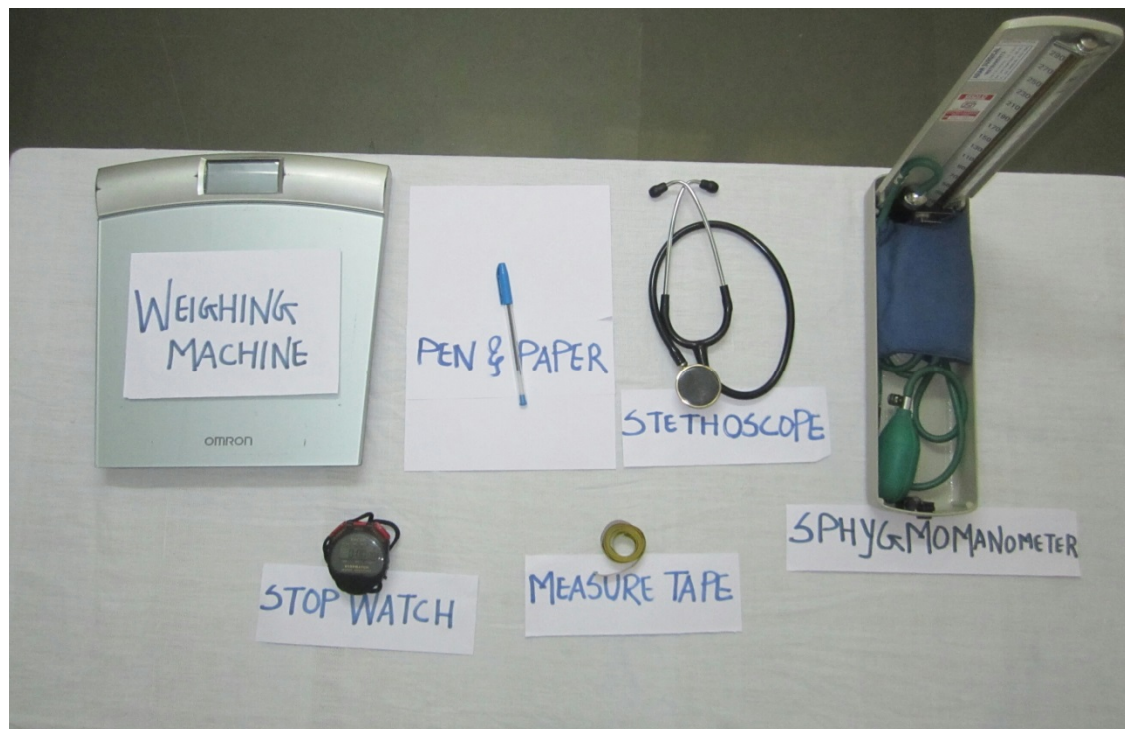
**Sample size:** 30 subjects.

**Source of data:** O.P.D in and around Rajkot city.

**Study duration :** 4 months ( January to april 2019)

**MATERIALS USED: (Figure 1)**

- Mercury Sphygmomanometer
- Stethoscope
- Stop watch
- Pen
- Paper
- Assessment form
- Consent form
- Data collection sheet
- Couch
- Pillow
- Weighing machine
- Measure tape



**Figure 1 : Materials used**

## CRITERIAS FOR SELECTION :

### ➤ Inclusion Criterias:

- 1) Age: 35-65 years<sup>2</sup>
- 2) Gender: male & female both will be included<sup>2</sup>
- 3) Patients with essential hypertension (SBP $\geq$ 140 mmHg and DBP  $\geq$  90 mmHg) diagnosed by a physician at least six months prior to study on stable anti-hypertensive treatment for a minimum of two months prior to the study and no change in medications during participation in the trial.<sup>6</sup>

### ➤ Exclusion Criterias :

- 1) Patients with secondary hypertension
- 2) Autoimmune diseases<sup>2</sup>
- 3) Cigarette smoking<sup>2</sup>
- 4) Alcohol consumption<sup>2</sup>
- 5) Use of oral contraceptives<sup>2</sup>
- 6) Use of neuroleptics/anti- arrhythmic <sup>2</sup>
- 7) Use of neuroleptics/anti- arrhythmic <sup>2</sup>
- 8) Impaired cognitive function<sup>8</sup>

### ➤ Method<sup>9</sup>

- On day 1- 30 Volunteers were briefed about the protocol and written consent , assessment and baseline readings of HR, RR and BP were taken. On day 2 Training was provided to Group A(n=15) for slow breathing exercise and Group B(n=15) for Jacobson's progressive relaxation technique . from 3<sup>rd</sup> day to 9<sup>th</sup> day Study duration of 20 mins twice daily was carried out and on day 9- post test readings were taken and the data obtained was analysed statistically.

## PROCEDURE FOR SLOW BREATHING EXERCISE: (Figure 2)

- One has to sit comfortably in an easy and steady posture on a fairly soft seat
- Patients were asked to take deep breath in through nose and then were asked to exhale completely through mouth.
- I: E = 4:6
- This completes 1 cycle of slow breathing<sup>10</sup>.



**Figure 2: Slow Breathing Exercise**

### **PROCEDURE FOR JACOBSON'S PROGRESSIVE MUSCULAR RELAXATION: ( Figure 3)**

- In Jacobson's progressive muscle relaxation technique person first tenses and releases major muscle of the body in a systematic order, usually beginning at the distal body parts and progressing proximally<sup>3</sup>.
- The tensing time was kept for 5 seconds followed by relaxation time for 10 seconds.
- This constituted 1 session of 20 minutes.<sup>11</sup>



Figure 3: Jacobson's Progressive Muscular Relaxation Technique

## RESULTS

- Data of 30 subjects were analysed using SPSS V.20 and MS Excel 2010.
- Within the group : paired t- test
- Between the group : unpaired t-test
- Mean age of participants
- Group A =  $57.8 \pm 6.08$  ( 8 Females , 7 males)
- Group B =  $58.67 \pm 7.32$  (11 Females , 4 males)

Table 1 : Results Of Slow Breathing Exercise

RESULTS OF SLOW BREATHING EXERCISE				
	PRE	POST	MEAN DIFF	P-VALUE
Systolic B.P	$144 \pm 4.65$	$137.20 \pm 4.32$	6.8	0.00
Diastolic B.P	$85.33 \pm 5.43$	$80.40 \pm 5.19$	4.93	0.00
Heart rate	$80.86 \pm 7.78$	$75.66 \pm 8.20$	5.20	0.00
Respiratory rate	$20.53 \pm 3.04$	$16.06 \pm 2.37$	4.46	0.00

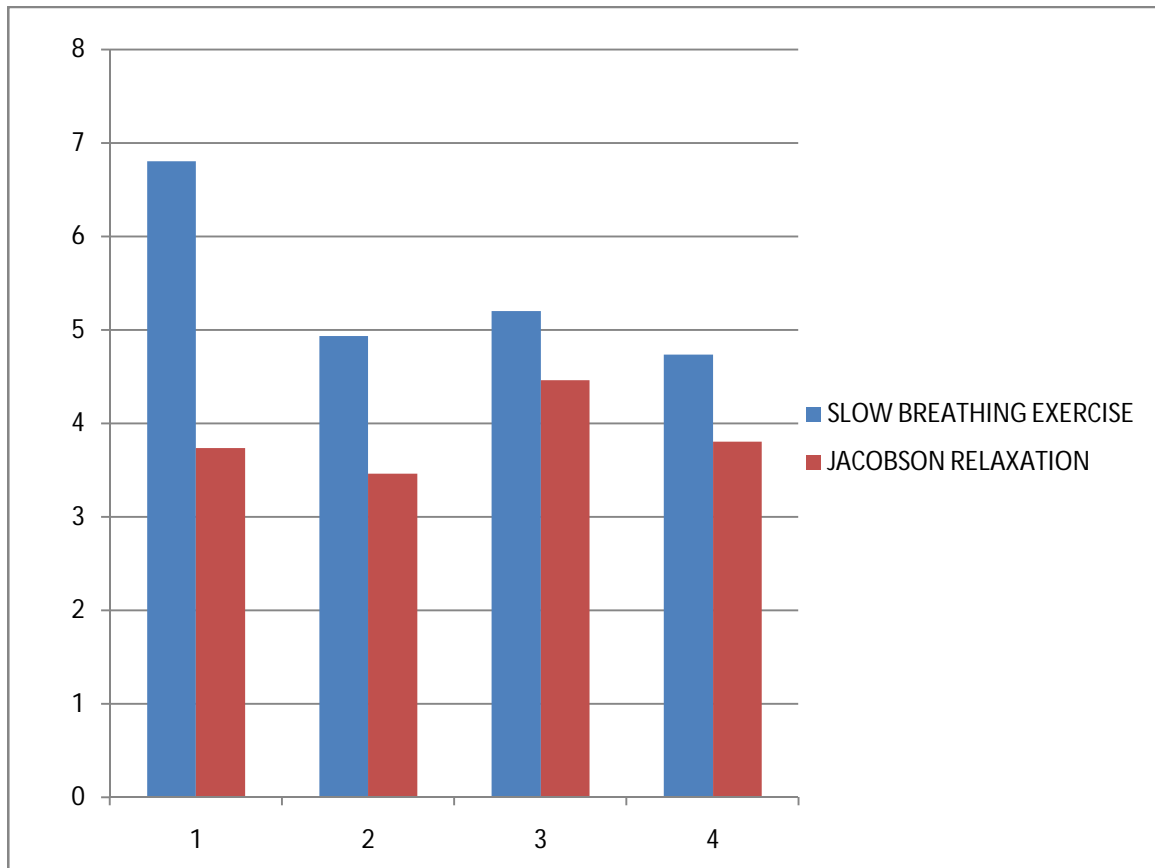
**Table 2 : Results Of Jacobson's Progressive Muscular Relaxation Technique**

<b>RESULTS OF JACOBSON'S PROGRESSIVE MUSCULAR RELAXATION TECHNIQUE</b>				
	PRE	POST	MEAN DIFF	P-VALUE
SYSTOLIC B.P.	145.73 $\pm$ 5.28	142.0 $\pm$ 5.23	3.73	0.00
DIASTOLIC B.P.	85.46 $\pm$ 4.74	82.0 $\pm$ 4.14	3.46	0.00
HEART RATE	79.60 $\pm$ 8.78	75.13 $\pm$ 8.74	4.46	0.00
RESPIRATORY RATE	20 $\pm$ 4.58	16.33 $\pm$ 4.28	3.66	0.00

**Table 3 : Between The Groups Comparison**

<b>BETWEEN GROUP ANALYSIS</b>				
	GROUP A	GROUP B	MEAN DIFF	P VALUE
SYSTOLIC B.P.	6.8 $\pm$ 2.36	3.73 $\pm$ 1.27	3.06	0.00
DIASTOLIC B.P.	4.93 $\pm$ 1.27	3.46 $\pm$ 1.59	1.46	0.01
HEART RATE	5.20 $\pm$ 2.07	4.46 $\pm$ 1.18	0.73	0.245
RESPIRATORY RATE	4.46 $\pm$ 1.86	3.66 $\pm$ 1.14	0.93	0.110

**Graph 1 : Between Group Analysis**



Were 1= SBP

2= DBP

3=HR

4= RR

## **DISCUSSION**

The result of the present study support the alternative hypothesis for SBP and DBP which shows the statistical significant difference between slow breathing exercise and jacobson's progressive muscular relaxation. However the study also accepts the null hypothesis for HR and RR which shows no statistical significant difference between slow breathing exercise and jacobson's progressive muscular relaxation technique.

In hypertensive subjects practicing slow deep breathing exercise at 6 cycles/min, the tidal volume increases to maintain minute ventilation. The reflex mechanism involves the pulmonary stretch receptors that are stimulated and afferents via vagi reaches nucleus tractus solitarius, reduces the chemoreflex sensitivity and thus might enhance the baroreflex, with an effect on reducing blood pressure and sympathetic activity as reported by Narkiewicz et al.<sup>12</sup>

Dr. Labiba Abd El-kader Mohamed et al in 2013 studied the Effect of slow deep breathing exercise on blood pressure and heart rate among newly diagnosed patients with essential hypertension and concluded that practicing slow deep breathing exercise decreased the systolic and diastolic BP as well as heart rate of patients with essential hypertension which supports the result of the present study.<sup>4</sup> When performing progressive muscle relaxation exercises with a calm, relaxed state and full concentration of tense and relaxed muscles trained for 15 minutes then the secretion of CRH (corticotropin releasing hormone) and ACTH (adrenocorticotrophic hormone) in the hypothalamus decreases<sup>13</sup>.

Decreased secretion of these two hormones cause decrease in sympathetic nerve activities, so that adrenaline and noradrenaline expenditure is reduced. The decrease in adrenaline and norepinephrine results in decreased heart rate, dilated blood vessels, reduced blood vessel resistance and decreased heart pumps so that cardiac arterial blood pressure decreases<sup>14</sup>.

## **CONCLUSION**

- Result of present study shows a significant difference for Pre-Post treatment values of all outcome measures ( $p < 0.05$ ) for both groups. Inter group comparison shows no significant difference for HR and RR, but significant difference ( $p < 0.05$ ) for SBP and DBP.
- So this study concludes that patient receiving slow breathing exercise has more beneficial effect in SBP and DBP while there is no significant difference in HR and RR between the two groups.

## **LIMITATIONS OF THE STUDY:**

- Sample size was small.

- Result of this study cannot be generalized on patients with secondary hypertension (due to liver, heart, renal failure, or on individuals with recent cardiovascular events, pulmonary diseases, diabetes mellitus, neuropathies, cardiac arrhythmias, with autoimmune diseases, cigarette smoking, alcohol consumption, using oral contraceptives, using neuroleptics, anti-arrhythmic and lithium)
- The result of present study could not consider the effects of medications on hemodynamic parameters.

### **FURTHER RECOMMENDATIONS:**

- Large sample size can be recommended for the study.
- Study can be done in secondary hypertension.
- It can be done in elderly patients with hypertension.

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