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EFFECTIVENESS OF BREATHING EXERCISES ON HYPERTENSION AMONG PATIENTS WITH CHRONIC RENAL FAILURE

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ABSTRACT

Chronic Kidney Disease (CKD) is a worldwide public health problem. According to World Health report, CKD is the 12th cause of death and 17th cause of disability. CKD can cause high blood pressure. High blood pressure can damage blood vessels in the kidneys, reducing their ability to work properly. Hypertension has been reported to occur in 85% to 95% of patients with CKD. A quasi experimental study was done with pre-test post-test and control group design to determine the effectiveness of breathing exercises on blood pressure among CRF patients. The subjects were 60 CRF patients with hypertension who were selected using non-probability purposive sampling technique. Among them, 30 were allotted to interventional group and 30 to control group. Blood pressure was checked and categorized based on the World Health Organization (WHO) recommended blood pressure category table. Breathing exercise was administered to the subjects in the interventional group for 15 minutes once in morning for 6 consecutive days. The data was analyzed by using descriptive and inferential statistics. The study findings showed that the obtained 't' value was significant at $p < 0.05$ level. It shows that the breathing exercise was effective in reducing the level of blood pressure among patients with CRF.

KEYWORDS

Breathing Exercises, Hypertension and Chronic Renal Failure patients.

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INTRODUCTION

The kidney is one of the major vital organs. Proper function of the urinary system is essential. Disorders related to kidney are currently the leading cause of death throughout the country. Kidney is the principal organ of the urinary system and their primary function is to regulate the volume and composition of extracellular fluid and to excrete waste products from the body. The kidneys also have several non-excretory metabolic and endocrine functions,

including blood pressure regulation, erythropoietin production, and insulin degradation. A disruption in renal function impairs the body's ability to maintain fluid, electrolyte and acid base balance. When renal function declines suddenly; the kidneys fail to adequately filter waste products from the blood leading to renal failure¹.

The National Kidney Foundation of India (NKFI) estimated that approximately 21 lakhs people go for kidney failure annually in India².

Hypertension has been reported to occur in 85% to 95% of patients with Chronic Kidney Disease (CKD). The relation between hypertension and CKD is cyclic in nature. Uncontrolled hypertension is a risk factor for developing CKD and is associated with a more rapid progression of CKD³.

According to WHO expert committee and Joint National Report recommended non-pharmacological treatment as the first measures in control of hypertension on prevention, detection, and evaluation of high blood pressure. Non pharmacological measures like progressive muscle relaxation, acupuncture, music therapy, breathing exercises are used to treat hypertension⁴.

The breath is considered the basic force of life in many cultures. In India the prana (life or literally breathing forth) of yogic tradition signifies the Universal life force as it enlives the individual being. In Chinese tradition, Qi is the vital energy of life. A component of Qi is called Natural Air Qi and is absorbed by the lungs from the air we breathe. The bible states that God breathed in to Adams nostril the breath of life⁵.

Pranayama, meaning 'breathing control', is an ancient technique involving slow and rhythmic breathing. It is known that the regular practice of *pranayama* increases parasympathetic tone, decreases sympathetic activity, improves cardiovascular and respiratory functions, decrease the effect of stress and strain on the body and improves cardiovascular and respiratory functions, decrease the effect of stress and strain on the body and improves physical and mental health⁶.

Today, breathing exercise is the most sought after form of complementary care in India and has

hundreds of studies investigating its effectiveness published all over the globe. Breathing exercise is truly an emerging field that the researcher find absolutely fascinating.

OBJECTIVES

1. To assess the levels of Blood Pressure among CRF patients between control and interventional groups.
2. To determine the effectiveness of breathing exercises on Blood Pressure among CRF patients in interventional group.

HYPOTHESES

1. There is a significant difference in the level of Blood Pressure among CRF patients in interventional and control groups.
2. There is a significant difference in the level of Blood Pressure among CRF patients before and after breathing exercises in the interventional group.

MATERIAL AND METHOD

A Quasi experimental pretest-posttest control group design was adopted for the study. The tool adopted was WHO recommended Blood Pressure Category Table (Table No.1)

In this study the researcher used mean arterial pressure (MAP) which is the average arterial pressure during a single cardiac cycle.

$$\text{MAP} = \frac{(2 \times \text{diastolic}) + \text{systolic}}{3}$$

The study was conducted for a period of 4 weeks. Totally 60 sample who were having mild to severe hypertension were selected for the study, among them 30 were allotted to interventional group and the remaining 30 to control group. Each day 10 subjects were selected for interventional group and 10 for control group based on the inclusion and exclusion criteria.

The researcher first checked the blood pressure of the subjects. The mean arterial pressure was taken for calculation. Patients with mild to severe hypertension were only included for the study. After screening the patients the researcher administered

breathing exercises namely abdominal breathing, equal breathing and alternate nostril breathing exercises to the subjects in the interventional group. Subjects were made to perform the exercises for 30 times in 15 minutes. After the intervention, the researcher checked the blood pressure immediately (zero hour), at half an hour, and one hour later.

Abdominal Breathing Exercise

With one hand on the chest and the other on the belly, patient inhales deep breath through the nose, ensuring the diaphragm inflates with enough air to create a stretch in the lungs and exhale slowly through mouth, having 10 breaths per minute with 20-30 breaths in 4-5 minutes⁷.

Equal breathing Exercise

Patient is made to sit comfortably and asked to slowly inhale for 4 counts. Then exhale slowly for a count of 4 through the nose, which is repeated for 20-30 times with 10 breaths/min⁷.

Alternate Nostril Breathing Exercise

Patient is asked to hold the right thumb over the right nostril and inhale deeply through the left nostril. Then at the peak of inhalation, the left nostril is closed with the ring finger and exhalation is done through the right nostril⁷.

RESULTS

Table No.2 reveals pre-test blood pressure level of patients in Interventional Group. Among them, 25 had severe hypertension and 5 had moderate hypertension in 1st week and in 4th week. It was interesting to note that none of them had severe hypertension and majority of 28 had only mild hypertension. When measured after 1 hour intervention, majority of 29 (96.6%) had moderate level of blood pressure during 1st week and majority of 27 (90%) subjects had only mild blood pressure during the 4th week.

Table No.3 shows that the mean pre-test score was 132.3. The mean value during post-test was 116.5, 120 and 122.6 respectively at zero hour, half an hour and one hour later. The obtained t' value during post-test was significant at $p < 0.05$ level in all the readings (zero hour, half an hour and one hour later). It indicates the effectiveness of breathing

exercise is effective to reduce the blood pressure level.

Figure No.1 It reveals that the obtained t' value was significant at < 0.05 level in all levels of blood pressure measurements during zero hour, half an hour, and one hour later. It is inferred that breathing exercises are effective in reducing the level of blood pressure. It is inferred that breathing exercises are effective in reducing the level of blood pressure.

DISCUSSION

Regular practice of rhythmic slow breathing has been shown to increase baroreflex sensitivity and reduce chemo reflex activation, and to reduce systolic, diastolic and mean blood pressure as well as heart rate variations in hypertensive patients.

The researcher was thrilled to have the opportunity to bring this modality to look forward to breaking new ground with the study of breathing exercise.

In this study among the control group, the blood pressure values between pre-test and post-test did not highly vary. Blood pressure at one hour in control group was severe for 17, 10, 19 and 20 subjects during 1st, 2nd, 3rd and 4th week respectively which prove that there was no much difference in blood pressure levels in control group. Whereas in interventional group, during 1st and 2nd week of pre-test 25 and 23 subjects had severe blood pressure, whereas none of them had severe blood pressure during 3rd and 4th week. This shows that the breathing exercise had been effective in reducing hypertension.

This finding was supported by Naik Anushman, who conducted a study on the effect of left nostril breathing among hypertensive patients. 30 number of hypertensive patients who were taking regular treatment were selected. Pulse rate and blood pressure were recorded using a standard sphygmomanometer. Left nostril breathing exercise was administered for 5 minutes and again BP and pulse rate was checked. Results of this study revealed that pulse rate dropped from 84.73 ± 1.89 per minute to 81.80 ± 1.84 minute. Systolic BP dropped from 144.50 ± 3.68 mm Hg to 133.83 ± 3.6 mmHg and diastolic BP dropped from 100.96

± 2.46 mmHg to 94.83 ± 2.4 mmHg. The study revealed that BP and pulse rate can be decreased in non-pharmacological way⁸.

It was further observed that in the Interventional Group mean pre-test score was 132.3 and the mean post-test scores were 116.5, 120, 122.6 at zero hour, half an hour and one hour later respectively. The obtained t' value was highly significant at all levels.

The study findings are supported by Peleg, Rosenthal *et al*, who conducted a study on effectiveness of slow breathing using an interactive device on blood pressure among 13 hypertensive patients for 8 weeks. This study revealed that slow breathing significantly reduces blood pressure⁹.

Similar result is observed in a study done by Hisao Mori who determined the effect of deep breathing on blood pressure and pulse rate.

Subjects were recruited from clinics and hospital. In one group, blood pressure was measured before and after taking deep breathing over a period of 30 seconds and the other group blood pressure was measured before and after 30 seconds rest in sitting position. The study revealed that in both the groups systolic blood pressure and diastolic blood pressure and pulse rate were significantly reduced, whereas the blood pressure reduction was more in the 1st group who underwent deep breathing exercise than in the 2nd group¹⁰.

So it was concluded that breathing exercise is potentially powerful and essential approach to reduce the level of blood pressure in CRF patients.

Table No.1: WHO recommended Blood Pressure Category table

S.No	Categories of blood pressure	Systolic mmHg	Diastolic mmHg	MAP MmHg
1	Normal blood pressure	120-139	80-89	93-103
2	Mild hypertension	140-159	90-99	107-119
3	Moderate hypertension	160-179	100-109	120-132
4	Severe hypertension	>180	>110	133.3

Table No.2: Pre-test and post-test level of blood pressure among CRF patients in Interventional Group

S.No	Week	Blood pressure level	Post-test								
			Pre test		Zero hour		At Half an hour		At One hour		
			N	%	n	%	N	%	n	%	
1	Week 1	Normal	0	0	0	0	0	0	0	0	0
		Mild	0	0	0	0	0	0	1	3.4	
		Moderate	5	16.6	29	96.6	30	100	29	96.6	
		Severe	25	83.4	1	3.4	0	0	0	0	
	Week4	Normal	0	0	26	86.3	12	40	2	6.6	
		Mild	28	93.3	4	13.7	18	60	27	90	
		Moderate	2	6.7	0	0	0	0	1	3.4	
		severe	0	0	0	0	0	0	0	0	

Table No.3: Effectiveness of breathing exercises on blood pressure among patients with CRF in interventional group. (Paired t’ test)

S.No	Variables	Mean	Standard deviation	Mean difference	t’ value
1	Pre-test	132.3	3.54	16.3	33.1*
	Post-test	116.5	1.6		
	• Zero hour	120	2.05	12.6	23.89*
	• At half an hour	122.6	2.3	10	12.58*
	• At one hour				

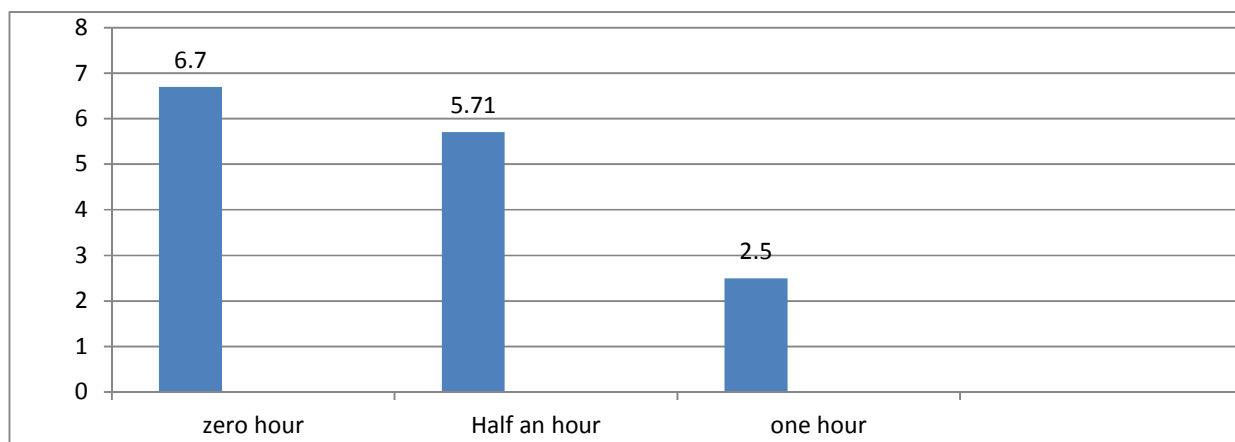


Figure No.1: Unpaired t’ test for post-test level of blood pressure among CRF patients in Control and Interventional Group

CONCLUSION

The main conclusion drawn from the present study was that most of the Chronic Renal Failure patients had high level of Blood Pressure. After receiving breathing exercises there was a significant reduction in the level of Blood Pressure. Subjects became familiar and found themselves comfortable and also expressed satisfaction. It is concluded that the breathing exercise is effective and a simple strategy to reduce the blood pressure.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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