

THE STUDY OF EFFECT OF DIAPHRAGMATIC BREATHING EXERCISE AND ACTIVE CYCLE BREATHING TECHNIQUE ON HYPERTENSIVE PATIENT

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Abstract: The effect of diaphragmatic breathing exercise and active cycle breathing technique on hypertensive patient.

Subject and method: 30 subject were included in this study they were assigned into two groups by inclusion and exclusion criteria (n= 15 per group) group A (experimental group) in this group included diaphragmatic breathing exercise and group (experimental group) in this group included active cycle of breathing exercise. **Result:** The study demonstrated score among two groups. Represents the comparison between mean of Pre-exercise MAP 112.33 (± 4.64), and 4thwk MAP 105.73 (± 4.51) after DBE, also compare the mean ($\pm$ SD) of Pre-exercise MAP 114.67 (± 4.42), and 4thwk MAP 109.0 (± 4.67) after ACBT, it also compare the effectiveness of both group and found no significant betterment in DBE & ACBT. **Conclusion:** Hence we concluded that practicing breathing exercises enhances parasympathetic activity, vagal tone and decreases the sympathetic excitability, thereby effectively reducing the blood pressure, it can be emphasized as a non-pharmacological adjunct in hypertensive patients along with drug treatment but there is no significant difference in between types of exercises, as DBE & ACBT both shows significant effects on hypertensive patients but don't shows any significant difference in types of exercises selected, so p-value <0.33 hence null hypothesis accepted & alternative hypothesis rejected.

Keyword: ACBT- Active cycle breathing technique.

INTRODUCTION:

Our blood pressure is the pressure within your blood vessels.¹ Hypertension is a condition where the pressure within your arteries is consistently too high.² This pressure is generated by the contraction of the heart and counteracted by the resistance of the small arteries.³ BP is essential to life. It keeps the blood flowing through your body and provides oxygen and energy to your organs.⁴ According to the World Health Organization (WHO)-There's been a 67% increase in hypertension from 1990 to 2010 in Sub-Saharan Africa, and 40% of all adults are affected. In Africa, 18% of all deaths are related to hypertension, resulting in half a million deaths and 10 million years of lost life in 2010.⁵ Blood pressure is the pressure exerted on the walls of the arteries. It is also named as silent killer because many of the people don't know they are hypertensive.⁶ There are many risk factors for essential hypertension such as advance in age, sex and family history of hypertension, obesity and atherosclerosis.⁷ A number of safe and effective medications are available for treatment of high blood pressure.⁸ These include older molecules such as thiazide diuretics, beta-blocking agents, Calcium channel blockers (CCB) and newer molecules, Such as, angiotensin converting enzyme (ACE) inhibitors, and angiotensin receptor blockers (ARB).⁸

In view of the recent clinical trials data, some international guidelines suggest that CCB, ACE inhibitors or ARB and not beta blockers or diuretics should be the

initial therapy in hypertension management. The former however, are much more expensive and beyond the affordability in many poor income countries.¹⁰ In an analysis of worldwide data for the global burden of HTN, 20.6% of Indian men and 20.9% of Indian women were suffering from HTN in 2005. The rates for HTN in percentage are projected to go up to 22.9 and 23.6 for Indian men and women, respectively by 2025.¹¹

Breathing exercise are fundamental intervention for the prevention or comprehensive management of acute and chronic pulmonary disorder.¹² Breathing exercise are use in pt. suffering from chronic bronchitis, emphysema, asthma, & gastric fibrosis & in pt. with high spinal cord lesion.¹³ Pt who have under gone thoracic and abdomen surgery are at high risk for acute pulmonary complication & in pt who must remain in bed for an extended period for time.¹⁴

Diaphragm control breathing at an involuntary level. Pt in copd can be taught breathing control by optimal use of diaphragm and relaxation of accessory muscle. Control expiration 4 or 5 times. Diaphragmatic breathing exercise design to improve the efficiency of ventilation and also use to mobilize lungs secretion during postural drainage.

REVIEW OF LITERATURE

Eman Elsayed Hussien Mohammad et.al. (2018) in their study "A study to assess the effectiveness of breathing exercise on hypertensive patients. A comparative study"

Concluded and evaluated the immediate effects of diaphragmatic breathing exercise, active cycle of breathing technique in subjects with hypertension.

G. Vasuki, LM Sweet et.al. (2017) in their study "*A study of usefulness of diaphragmatic breathing exercise on blood pressure in pre hypertensive and hypertensive patients*" to evaluate the effectiveness of diaphragmatic breathing exercise on hypertensive patients Regular practice of diaphragmatic breathing exercise is useful for reducing systolic and diastolic blood pressure.

Dr. E. Premila et.al. (2017) in their study "*A study to assess the effectiveness of deep breathing exercise on blood pressure among patients with hypertension*" diet and exercise are basic elements to maintain blood pressure. Although many alternative therapies are promoted for the management of hypertension. Few are truly therapeutic. Deep breathing exercise intervention on the reduction of blood pressure.

E Grossman, MH Schein, R Zimlichman and B Gavish et.al. (2000) in their study "*A study to assess the breathing control lowers blood pressure*" concluded that breathing exercises are control and reduce the blood pressure of hypertensive patients.

Dr. X. S. Blessing Nimma Sajai, Dr. Selvia Arokia Mary et.al. (2018) in their study "*A study to assess the effect of segmental breathing exercise in lowering high blood pressure among hypertensive patients at general hospitals*" Concluded and evaluated the immediate effects of diaphragmatic breathing exercise, active cycle of breathing technique in subjects with hypertension

Mr. Preethin R et.al. (2017) in their study "*A study to assess the effectiveness of active cycle of breathing technique along patients with hypertensive*" Concluded and evaluated the immediate effects of active cycle of breathing technique in subjects with hypertension.

HYPOTHESIS:

Null Hypothesis:

It state that there will be no significance difference in effectiveness to diaphragmatic breathing exercise and active cycle of breathing technique on hypertensive patients.

Alternate Hypothesis:

It state that there will be a significant difference in effectiveness of diaphragmatic breathing exercise and active cycle of breathing technique on hypertensive patients.

Aim of the Study:

To compare the effects of two different breathing exercises in improving breathing pattern and functional status on hypertensive patients.

OBJECTIVE OF THE STUDY:

To determine the study of effect of diaphragmatic breathing exercise and active cycle breathing technique on hypertensive patient.

METHODOLOGY:

Design of the Study: Randomised controlled trial

Sampling: Systematic random sampling.

Study Population: Will be taken from (kalyanpur, panki, bithoor, chaubeypur, mandhana) Kanpur nagar.

Sample Size: 30 individuals.

Place of the Study: Saaii College of medical science and technology chaubeypur, kanpur

Selection Criteria:

Inclusion Criteria:

- Clinically diagnosed cases of hypertension
- Both genders male and female taken
- Those who were willing to participate in the study and willing to take exercise for 4
- Weeks.
- Age group (45-65)

Exclusion Criteria:

- No history of rib fractures
- Previous surgical history
- Subjects with neurological disorders
- Avoid COPD patients
- No chest pain occurred
- No any kind of medicine taken

Variables:

Dependent:

Stethoscope

Sphygmomanometer

Diaphragmatic breathing exercise

Active cycle of breathing technique

Independent:

Diaphragmatic breathing exercise

Active cycle of breathing technique

Tools:

Couch/treatment table/chairs

Subjects/patients

Therapist

Stethoscope

Sphygmomanometer

Procedure:

Subjects who fulfill the inclusion and exclusion criteria will be included in the study and an informed consent will be taken from each of the subjects prior to participation. This was followed by subjective as well as objective assessment of the involvement of hypertension (high blood pressure). Instructions are given to the subjects about the subjects about techniques performed. After this participants were randomly allocated to two groups, Group A, Group B. for this purpose randomization is done by allocating subjects with number of experimental group.

Group A - Experimental Group:

Diaphragmatic breathing exercise

Group B - Experimental Group:

Active cycle of breathing technique

Diaphragmatic Breathing Exercise:

Prepare pt. in a relaxed position (semi fowler position). Place your hand on rectus abdominus below the anterior costal margin.²⁰ After the pt. understand and is able to breath using the diaphragmatic pattern, suggest pt. that breath nose and out through mouth.²¹ Control expiration 4 or 5 times. Diaphragmatic breathing exercise design to improve the efficiency of ventilation and also use to mobilize lungs secretion during postural drainage.²² Diaphragmatic breathing in a variety of position:-

- sitting
- standing & during activity walking.

Active Cycle of Breathing Technique:

breathing control-Breathing control is breathing gently using as little effort as possible.²³ Breathing and out through nose if is breath out through mouth can be used breathing control with pulse lip breathing.¹⁷ Try to let go any tension in body with each breath out.²⁴ Gradually try to make breath slower. Try to close eyes may be focus on breathing and to reflux. Breathing control can also help when pt. are short of breath on feeling anxious, fearful, or panic.²⁵ Breath out gently and should to 3-5 deeper breath some found it helpful to hold there breath for about 2-3sec at the end of breath in before breath out.²⁶

Thoracic expansion exercise- *Thoracic Expansion Exercises*. Try to keep your chest and shoulders relaxed. Take a long, slow and deep breath in, through your nose if you can. At the end of the breath in, hold the air in your lungs for 2-3 seconds before breathing out (this is known as an inspiratory hold)²⁷

Huffing- A huff is exhaling through and open mouth and throat instead of cuffing.²⁸ It has move sputum up air ways so that can clear it in a control way.²⁹ To huff squeeze air quickly from lungs out through open mouth and throat as if were mist up a mirror or glass.³⁰ Use abdominal muscles to squeeze the air but do not forces so much that cause wheezing or hightness in the chest.³¹ Huffing should always is yellow by breathing control.²⁵ There have two types of huff to clear sputum from different part of lung.³² The small long huff-This way move sputum from low down in chest take a small to medium breath in and then huff the air out until lungs fill quite aptly.³³ With short huff-This moves sputum from higher up chest so use this huff when it fills ready to come out but not before take a deep breath in hand than huff the air out quickly.³⁴ Position for doing ACBT-The best position for ACBT depend on medical condition of the patient.it can be done in sitting or a postural drainage position.³⁵

Data Analysis:

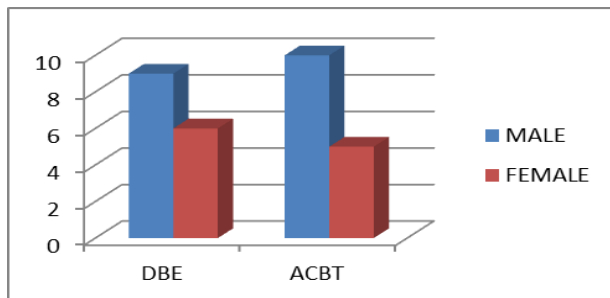
Data analysis was done using IBMSPSS Statistics (software package used for statistical analysis 2015 version-Rev.) Descriptive statistics was done to determine the demographic characteristics of the subjects recruited in this study, t-test used. p-value used in hypothesis tests to help you decide whether to reject or fail to reject a null hypothesis. The p-value is the probability of obtaining a test statistic that is at least as extreme as the actual calculated value, if the null hypothesis is true. A commonly used cut-off value for the p-value is 0.05.

RESULT:

Diaphragmatic Breathing Exercise (DBE) on Hypertensive Patients								
MEASURED BLOOD PRESSURE (BP)								
SNo.	Name	Gender	Age	Pre-ex.BP	Post ex.BP 1 wk	2nd wk BP	3rd wk BP	4th wk BP
1	Suresh chandra	M	65	160/94	162/92	160/94	155/90	155/85
2	Ganga devi	F	62	159/83	155/84	154/80	157/86	155/82
3	Jagdeesh	M	60	145/94	146/82	144/84	146/82	142/80
4	Suman	F	55	148/99	150/90	152/92	146/88	146/84
5	Snehlata	F	62	166/96	166/94	162/94	162/92	160/90
6	Ram pyari	F	59	144/88	146/90	144/88	142/86	140/80
7	Shashi prabha	F	55	150/78	150/82	150/80	149/81	148/80
8	Ravikant shukla	M	58	145/88	146/82	146/82	146/80	144/84
9	Virendra kumar	M	50	144/90	150/74	148/76	148/80	142/82
10	Suresh tripathi	M	63	155/100	156/98	156/94	154/90	152/84
11	Prerna devi	F	58	160/100	158/96	158/98	156/92	156/90
12	Jay ganesh	M	60	151/95	150/94	150/92	148/90	147/88
13	Ram ratan	M	55	152/92	153/93	150/90	150/90	149/88
14	Ram teerath	M	51	162/100	162/96	160/98	160/86	158/88
15	Ravi kumar	M	53	150/90	150/88	150/86	148/84	146/82

Table 1: Active Cycle of Breathing Technique (ACBT) on Hypertensive Patients: Calculated MAP

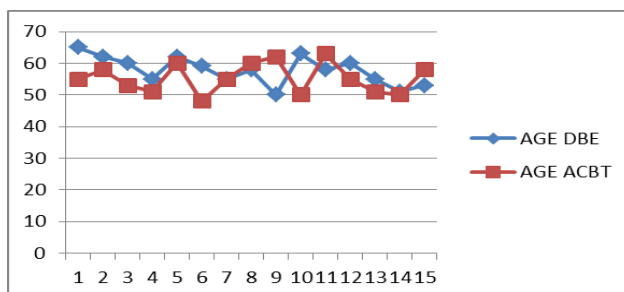
Active Cycle of Breathing Technique (ACBT) on Hypertensive Patients								
CALCULATED MEAN ARTERIAL PRESSURE (MAP) BY MEASURED BP.								
SNo.	Name	Gender	Age	Pre-ex.MAP	Post ex.MAP 1 wk	2nd wk MAP	3rd wk MAP	4th wk MAP
1	Ram ji	M	55	114	112	109	107	107
2	Devi prasad	M	58	110	120	108	108	106
3	Rita awasthi	F	53	124	121	120	117	114
4	Vishuna devi	F	51	120	119	118	114	124
5	Rahul kumar	M	60	113	112	111	109	106
6	Rakesh kumar	M	48	111	110	111	108	105
7	Rajesh pal	M	55	117	113	111	110	107
8	Sumit kushwaha	M	60	107	106	107	104	102
9	Ram dulare	M	62	118	116	114	109	108
10	Ashish kumar	M	50	110	108	123	108	105
11	Ram narayan	M	63	123	122	112	119	119
12	Suman devi	F	55	116	113	112	113	109
13	Archana pandey	F	51	105	108	104	105	105
14	Lakshmi dubey	F	50	113	111	11	108	108
15	Brajmohan	M	58	119	114	111	111	110
			55.3	114.67	113.67	105.47	110	109



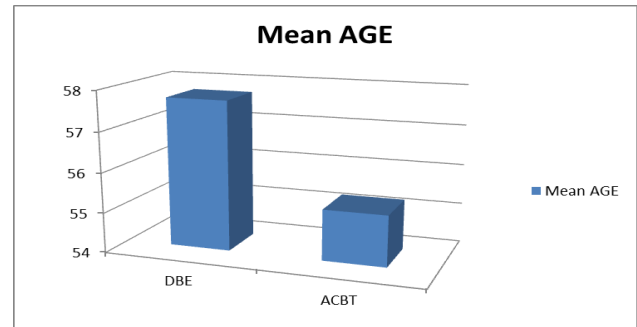
Graph-1: Represents the gender wise distribution of all study subjects. A finding shows total 15 subjects in each group (15+15=30 subjects), in group Diaphragmatic Breathing Exercise (DBE) there are 9 males & 6 female subjects while in group Active Cycle of Breathing Technique (ACBT) there are 10 male & 5 female subjects.

Table 2:

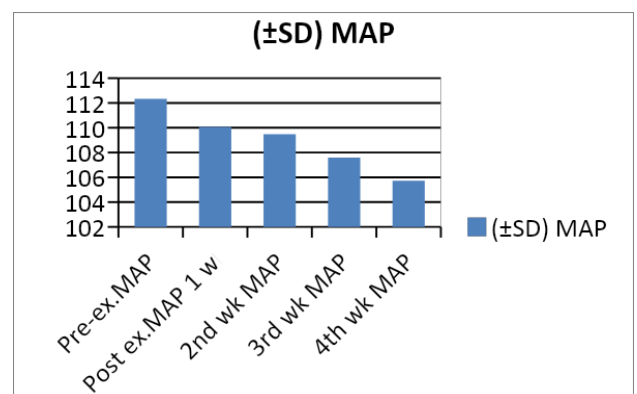
	DBE	ACBT
MALE	9	10
FEMALE	6	5



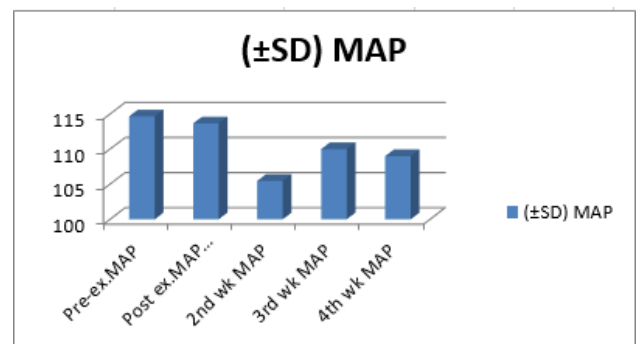
Graph-2: Represents the age of all 30 subjects which are of both group.



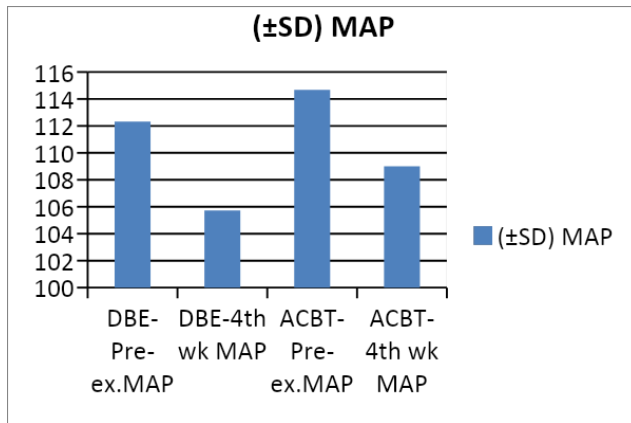
Graph-3: Represents the mean age (±SD) of all 30 study subjects of both group, a finding shows mean age (±SD) is 57.73 (±5.64) years for group DBE & mean age (±SD) is 55.27 (±4.88) years for group ACBT



Graph-4: Represents the mean (±SD) MAP of Pre-Exercise MAP 112.33 (±4.64), post-Exercise (after 1 wk) 110.07 (±4.39), post-Exercise (after 2 wk) 109.47 (±4.31), post-Exercise (after 3 wk) 107.06 (±4.44) & post-Exercise (after 4 wk) 105.73 (±4.51), which shows significant improvement in MAP after DBE.



Graph-5: Represents the mean (±SD) MAP of Pre-Exercise MAP 114.67 (±4.42), post-Exercise (after 1 wk) 113.67 (±4.49), post-Exercise (after 2 wk) 105.47 (±4.27), post-Exercise (after 3wk) 110.0 (±4.49) & post-Exercise (after 4 wk) 109.0 (±4.67), which shows significant improvement in MAP after ACBT.



Graph-6: Represents the comparison between mean of Pre-exercise MAP 112.33 (± 4.64), and 4th wk MAP 105.73 (± 4.51) after DBE, also compare the mean ($\pm$ SD) of Pre-exercise MAP 114.67 (± 4.42), and 4th wk MAP 109.0 (± 4.67) after ACBT, it also compare the effectiveness of both group and found no significant betterment in DBE & ACBT.

DISCUSSION:

In an analysis of worldwide data for the global burden of HTN, 20.6% of Indian men and 20.9% of Indian women were suffering from HTN in 2005. The rates for HTN in percentage are projected to go up to 22.9 and 23.6 for Indian men and women, respectively by 2025.

Emanelsayed et al (2017) describes in his study that breathing exercise are fundamental intervention for the prevention or comprehensive management of acute and chronic pulmonary disorder including improvement in patients with hypertension.

In our study we selected two different breathing techniques one is Diaphragmatic breathing exercise (DBE) and Active Cycle of Breathing Technique (ACBT) respectively as two different study group & compare in-between them.

Total sample size was 30 subjects (Systematic random sampling) from Saaii College of medical science and technology chaubeypur Kanpur on the basis of inclusion criteria such as Clinically diagnosed cases of hypertension, Both genders male and female taken, Those who were willing to participate in the study and willing to take exercise for 4 weeks & Age group (45-65) and exclusion criteria such as No history of rib fractures, Previous surgical history, Subjects with neurological disorders, Avoid COPD patients, No chest pain occurred & No any kind of medicine taken.

Subjects who fulfill the inclusion and exclusion criteria will be included in the study and an informed consent will be taken from each of the subjects prior to participation. This was followed by subjective as well as objective assessment of the involvement of hypertension (high blood pressure). Instructions are given to the subjects

about the subjects about techniques performed. After this participants were randomly allocated to two groups, Group A (DBE), Group B (ACBT) for this purpose randomization is done by allocating subjects with number of experimental group.

Graph-1 represents the gender wise distribution of all study subjects. A finding shows total 15 subjects in each group (15+15=30 subjects), in group Diaphragmatic Breathing Exercise (DBE) there are 9 males & 6 female subjects while in group Active Cycle of Breathing Technique (ACBT) there are 10 male & 5 female subjects.

Graph-3 represents the mean age ($\pm$ SD) of all 30 study subjects of both group, A finding shows mean age ($\pm$ SD) is 57.73 (± 5.64) years for group DBE & mean age ($\pm$ SD) is 55.27 (± 4.88) years for group ACBT.

Graph-4 represents the mean ($\pm$ SD) MAP of Pre-Exercise MAP 112.33 (± 4.64), post-Exercise (after 1 wk) 110.07 (± 4.39), post-Exercise (after 2 wk) 109.47 (± 4.31), post-Exercise (after 3 wk) 107.06 (± 4.44) & post-Exercise (after 4 wk) 105.73 (± 4.51), which shows significant improvement in MAP after DBE.

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G. vasuki, LM sweet et.al. (2017) in their study "A study of usefulness of diaphragmatic breathing exercise on blood pressure in pre hypertensive and hypertensive patients" suggest that a multidisciplinary approach, comprising clinical, pharmacological treatment & non-pharmacological intervention is more effective in optimal control of blood pressure. In our study we also found the same which reflects in Graph-6 represents the comparison between mean of Pre-exercise MAP 112.33 (± 4.64), and 4th wk MAP 105.73 (± 4.51) after DBE, also compare the mean ($\pm$ SD) of Pre-exercise MAP 114.67 (± 4.42), and 4th wk MAP 109.0 (± 4.67) after ACBT, it also compare the effectiveness of both group and found no significant betterment in DBE & ACBT as p-value < 0.33 .

Our study it is clearly evident that there is no statically significant difference in both groups but both have significant effect on blood pressure, which reduces after exercises. It is important to highlight that respiratory & cardiovascular systems share similar control mechanisms, thus alterations in one system will modify the functioning of the other.

CONCLUSION:

Hence we concluded that practicing breathing exercises enhances parasympathetic activity, vagal tone and decreases the sympathetic excitability, thereby effectively reducing the blood pressure, it can be emphasized as a

non-pharmacological adjunct in hypertensive patients along with drug treatment but there is no significant difference in between types of exercises, as DBE & ACBT both shows significant effects on hypertensive patients but don't shows any significant difference in types of exercises selected, so p-value <0.33 hence null hypothesis accepted & alternative hypothesis rejected.

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