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An Experimental Study on Effectiveness of Spontaneous Respiratory Modulation and Aerobic Exercise in Subjects with Grade-1 Hypertension

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Abstract

Background: Objective of the study was to compare the effect of spontaneous respiratory modulation and aerobic exercise in Grade 1 hypertensive patients. Study Design is an Experimental study, study was conducted at Co-operative Institute of Health Sciences, Thalasseri, India, A total numbers of 30 subjects were included for the study according to inclusion and exclusion criteria of the study.

Intervention: The participants were divided into two groups, experimental group (=15) and control group (n=15). The control group received aerobic exercise on five days per week for a month, while the experimental group was assigned to do spontaneous respiratory modulation on two days per week and aerobic exercise on five days per week for a month.

Outcome measures: Systolic blood pressure and Diastolic blood pressure was evaluated using sphygmomanometer.

Results: Significant improvements in all outcome parameters were observed in response to the intervention. Between group analysis showed a statistically significant difference in SBP (P=0.000) and DBP (P=0.008).

Conclusion: The study concluded that spontaneous respiratory modulation and aerobic exercise training is an effective approach to improve blood pressure in grade 1 hypertensive patients.

Keywords

Spontaneous respiratory modulation; Aerobic exercise; Hypertension; Physiotherapy; Exercise protocol

Introduction

High blood pressure has been observed as a major health problem that prevails in India affecting the urban and rural population [1,2]. Persistent elevation of arterial blood pressure above 140 mm Hg systolic or 90 mm Hg diastolic is defined as hypertension.

WHO/ISH has divided hypertension into three grades: Grade 1 (Systolic BP 140-159 mm Hg, Diastolic BP 90-99 mm Hg), Grade 2 (Systolic BP 160-179 mm Hg, Diastolic BP 100-109 mm Hg), Grade 3 (Systolic BP ≥ 180, Diastolic BP ≥110) [3]. Hypertension is classified as primary or essential hypertension and secondary hypertension. Though primary hypertension is strongly associated with lifestyle, it has no specific origin. It is treated with changes in diet, increased physical activity, and medication as it has been responsible for 90 to 95% of diagnosed hypertension. The main cause of Secondary Hypertension is the pre-existing medical condition such as congestive heart, kidney and liver failures, or damage to the endocrine system [4], responsible for 5 to 10% of diagnosed hypertension.

The term "Hypertension" states that Hypertension is a common disease that contributes importantly to the high cardiovascular morbidity and mortality observed in industrialized countries. The proper diagnosis and management of this disorder affords considerable reduction of the risk of developing cardiac, cerebral, and renal complications. Approximately 95% of patients with high blood pressure exhibit the so-called essential or primary form of hypertension [5].

"Trends in hypertension epidemiology in India" stated that cardiovascular disease caused 2.3 million deaths in India in 1990 and this is projected to double by the year 2020. Hypertension is directly responsible for 57% of all stroke death and 24% of all coronary heart disease death in India. As per this study on an average there are 31.5 million hypertensive subjects in rural and 34 million in urban populations and 70% of these would be 'stage I hypertension'. Recent reports show that borderline hypertension and stage I hypertension carry a significant cardiovascular risk and there is a need to reduce this blood pressure. For this, population based cost effective hypertension control strategies should be developed [6].

Hypertension affects 23.10% men and 22.60% women over 25 years old in India. Increased blood pressure is a high-risk condition that causes approximately 51% deaths from stroke and 45% from coronary artery disease. It was directly responsible for 7.5 million deaths in 2004 that is about 12.8% of the total global deaths [7]. A survey of 26,000 adults in South India showed a hypertension prevalence of 20% (men 23% and women 17%) but 67% of those with hypertension was unaware of their diagnosis. Most of the people still remain undetected and it's controlling also inadequate. These situation calls for urgent prevention and control measures [8].

A recent survey study on hypertension and stroke in Asia, which expressed about the prevalence, control and strategies in developing countries for prevention of hypertension and stroke, States that In India, China, Philippines, Thailand, Sri Lanka, Iran, Pakistan, Nepal, there has been a rapid increase in stroke mortality and prevalence of hypertension. According to the new criteria the prevalence of hypertension varies between 15%-35% among urban adults and it is two to three times lower among rural subjects. Hypertension and stroke occur at a relatively younger age and the risk of its increase is at lower levels of BMI of 23-25 kg/m^2 among Asians. It has been observed that overweight, sedentary behaviour, alcohol, higher social class, salt intake, diabetes mellitus and smoking are main risk factors of hypertension [9].

Progression of hypertension is strongly associated with functional and structural cardiac and vascular abnormalities that damage the heart, kidneys, brain, vasculature, and other organs and lead to premature morbidity and death [10]. 70% of these patients would be

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Stage I hypertensive. Each 10 mm of Hg increase in blood pressure doubles the risk of death in hypertensive patients [11]. Recent reports show that borderline hypertension (systolic BP 130-139 mm Hg and/or diastolic BP 85-89 mm Hg) and Stage I hypertension carry a significant cardiovascular risk [12]. 91% of hypertension cases precede the development of Congestive Heart Failure (CHF) with high blood pressure increase having the risk of developing CHF by two to three times [13].

Lowering blood pressure with antihypertensive drugs can reduce the risk [14]. 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. Several studies have demonstrated that lifestyle modifications such as physical exercise, salt restriction and weight reduction can lower BP [14,15].

Baroreflex sensitivity can be improved by slow breathing and it decreases blood pressure in healthy [16] and hypertensive subjects [17]. Therefore, respiratory modulation may be of therapeutic value in controlling hypertension. According to a study, such improvement is associated with a change in patient's breathing pattern, which would initiate at a lower frequency and higher amplitude [18]. The breathing exercises that is practised regularly increases parasympathetic tone, decreasing the sympathetic activity, and as a result it improves the cardiovascular and respiratory functions and decreases the effect of stress and strain on the body and improves the physical and mental health [19,20].

In hypertensive and normotensive person's blood pressure can be reduced by the aerobic exercises. For the prevention and treatment of high blood pressure aerobic physical activity can be considered as an important component of lifestyle modification [17]. To promote and maintain health, all healthy adults aged 18-65 years, need moderate-intensity aerobic physical activity for a minimum of 30 minutes on five days each in a week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week [21].

Subjects with hypertension are known to have a two-fold higher risk of developing coronary artery disease (CAD), four times higher risk of congestive heart failure and seven times higher risk of cerebrovascular disease and stroke compared to normotensive subjects [22].

Reducing blood pressure can decrease cardiovascular risk and this can be achieved by lifestyle measures in mild cases and should be the initial approach to hypertension management in all cases. This includes dietary interventions weight reduction, tobacco cessation, and physical activity [1].

There are many studies on effect of aerobic exercise in hypertension. The effect of aerobic training in reducing clinical blood pressure in hypertensive subjects is well proven and accepted. There are only few studies which explain about effect of spontaneous respiratory modulation in hypertensive patient. Therefore, the purpose of the study is to find out effectiveness of spontaneous respiratory modulation and aerobic exercise and to compare the effect of spontaneous respiratory modulation and aerobic exercise in subjects with Grade 1 hypertension.

Materials and Methods

A total 30 subjects were selected based on inclusion criteria.

Grade 2 hypertension and Grade 3 hypertension, Secondary hypertension; patients with recent cardiovascular and Pulmonary disease/disorders were excluded from the study. Patients reported of Cardiac arrhythmias, patient on Antihypertensive drugs, Subjects with major neurologic disease, recent fracture and surgery of spine upper and lower extremity, any Psychogenic disorders like Physical fatigue, depression and frustration were also excluded. Non-alcoholic, non-smoker and Cooperative patients were only included in the study.

The total duration of the study was 3 months and duration of exercise for each individual subjects was 4 weeks.

Grade 1 Hypertension and both genders with age group 45-55 years were included in the study. Subjects were explained about the research work and a written informs consent was collected. Selected subjects were informed to sign a consent stating the voluntary participation in this study. An institutional ethical clearance was obtained. The study was conducted at Co-operative Institute of Health Science, Thalasseri, India.

Later the subjects were divided into two groups, Control Group and Experimental Group based on purposive random sampling method. Control Group was given aerobic exercise and Experimental Group was given spontaneous respiratory modulation and aerobic exercise. The procedures were explained to them and exercises were demonstrated with commands. Prior to the training pre-test systolic and diastolic blood pressure was measured using sphygmomanometer. After pre-test measurement training was given as per protocol. Post-test measurements were taken after the end of 4^{th} week training.

Group I received an exercise protocol which included an Aerobic Exercise regime. It includes Warm up phase (10 minutes)**,** 5 minute of light (low intensity) physical activity such as walking, jogging on the spot. Pumping arms or makes large but controlled circular movements with your arms to help warm the muscles of your upper body. Static stretching was performed after muscles warm up state.

A Static stretching for 5 minutes for patients were also performed (stretching a muscle and holding it in this position without discomfort for 10-30 seconds).

Aerobic phase (30 minutes) includes Static cycling, Intensity: Moderate 12-13 RPE Duration: 30 minute session 5 days per week for a month. Cool down phase (10 minutes) Low intensity exercise for 5 minutes and Static stretching for 5 minutes.

Whereas Group II receives Spontaneous Respiratory Modulation: Training protocol for breathing control was applied using, first, diaphragmatic, intercostal, and upper chest breathing pattern to make the patient aware of his respiratory movements. Patients were asked to lie supine, with knees flexed and feet flat on the floor, and raise their hands to the area of the chest related to each breathing pattern: diaphragm, intercostal muscles, and clavicular region. At each breathing pattern, patients were instructed to feel and identify the rib cage motion and its amplitude. Subsequently, they were instructed to decrease their respiratory rate gradually while increasing respiratory amplitude. This procedure was performed ten times for each breathing pattern.

The patients then sat down and performed the slow breathing technique, intended to promote quieter breathing by increasing respiratory amplitude and reducing respiratory rate while the three breathing patterns described above are simultaneously performed. This technique was done in 30-minute sessions held twice a week during one month.

Other than the above mentioned procedure, an aerobic phase (30 minutes) and Cool down phase (10 minutes) were performed. Aerobic phase (30 minutes) includes a static cycling Intensity: Moderate 12-13

RPE, Duration: 30 minute session 5 days per week for a month and a Cool down phase (10 minutes) includes low intensity exercise for 5 minutes static stretching for 5 minutes.

Statistical analysis

All the data were collected and cleaned and checked in SPSS 16 version for any missing or wrong entry. Kolmogorov-Smirnov test was done to find out the normality in the groups. Paired' t-test was performed as parametric test to find out the intra group significance and for inter group significance Mann-Whitney 'U' test was used as a non-parametric test.

Results and Interpretation

All the data were collected and entered in SPSS 16 version, the demographical data of the two groups are illustrated below (Table 1).

In Control group consist of 15 subjects with mean age 49.80 ± 3.234 (SD), Mean Height of 161.60 ± 5.234 (SD), Mean Weight of 64.53 ± 3.441 (SD) and Mean BMI 24.9340 ± 0.88831 (SD) and in Experimental group consist of 15 subjects with mean age 49.73 ± 2.789 (SD), Mean Height of 161.87 ± 4.190 (SD), Mean Weight of 64.47 ± 3.378 (SD) and Mean BMI 24.3987 ± 1.45631 (SD) (Graph 1).

Analysis of scale used in the study was checked and statistical analysis was performed by SPSS 16.0 software and the results are illustrated below.

Analysis of scale 1

From above table, it is evident that 't' test was used to analyse the intra group significance of SBP of control group (Table 2).

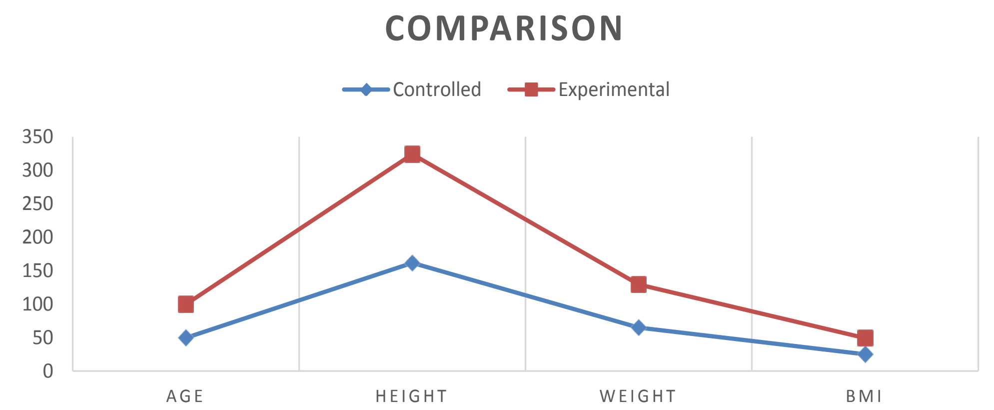
The above table shows the paired 't' test scores of SBP of control group (Table 3).

Interpretation: The Graph 2 shows that mean pre-test SBP value of control group is 149.27 and the post-test value is 145.4 so there is significance difference in pre and post-test value in control group and from the graph it is clear that the systolic blood pressure has decreased significantly in post-test. It also represents mean pre-test SBP value of experimental group is 150.4 and the post-test value is 145.33 so there is significance difference in pre and post-test value in experimental group and from the graph it is clear that the systolic blood pressure has decreased significantly in post-test.

From above table, it is evident that 't' test can be used to analyse the intra group significance of SBP of experimental group (Table 4).

Table 1: Mean of age, height, weight and BMI of control group and experimental group.

Variables	Controlled Group (n=15)				Experimental Group (n=15)			
	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation
Age	45	55	49.80	3.234	46	54	50.13	2.669
Height	153	169	161.60	5.514	155	167	162.40	4.517
Weight	61	70	65.07	2.939	60	69	64.27	3.105
BMI	23.42	26.56	24.9340	0.88831	21.77	28.30	24.3987	1.45631



Graph 1: Mean Age, Mean Height, Mean weight, mean BMI of subjects in control and experimental group.

Table 2: Test of normality for intra-group significance of SBP control group.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig.
SBP Pre Test	.100	15	.200	.970	15	.861
SBP Post Test	.133	15	.200	.963	15	.747

Table 3: Analysis pre-test and post-test scores of SBP of control group.

Control group		Mean	Std Deviation	Std error mean	95% confidence interval of difference		T	df	Sig
					Lower	Upper			
SBP	**Pre test**	149.27	5.861	1.513	3.455	4.278	20.149	14	.000
	Post test	145.40	6.345	1.638					

The above table shows the paired 't' test scores of SBP of experimental group (Table 5).

From above table, it is evident that the inter-group significance of SBP can be analysed by Mann-Whitney U Test (Table 6).

Interpretation: From above table through Mann-Whitney U-test, it is evident that significant value .000 which is less than probability value p=0.05; which indicates that there is significant difference of SBP in the control and experimental group. Hence, pre-test and post-test value difference of experimental group shows grater improvement than that in control group (Table 7).

Analysis of scale 2

From above table, it is evident that 't' test can be used to analyse the intra group significance of DBP of control group (Table 8).

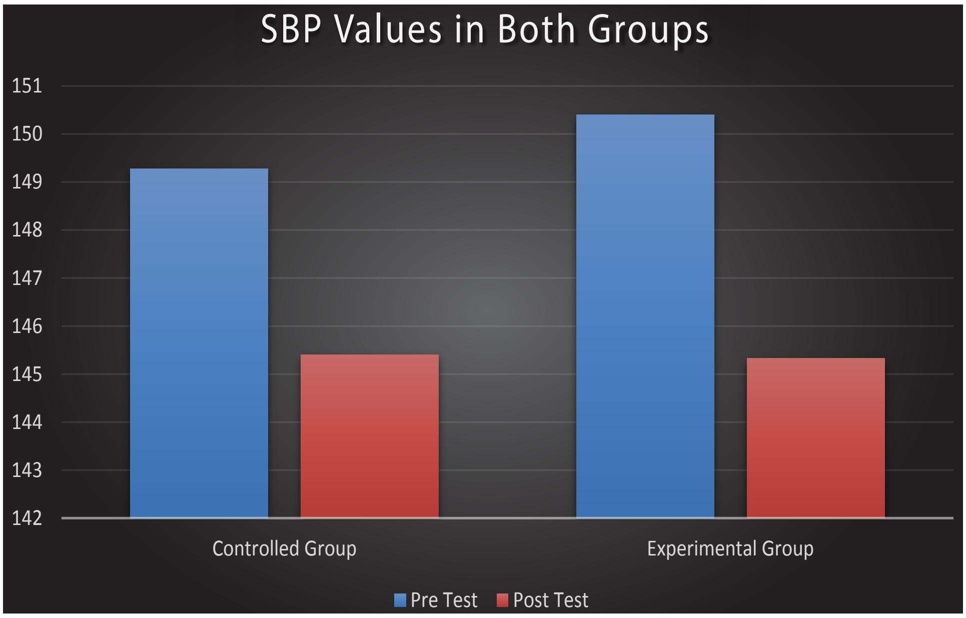
The above table shows the paired 't' test scores of DBP of control group (Table 9).

From above table, it is evident that 't' test can be used to analyse the intra group significance of DBP of experimental group (Table 10).

The above table shows the paired 't' test scores of DBP of experimental group (Table 11).

From above table, it is evident that the inter-group significance of DBP can be analysed by Mann-Whitney U Test (Table 12).

Interpretation: From above table through Mann-Whitney U-test, it is evident that significant value .008 which is less than probability value p=0.05; which indicates that there is significant difference of DBP in the control and experimental group. Hence, pre-test and post-test value difference of experimental group shows grater improvement than that in control group (Table 13).



Graph 2: Mean score of SBP of control group.

Table 4: Test of normality for intra-group significance of SBP experimental group.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig.
SBP Pre test	.144	15	200	.950	15	.527
SBP Post test	.132	15	200	.969	15	.839

Table 5: Analysis pre-test and post test scores of SBP of experimental group.

Experimental group		**Mean**	**Std Deviation**	**Std error mean**	**95% confidence interval of difference**		**T**	**df**	**Sig**
					Lower	**Upper**			
	Pre test	150.40	5.180	1.337					
SBP	**Post test**	145.33	5.381	1.389	4.677	5.456	27.884	14	.000

Table 6: Test of normality for inter-group significance of SBP.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig.
Control SBP	.238	15	.022	.817	15	.006
Experimental SBP	.271	15	.004	.815	15	.006

Table 7: Analysis of pre-test and post-test value difference of SBP of control and experimental group.

VAR00004	**N**	**Mean rank**	**Sum of ranks**
PRESBP-POSTSBP 1 2 Total	15 15 30	20.90 10.10	313.50 151.50
Mann-Whitney U Wilcoxon W Z Asymp.Sig (2-tailed) Exact Sig [2*(1-tailed Sig.)]	31.500 151.500 -3.526 .000 .000[a]		

Table 8: Test of normality for intra-group significance of DBP control group.

	Kolmogorov-Smirnov			**Shapiro-Wilk**		
	Statistic	df	Sig	Statistic	df	Sig.
DBP Pre test	.126	15	.200*	.938	15	.352
DBP Post test	.139	15	.200*	.949	15	.503

Table 9: Analysis pre-test and post test scores of DBP of control group.

Control group		**Mean**	**Std Deviation**	**Std error mean**	**95% confidence interval of difference**		**T**	**df**	**Sig**
					Lower	**Upper**			
DBP	**Pre test**	94.80	3.052	.788	1.847	2.419	16.000	14	.000
	Post test	92.67	3.436	.887					

Table 10: Test of normality for intra-group significance of DBP experimental group.

	Kolmogorov-Smirnov			**Shapiro-Wilk**		
	Statistic	df	Sig	Statistic	df	Sig.
SBP Pre test	.149	15	200*	.931	15	.285
SBP Post test	.109	15	200*	.983	15	.985

Table 11: Analysis pre-test and post test scores of DBP of experimental group.

Experimental group		**Mean**	**Std Deviation**	**Std error mean**	**95% confidence interval of difference**		**T**	**df**	**Sig**
					Lower	**Upper**			
DBP	**Pre test**	95.60	2.667	.689	2.344	3.123	15.043	14	.000
	Post test	92.87	3.114	.804					

Table 12: Test of normality for inter-group significance of DBP.

	Kolmogorov-Smirnov			**Shapiro-Wilk**		
	Statistic	df	Sig	Statistic	df	Sig.
Control DBP	.402	15	.000	.694	15	.000
Experimental DBP	.381	15	.000	.771	15	.002

Table 13: Analysis of pre-test and post-test value difference of DBP of control and experimental group.

VAR00005	**N**	**Mean rank**	**Sum of ranks**
Pre DBP-Post DBP 1 2 Total	15 15 30	19.33 11.67	290.00 175.00
Mann-Whitney U Wilcoxon W Z Asymp.Sig (2-tailed) Exact Sig [2*(1-tailed Sig.)]	55.000 175.000 -2.638 .008 .016[a]		

Discussion

The study performed was opted an experimental pre-test, post-test approach to find out the effect of spontaneous respiratory modulation with aerobic exercise in Grade-1 hypertension.

In this study, 30 stage 1 hypertensive patients satisfying the inclusion criteria were selected and they are divided into two groups experimental group (n=15) and control group (n=15). Both the group were assessed on the first day and the last day of treatment. Systolic and Diastolic blood pressure reference were taken and noted. Those values were taken as Pre and Post blood pressure value which was measured by using sphygmomanometer.

The result of the study showed that there is improvement in both the groups, and the experimental group training was found to be more beneficial than the control group training on improving blood pressure in Grade 1 hypertensive subjects.

The effect of aerobic training in reducing clinical blood pressure in hypertensive subjects is well proven and accepted. Hypertension has a multifactorial etiology and, therefore, several mechanisms may be involved in the hypotensive effects of aerobic training. Nevertheless, a meta-analysis [23] has concluded that aerobic training reduces blood pressure due to a reduction in peripheral vascular resistance.

During dynamic exercise, cardiac output increases dramatically to ensure adequate perfusion to the working musculature. This increase is achieved by a withdrawal of parasympathetic tone (causing an increased heart rate and contractility), an increase in sympathetic activity (directly and indirectly increasing heart rate and contractility) and pronounced vasoconstriction of the venous vasculature (causing a greater venous return and therefore stroke volume). In parallel, the need for increased blood flow and oxygen delivery to the exercising muscle is achieved through regional vasodilatation of those arterioles supplying blood to the exercising tissue in combination with a vasoconstriction of arterioles, which perfuse non-essential tissues. Contraction of the active muscle mass also assists in returning blood towards the heart. This 'muscle pump' effect further increases venous return and stroke volume. Increased cardiac output and vasoconstriction in non-exercising vascular beds increases systolic blood pressure (SBP), but the significant vasodilation at the exercising muscle beds helps to buffer this increase and results in a minimal rise in diastolic blood pressure (DBP). As exercise continues at the same intensity, blood pressure is often found to diminish from the peak values achieved early in exercise. This may be attributed to a redistribution of blood to the periphery for heat dissipation, and a resultant reduction in cardiac filling [24].

During endurance exercise (i.e. cycling, running), SBP is tightly coupled to the exercise intensity and can often reach values of over 200 mm Hg [25]. Although it is usually reported that DBP changes little throughout changes in the exercise intensity, Palatinis [26] has suggested that changes in DBP are more variable and can range from a slight decrease, due to the vasodilatation of the muscle vasculature, to an increase of 10 to 20 mm Hg, presumably from the occlusion of blood flow caused by the forceful contractions of the exercising muscle. Following exercise, blood pressure rapidly returns to normal.

The results of our study are supported by studies in the literature showing that an acute slow and regular breathing pattern may beneficially affect reflex control of the cardiovascular system and modulates BP, probably *via* stimulation of slowly adapting pulmonary stretch receptors [27-29]. More specifically, slowing down breathing rate increases baroreceptor sensitivity [30]. According to Joseph et al. [17], the decrease in blood pressure during slow breathing, more precisely less than ten breaths per minute (BPM), is associated with improved baroreflex sensitivity, which states a change in autonomic balance resulting from an absolute or relative reduction in sympathetic activity or increase in parasympathetic tone.

Slow breathing at 6 cycle/minute affects all respiratory rate interval fluctuations and cause them to merge at the rate of respiration and to increase greatly in amplitude. This increase in RR interval fluctuations (relative to blood pressure changes) has the effect of enhancing the baroreflex efficiency [31,32] and in turn, might have contributed to lower blood pressure. It reduces sympathetic activity by enhancing central inhibitory rhythms [33] as result it decrease the blood pressure while enhancing the baroreflex. Added to that, the increase in Vt (Tidal Volume) (deriving from the slowing in breathing rate) activates the Hering-Breuer reflex [34] which in turn reduces the chemoreflex sensitivity and thus might enhance the baroreflex by reducing blood pressure and sympathetic activity [34-37]. Whatever may the mechanism, it is certain that changes in sympathetic activity and in baroreflex sensitivity are interrelated [38,39].

In hypertension, the sympathetic hyperactivity has been found associated with a generalized enhancement of the excitatory pathways, leading not only to sympathetic vasoconstriction, but also chemoreflex activation [40,41]. Therefore, one can expect that a modification in the respiratory control would affect also the control of the cardiovascular system, as the breathing is also under voluntary control and so it is possible to induce such changes by voluntary breathing modification. This may induce long-term cardiovascular and respiratory effects as a result of independent volitional control.

Hypertensive patients have a tendency to hyperventilate, the higher respiratory rate and the lower values of Breath-by-breath end-tidal CO_2 (CO_2-et) clearly point to this conclusion. This may have important consequences because it is well known that an enhanced chemoreflex can increase sympathetic activity and, in turn, increase blood pressure [37,42,43]. Therefore, manipulation of the breathing pattern bears a logical rationale because by using a voluntary stimulus on respiration, we can induce reflex changes on the cardiovascular system. Slow breathing did not change minute volume and end-tidal carbon dioxide ($ETCO_2$) [17]. When CO_2 is within the resting values, the patient tolerates slow breathing, and with adequate training it can be maintained for a longer period without inducing hyperventilation.

On statistical analysis, the mean pre-treatment value of SBP was 150.40 and 149.27 for experimental and control group respectively and mean post treatment value of SBP was 145.33 and 145.40 for experimental and control group respectively. Both experimental and control group shows that decrease of SBP 5.07 and 3.87 for respectively. This reveals that there is an improvement of Systolic blood pressure in experimental group when compare to control group.

On statistical analysis, the mean pre-treatment value of DBP was 95.60 and 94.80 for experimental and control group respectively and mean post treatment value of DBP was 92.87 and 92.67 for experimental and control group respectively. Both experimental and control group shows that decrease of DBP 2.73 and 2.13 for respectively. This reveals that there is an improvement of Diastolic blood pressure in experimental group when compare to control group.

The result showed that the experimental group was more significant. This favourable improvement of blood pressure indicates that Spontaneous respiratory modulation and aerobic exercise can be advisable in Grade 1 hypertension.

Conclusion

The study was an experimental approach- pre-test, post-test with control group design, aimed to evaluate the effect of spontaneous respiratory modulation and aerobic exercise in Grade 1 hypertensive subject. Population included Grade 1 hypertension with age group 45 to 55 years. Thirty samples were selected based on inclusion and exclusion criteria. All the subjects were divided into two groups, experimental group and control group based on purposive random sampling method.

Experimental group was given spontaneous respiratory modulation and aerobic exercise and control group was given aerobic exercise only.

The outcome measures used for study were Systolic blood pressure and Diastolic blood pressure. The measurements were taken prior to commencement of treatment (pre-test) and after 4 weeks (post-test).

The result of statistical analysis showed significant improving in the systolic and diastolic blood presser in Grade 1 hypertension.

Spontaneous respiratory modulation and aerobic exercise appears to be a useful adjunctive for improving blood pressure in s Grade 1 hypertensive patients. And it showed the potential to be a simple and inexpensive method to reduce blood pressure and it can be advisable in Grade 1 hypertension.

Recommendations

1. To establish the accuracy of the study, a large sample size can be taken and Use of a different outcome measure could make the study more valuable.

2. Activities, stressful events, and food consumption should be evaluated and Blinding of the procedures could improve the reliability of the outcome.

3. To make the results more valid and more generalized, a long term study may be carried out in all age group people would be suggested.

Conflicts of Interest

No conflicts of interest reported among authors.

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