

To Compare the Effects of Aerobic Exercise Versus Jacobson's Progressive Muscular Relaxation Exercise on Hypertension

G Tharani*, Ragipati Jyothi, K Kamatchi and VB Udhayapriya

Faculty of Physiotherapy, Dr. M.G.R. Educational and Research Institute, Chennai, India

***Corresponding Author:** G Tharani, Faculty of Physiotherapy, Dr. M.G.R. Educational and Research Institute, Chennai, India.

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Abstract

Hypertension is an important global health issue invariably affecting all the races of people. It is a leading cause of cardiovascular disease and premature death world-wide. High BP usually has no symptoms, but it can cause serious problem such as stroke, heart failure, heart attack and kidney failure. Individual with hypertension use long term medications to keep their BP under control. Recent studies have reported that 60 percent of patients using antihypertensive drugs end up with one or many adverse reactions. Like, Increased frequency of micturition, headache, insomnia, fatigue, swollen ankles/oedema, muscular cramp/myalgia, dizziness upon standing up, palpitation and reduced sexual urge. Unhealthy diet, poor physical activity and personal habits also increase the prevalence of hypertension. Since there is an urge to find an alternate therapy to reduce the adverse effects of medication and to improve the life style of hypertensive patients, this study intended to examine the effects of Aerobic exercise and Jacobson's progressive muscular relaxation on blood pressure. 60 hypertensive subjects aged between 40 - 60 years participated in this study. One half of the individuals performed aerobic exercise and the other half performed Jacobson's progressive muscular relaxation exercise for a period of 4 weeks. Sphygmomanometer was used to assess the blood pressure in pre and post intervention period. We found that both Aerobic exercises and Jacobson's progressive muscular relaxation significantly reduced the blood pressure among the individuals who participated in the study.

Keywords: Hypertension; Aerobic Exercise; Jacobson's Progressive Muscular Relaxation; Sphygmomanometer

Abbreviations

JPMR: Jacobson's Progressive Muscular Relaxation; AE: Aerobic Exercise; BP: Blood Pressure; WHO: World Health Organisation; HTN: Hypertension

Introduction

Hypertension is ranked as fourth top most disease on the basis of its prevalence [1]. Since most of the individuals who suffer from hypertension do not have specific symptoms related to their elevated blood pressure it is often called as the silent killer [2]. High blood pressure is one of the most important modifiable risk factors for cardiovascular disease, which accounts for one in every eight deaths worldwide [3]. It is accounting for 10% of overall deaths in India [4].

Hypertension is a major emerging health problem in India which is more prevalent in urban than in rural population [5,6] and associated with a higher risk of developing Chronic Heart Disease, Chronic Heart failure and stroke [7]. Hypertension is directly responsible for

57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India [8]. Systematic hypertension is a multifactorial clinical condition characterized by persistently high blood pressure (BP) levels with systolic BP 140 mm Hg and diastolic BP 90 mm Hg [9].

Hypertension affects nearly 26 per cent of the adult population worldwide [10]. The prevalence of diseases and hypertension is rapidly increasing in developing countries [11]. A recent report on the global burden of hypertension indicates that nearly 1 billion adults (more than a quarter of the world's population) had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2025. 20.6% of Indian men and 20.9% of Indian women were suffering from hypertension in 2005. The rates for hypertension in percentage are projected to go up to 20.9 and 23.6 for Indian men and women, respectively by 2025 [12]. The recent systematic review estimated that the overall worldwide prevalence of HTN is approximately 26% in the adult population. Awareness varies from 25% to 75% and treatment varies from 11% to 66%, the control of HTN widely ranges from a low of 5% up to 58% [13].

Widespread use of antihypertensive medications has slightly reduced the global mortality over the past four decades. In contrast, it has increased the frequency of adverse effects like headache, insomnia, fatigue, swollen ankles/oedema, muscular cramp/myalgia, dizziness upon standing up, palpitation on the long-term antihypertensive drug users. The fright of adverse effects and the cost of these drugs has resulted in nonadherence to therapy, increased morbidity and mortality in low- and middle-income countries [15,16]. Hence, people are in hunt of low cost non-pharmacological therapies and alternate therapies with no adverse effects for keeping themselves fit with their blood pressure under control.

In recent time, aerobic exercise is advised by physical therapists for health promotion and as prophylaxis for many cardiovascular diseases. They refer to all exercises that involve major muscle groups and improve oxygen consumption by the body. Many methods of aerobic exercises are available like walking, jogging, running, cycling, and others. Recent studies confirm that aerobic exercise would result in reduction of blood pressure [17]. Dynamic moderately intense AE is recommended for the prevention and treatment of high blood pressure [18].

There are several types of relaxation therapies such as stretch release relaxation, Jacobson's progressive muscle relaxation, cognitive imagery relaxation and some types of medications. The deep relaxation technique produces an immediate reduction in state of anxiety [19]. Jacobson's progressive muscular relaxation shows decrease in blood pressure and decrease in respiratory rate [20]. PMR is a systematic technique used to achieve a deep state of relaxation and has been shown to improve health-related quality of life in a variety of medical and psychiatric illnesses [21-23].

There are studies on aerobic exercise and jacobson's progressive muscular relaxation on the immediate effects of reduction in blood pressure but, there is lack of literature on comparison of AE and JPMR, its late effects on blood pressure and adherence of middle-class people to exercise. Hence this study intended to compare aerobic exercise and jacobson's progressive muscular relaxation on blood pressure.

Materials

Sphygmomanometer.

Methods

This experimental study was carried out at Faculty of physiotherapy department, Dr. M.G.R. Educational and Research Institute for 4 weeks after the approval of this proposal by Institutional Review Board. Subjects 40-60 years with clinically diagnosed hypertension under medication for more than 6 months, having blood pressure above 140/90 mm Hg and those who can follow instructions were included in the study after obtaining the consent for participation. Subjects with any other systemic illness, psychologically unstable subjects, subjects who are not taking medications and who reported about aggravation of any symptom due to exercise were excluded from

the study. They were divided into two groups, Group-A and Group-B. Blood pressure of all the subjects were assessed with sphygmomanometer before and after the intervention. Group A performed aerobic exercise and Group B performed Jacobson’s progressive muscular relaxation for about 30 minutes. Both groups performed the exercises 5times/week for a period of 4 weeks.

Group A (Aerobic exercise)

Aerobic exercise was performed in the form of walking for 30 minutes (5 times/week) for 4 consecutive weeks by the subjects in Group - A.

Group B (Jacobson’s progressive muscular relaxation exercise)

JPMR was performed for 30 minutes (5 times/week) for 4 consecutive weeks by the subjects in Group-B. The subjects were instructed to lie on the floor or recline in a chair with eyes closed, then tense the muscle for 5 seconds and relax the same muscle for 10 seconds progressively from distal to proximal, one by one involving all the muscles of the body. The subjects were also instructed to take 2 - 3 deep breaths in between each step.

Results

In both systole and diastole, statistically high significant difference was found between the pre-test and post-test values within group A and group B at $P \leq 0.001$.

Comparison of systolic pressure within group-A and group-B between pre and post test values

SYS	Pre-Test		Post Test		T - Test	Df	Significance
	Mean	S. D	Mean	S. D			
Group-A	143.3	5.46	124.0	5.63	23.543	29	0.000***
Group-B	144.0	4.98	123.6	6.68	15.503	29	0.000***

Table 1: Group A: AE; Group B: JPMR.

Comparison of diastolic pressure within group-A and group-B between pre and post test values

DS	Pre-Test		Post Test		T - Test	Df	Significance
	Mean	S. D	Mean	S. D			
Group-A	93.66	4.90	81.33	3.45	15.703	29	0.000***
Group-B	93.00	6.51	82.66	5.20	10.179	29	0.000***

Table 2: Group A: AE; Group B: JPMR.

Discussion

Hypertension attributes to 6% of global burden of diseases and is responsible for 7.7 million global premature deaths annually due to cardiovascular diseases. It is also accountable for the high prevalence of cerebrovascular accidents in young and middle-aged adults [24]. Most people with hypertension are unaware of the problem because no warning signs or symptoms occur during its early stages. Knowledge of lifestyle modification such as reduced salt and fat intake, increased physical activity, cessation of smoking and alcohol consumption is needed to reduce the prevalence and other health complication following hypertension.

In this study subjects showed a significant reduction in both systolic and diastolic blood pressure after aerobic exercise training which corresponds to the findings of Roque FR., *et al.* that AE can reduce blood pressure via improving vascular stiffness and endothelial function [25]. It can be also due to the fact, that psychological stress which is an appropriate important factor in the pathogenesis of hypertension is reduced after AE as stated Harshfield GA., *et al* [26]. The subjects in this study showed reduction in blood pressure after JPMR which involves physical and mental components in the form of tensing and relaxing of different muscle groups. This can be related to the findings of İbrahimoğlu that with PMR, the sympathetic nervous system tone decreases, and the parasympathetic nervous system increases, so the heart rate slows down, blood pressure drops, breathing rate decelerates, oxygen need decreases, metabolic rate slows down, pupils dilate, peripheral dilatation begin by increasing the peripheral heat, blood flow to big muscles increases, muscular rigidity, stress, fatigue and pain reduce and comfortable sleep is provided [27].

Thus, the results of our study found that both Aerobic exercise and Jacobson's progressive muscular relaxation is effective in reducing blood pressure.

Conclusion

From this study, it is inferred that both AE training and JPMR training can be used as an adjunct therapy in maintaining the blood pressure under control in hypertensive subjects as there is no significant difference between both the trainings on blood pressure. Thus, in future studies with larger sample size involving hormonal and vascular evaluation is recommended to find the exact effects of AE and JPMR on hypertension.

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Conflict of Interest

Nil.

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