International Journal of Medical and Health Research
ISSN: 2454-9142, Impact Factor: RJIF 5.54
www.medicalsciencejournal.com
Volume 3; Issue 1; January 2017; Page No. 29-32

Effect of aerobic exercise training on hypertensive women

B Sujatha, Annie George

[1] Assistant Professor, Saveetha College of Physiotherapy, Chennai, Tamil Nadu, India
[2] Meenakshi College of Physiotherapy, Chennai, Tamil Nadu, India

Abstract
Background: The present study was undertaken to examine the effect of aerobic exercise training on hypertensive women, there is substantial evidence that the use of aerobic exercise is associated with a reduction in hypertension
Objective of the study: - Aim of this study is to find out the effect of aerobic exercise on systolic and diastolic blood pressure among hypertensive women.
Methodology: - The study was Experimental design set up in JIG N JOGS fitness centre, Kilpauk Chennai.
35 Female hypertensive subjects were selected by Simple Random sampling
Procedure: - Adult women aged 18 – 60 years with grade-1 hypertension were recruited for 6 weeks aerobic exercise training program. At the beginning of each exercise session blood pressure recordings were taken before the warm up period after recording the pre exercise blood pressure. After the warm up period, the subjects performed 20 minutes of bicycle ergometer within 50 – 60% heart rate. This was recorded using a wrist watch heart rate monitor. Rest was given when the subjects needed, The blood pressure was then monitored after the cool down. For statistical analysis the Blood Pressure at the beginning of 1st week and Blood Pressure at the end of 6th week were taken and results were obtained.
Results: - Data for pre diastole shows a mean value of 82.33 and 27 standard error of mean. The post diastole values at the end of 6th week shows a mean value of 82.07 and 26 standard error of mean. When pre-diastole and post diastole were compared using paired sample T-test, it shows a p-value of 0.043 which states a slight significance at 0.05 level. This analysis shows that the diastolic blood pressure has been slightly reduced after the aerobic exercise regime.
Conclusion: - The overall result suggests that aerobic training may lower conventional blood pressure and that borderline hypertension.

Keywords: aerobic exercise, hypertension

Introduction
Hypertension, also known as high blood pressure is defined as "chronically elevated blood pressure with systolic pressure of 140mmHg and diastolic pressure of 90mmHg[19].Hypertension can be effectively controlled at the initial stage (stage 1) by life style modifications[7].The greatest reduction in blood pressure is among those with base line values. Even the smallest reduction in blood pressure seems to be highly significant, as it reduces the risks of Cardio Vascular Diseases[6]. It is been proved that performing aerobic exercises reduces the blood pressure atleast to 2 to 3 mm Hg which is also considered as a significant reduction in the treatment of hypertensive patients.
In this study, we have attempted to isolate the effects of aerobic exercise on hypertension.

Objective of study
The objective of my study is to determine the antihypertensive efficacy of aerobic exercise training in high normal and grade1 unmedicated hypertension.

Hypothesis
Null Hypothesis (H0)
Aerobic exercise does not have an independent capacity to lower the systolic and diastolic blood pressure.

Experimental hypothesis (H1)
Aerobic exercise has an independent capacity to lower the systolic and diastolic blood pressure.

Materials and Methodology
- **Study Design**: Experimental design
- **Study Setting**: The study was set up in JIG N JOGS fitness centre, Kilpauk Chennai. The fitness centre followed an aerobic regimen, which suits my study.
- **Sampling Size And Method**: 35 Female hypertensive subjects, Simple Random sampling
- **Sampling Criteria**

Inclusion Criteria
- Female subjects [4, 6, 9].
- Between age 30 and 44 [15].
- Absence of medication that influence B.P [14].
- High Normal and stage 1 hypertension subjects [7].

Exclusion Criteria
- Female subjects with unstable hypertension [25]
- Unstable angina [14]
- Recent myocardial infarction [14]
- Lower limb orthopaedical deformities [14]
- Joint diseases [14]

Tools Required

- Bicycle ergometer – Steel Flex 7300
- Wrist watch - Titan
- Stethescope – Lith'sman
- Sphygomanometer – Diamond Company
- Wrist watch heart rate monitor

Procedure

Consent forms were given to all the subjects, Explanation was given about the procedure and purpose of the study to all participants. None of the personal details were collected other than that related to the study. They were given the choice to leave the study if they were not willing.

Adult women aged 18 – 60 years with grade-1 hypertension [7] and High normal blood pressure, without antihypertensive medication were recruited for 6 weeks [15] aerobic exercise training program. After signing consent forms subjects were seen at 3 times per week for 6 weeks [15]. At the beginning of each exercise session blood pressure recordings were taken before the warm up period in relaxed sitting position using a Lithman Stethescope and Sphygmanometer by auscultation method. After recording the pre exercise blood pressure, the treatment program started, which was for 30 minutes duration out of which first and last 5 minutes were for warm up and cool down, which consisted of slow walking in the Corridor at their own pace.

After the warm up period, the subjects performed 20 minutes of bicycle ergometer [10] within 50 – 60% heart rate, this was recorded using a wrist watch heart rate monitor. Rest was given when the subjects needed, but later, as the exercise sessions progressed rest period was reduced. The blood pressure was then monitored after the cool down period in relaxed sitting position. For statistical analysis the Blood Pressure at the beginning of 1st week and Blood Pressure at the end of 6th week were taken and results were obtained.

Statistical Analysis

Table 1: Descriptive statistics

	Mean	Standard deviation	Standard error of mean
Pre Systole	131.53	5.11	.93
Post systole	126.47	2.94	.54

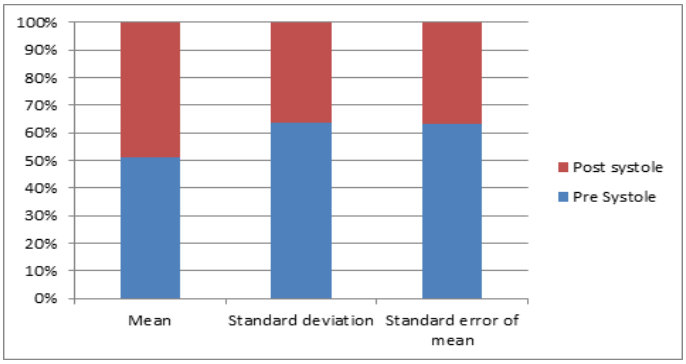

Fig 1: Pre and post systole representation

Table 2: Paired sample T-Test

	Mean Diff	t-Value	Deg of free	P - Value
Pre Systole v/s Post Systole	5.07	7.67	29	0.000 *

* Highly significant at 0.05 level

From the above table, standard deviation and standard error of mean values are calculated and it shows a high significant difference by using paired T-test at 0.05 level. So we conclude that aerobic exercise is more effective in reducing the systolic blood pressure.

Descriptive statistics of the above data for pre systole shows a mean value of 131.53 and .93 standard error of mean. The post systole values at the end of 6th week shows a mean value of 126.47 and .54 standard error of mean. When pre-systole and post systole were compared using paired sample T-test, it shows a p-value of 0.000 which states high significance at 0.05 level. This analysis shows that the systolic blood pressure has been well reduced after the aerobic exercise regimen.

Table 3: Pre and post diastole values Descriptive Statistics

	Mean	Standard deviation	Standard error of mean
Pre diastole	82.33	1.49	27
Test diastole	82.07	1.44	26

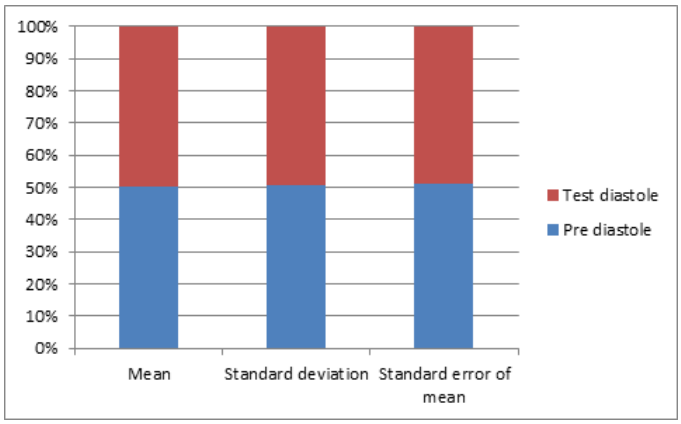

Fig 2: Pre and post diastolic representation

Table 4: Paired sample T-Test

	Mean Diff	t-Value	Deg of free	P - Value
Pre diastole v/s Post diastole	.27	2.11	29	0.043 *

* Slightly significant at 0.05 level.

From the above table, standard deviation and standard error of mean values are calculated and it shows that there is slight significant difference by using paired T-test at 0.05 levels. So we conclude that aerobic exercise has minimum effect in reducing the diastolic blood pressure.

Descriptive statistics of the above data for pre diastole shows a mean value of 82.33 and 27 standard error of mean. The post diastole values at the end of 6th week shows a mean value of 82.07 and 26 standard error of mean. When pre-diastole and post diastole were compared using paired sample T-test, it shows a p-value of 0.043 which states a slight significance at 0.05 level. This analysis shows that the diastolic blood

pressure has been slightly reduced after the aerobic exercise regimen.

Discussion

The outcome of this present study shows that aerobic exercise reduces the systolic and diastolic blood pressure in stage 1 and high normal hypertension. Statically analysis and graphical representations of my data shows that the reduction of systolic blood pressure at the end of 6th week is highly significant at 0.05 level with a p-value of 0.00 and the diastolic blood pressure is slightly significant at 0.05 level with a p-value of 0.043. This study includes 35 subjects out of which only 30 subjects completed the 6 weeks of aerobic exercise regimen while the other 5 subjects were not able to come for regular follow up due to personal reasons.

The present study shows that after exercise duration of 6 weeks, 3 times a week for 30 minutes the systole Blood Pressure has reduced to 2 to 4mm Hg and diastolic blood pressure has reduced to 1 to 2mmHg. This is well supported by Bonet J&Coll in their study, they have concluded that there is a reduction in blood pressure and improvement in cardio vascular values after supervised aerobic exercise regimen for 6 weeks[15].

A study conducted by Bond V, Stephens Q, Adams PG showed a reduction of 16.2 mmHg decrement in systole and 11.5mmHg decrement in systole, when subjects were trained for 8 weeks, 3 times a week for 30 minutes[16]. So this shows that if exercise regimen was prolonged then better results in reduction of blood pressure might be obtained. But from the present study it is evident that Blood Pressure reduction is well noticed only at the 4th week, so it is suggested that aerobic exercise should be continued atleast for a minimum of 4 weeks to know its antihypertensive effects.

Similarly many types of aerobic exercise were used for the prevention and treatment of hypertension. A study done by Patrella R.J. showed a reduction of 13mmHg in systolic blood pressure when walking and jogging exercises were given for 10 weeks[17]. Whereas, Bond V, Stephens conducted a study in which subjects were trained on a stationary bicycle for 8 weeks, their study resulted in a decrement of 16.2mmHg in systole and 11.5 mmHg in diastole[16]. By comparing these two studies it is clear that aerobic training with a bicycle ergometer is much better, in which the required intensity can be maintained, whereas it may not be possible in other aerobic exercise like jogging. Therefore bicycle ergometer was chose for this present study.

The present study has used an exercise protocol of moderate intensity at 50 – 60% of heart rate, and the exercise was given 3 days per week for 6 weeks. This protocol is supported by Miyai, Anita M., Miyashita, their exercise training protocol consisted of stationary bicycling for 3 days a week at 50 – 60% of heart rate, and they concluded that aerobic training reduced the risk of hypertension.

Some studies state that intensity is not a main factor in reducing the Blood pressure. Halbert JA, Silagy CA, stated that Blood Pressure reduction seen with aerobic exercise training was independent of the intensity of exercise and the number of exercise session per week. They further concluded that increasing exercise intensity above 70% VO_2 maximum or increasing the exercises frequency for more than 3 sessions a week, did not have any additional impact on reducing Blood pressure [18].

The physiological reason behind this antihypertensive effect of aerobic exercise is that acetyl choline stimulates nitrous oxide release which improves endothelium vaso dilation. This physiological reason is supported by Yukihino Higasial., they suggested that acetyl choline induced vasodilation was significantly blunted in patients with essential hypertension and that long term mild aerobic exercise not only lowers Blood Pressure, but also improves endothelium dependent vaso relaxation with mild essential hypertension through the increased nitrous oxide release. In addition acetyl choline stimulated No release was augmented by long term aerobic exercise in normotensive subjects. They also concluded that a 12 week of aerobic exercise regimen raised HDL cholesterol and lowered LDL cholesterol, but these findings are consistent with studies of long term duration [8].

Therefore this present study shows that aerobic exercise has an independent Blood Pressure lowering effect. Though the reduction were small they can be considered as clinically significant to reduce the risks of hypertension.

Limitations and Recommendations

Limitations

- Study is a short duration study
- Study sample size is small
- Only female subjects were selected
- Only grade1 hypertensive were selected

Recommendations

- This study can be performed on a larger sample size.
- This study can be conducted in male group.
- This study can be conducted in other grades of hypertension
- The duration of the study can be more longer
- The age group can be restricted
- Some other type of aerobic exercise can be used.

Conclusion

The overall result suggests that aerobic training may lower conventional blood pressure and that borderline hypertensive may obtain cardiovascular benefits by aerobic conditioning. Thus, aerobic exercise can be used as a corner stone therapy for prevention, treatment and control of hypertension.

References

1. Fagard RH. Effect of exercise on blood pressure control in hypertensive patients; European journal-Cardiovascular and preventive rehabilitation. 2007; 14(1):12.
2. Robert code, Donald Mars. Effect of aerobic exercise training on patients with systemic arterial hypertension. The American Journal of Medicine; March 2004, 77-5.
3. Seamus P. Whelton. Effect of Aerobic Exercise on blood pressure-Annals of internal medicine-The American College of physicians. 2002; 136(7):493-503.
4. George A. Kelly. Aerobic exercise and resting blood pressure among women; preventive medicine. 1999; 28(3):264-275.
5. Kelly GA, Kelly KA. Aerobic exercise and resting blood pressure; preventive Cardiology. 2001; 4(2):73-80.
6. Kelly KS, Kelly GA. Aerobic exercise and resting blood pressure in women; Journal Women health gender based medicine. 1999; 8(6):787-803.

7. Mughal MA, Alvi IA. The effects of Aerobic exercise training on resting blood pressure in hypertensive patients; Journal of Pakistan medical association. 2001; 51(6):222-226.
8. Yukihito Higashi, Shota Sasaki. Regular Aerobic exercise augments endothelium dependent vascular relaxation in normotensive subject-American heart association, Circulation. 1999; 100:1194-1202.
9. Craig K. Ewart. Effects of school based aerobic exercise on blood pressure in adolescent girls at risk for hypertension-American journal of public health. 1998; 88:6.
10. Brownley KA, West SG. Acute aerobic exercise reduces ambulatory blood pressure in borderline hypertensive men and women; American journal of Hypertens. 1996; 9930:200-206.
11. Fagard RH. The role of exercise in blood pressure control. American journal of Hypertens. 1995; 13(11):1223-7.
12. Kelly G, McClellan P. Anti-hypertensive effects of aerobic exercise; American journal of hypertens. 1994; 7:677.
13. Fagard RH. Physical fitness and blood pressure; American journal of hypertens. 1993; 11(5):547-552.
14. Martin JE, Dubbert PM. Controlled trial of aerobic exercise in hypertension; Journal of the American heart association; Circulation. 1990; 81:1560-1567.
15. Bonet J, Coll R. Supervised versus recommended physical exercise in hypertensive women. Blood Press Journal. 2003; 12(3):139-144.
16. Bond V, Stephens Q. Aerobic exercise attenuates an exaggerated exercise blood pressure response in normotensive young adult African Men and Women; Blood Press Journal. 2002; 11(4):229-234.
17. Petrella RJ. How effective is exercise training for the treatment of hypertension; Clinical Journal of Sports Medicine. 1998; 8(3):224-231.
18. Halbert JA, Silagy CA. The effectiveness of exercise training in lowering blood pressure; Journal of Human hypertension. 1997; 11(10):641-649.
19. Tom Baster. Exercise and Hypertension Australian Journal. 2005 34:6.
20. Michel H, John MD, MDP. Cardiology (2nd edition)-Mosby Publication, Elsevier ltd. Printed in Spain.
21. Wayne Alexander MDR' Ph.D; Hurst's- The Heart; (10th edition); International edition, printed in 2001 at USA, 1-2.
22. Lippinur JB. Cardiology-An illustrated text Gower medical publication-New York, 1-2.
23. Jacques. Otto. Kuchel. Hypertension-physiology and treatment (2nd edition) Printed in 1983. Holliday Group Publishers.
24. James T. Willerson. Cardiovascular Medicine; Printed in USA Churchill Livingston publication, 1995.
25. Davidson's Principles and practice of medicine; Churchill Livingston publications, Toronto, 1999.
26. Desmond G, Julian. Cardiology (7th edition) Saunders publication, Edinburgh; London. 1998.
27. Katch, Katch. Exercise Physiology, (3rd edition) published by-Wolters company. Printed in USA 1991.
28. Carolin Kisner. Therapeutic exercise foundations and techniques 3rd edition, published by Jaypee brothers, New Delhi; India, Essentials of medical physiology, 2nd edition-k. Jaypee, 1996.
29. Sembulingam. Brothers publication, printed in New Delhi, India.
30. Susan BO. Sullivan; Physical rehabilitation, Assessment and treatment, 4th edition Jaypee Brother's publication, printed in New Delhi, India.
31. Scot Irwin; Cardio pulmonary physical therapy, Mosby Publication-Elsevier 4th edition, 2004.
32. Frances J. Branon Ph.D Cardio pulmonary rehabilitation basic theory and application. (3rd edition) published by F.A. Dewis company, 1998.