

Efficacy of Aerobic Exercise Training in Hypertensive Postmenopausal Women

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ABSTRACT

The purpose of this study was to investigate the effect of aerobic exercise on blood pressure, pulse rate and cholesterol level in hypertensive women during menopause. Thirty patients with essential hypertension were selected in this study. Their ages ranged between 50-65 years. Exercise was performed by bicycle ergometer for 30 minutes/day, every other day for 4 weeks.. Assessments were performed through measurements of systolic and diastolic blood pressure, pulse rate and estimation of serum blood cholesterol. The results obtained indicated that there were statistically significant reduction of systolic and diastolic blood pressures also, in total cholesterol level and pulse rate after exercise. From these results it could be concluded that aerobic exercise was effective in reducing elevated blood pressure, total cholesterol and pulse rate in hypertensive postmenopausal women.

Keywords: Aerobic exercise, Blood pressure, Serum blood cholesterol, Menopause.

INTRODUCTION

High blood pressure is a major risk factor for stroke, coronary heart disease, congestive heart failure and renal diseases^{1,16}.

Clinical trials have demonstrated that lowering blood pressure reduces incidence of death from cardiovascular diseases. It was indicated that a decrease of 2 mmHg in diastolic blood pressure could reduce the risk for diseases associated with elevated blood pressure¹⁹.

Cholesterol when present in excessive amount, it can injury blood vessels and cause heart attacks and stroke^{2,21}.

The body needs cholesterol for digesting a dietary fat, making hormones, building cell wall and other important processes. Increased level of cholesterol can injury the arteries, especially the coronary ones that supply the

heart leading to chest pain (angina). If a blood clot obstructs the coronary artery, a heart attack (myocardial infarction) or death occur³.

Physical inactivity is a major risk factor for developing coronary artery disease which is characterized by deposits of fatty substances, cholesterol, calcium and other substances in the inner lining of arteries that supply blood to the heart muscle. It also contributes to other risk factors, including obesity, high blood pressure and high triglycerides⁷.

Moderately intense physical activity as brisk walking and bicycling is beneficial when performed regularly for a total of 30 minutes or longer on most days⁵. Regular aerobic physical activity increases capacity of exercise. It also plays a role in both primary and secondary prevention of cardiovascular disease. Exercise can help control blood lipid abnormalities, diabetes and obesity. Also, it

has an independent, modest blood pressure lowering effect¹⁷.

Several studies have shown that people who modify their behavior and start regular exercise after suffering a heart attack have better rates of survival and a higher quality of life. Healthy people as well as many patients with cardiovascular disease can improve their exercise performance with routine training⁴.

Physical activity reduces triglyceride levels which if elevated are linked to developing coronary artery disease in some people³.

This study was designed to investigate the effect of bicycling aerobic exercise training on blood pressure, pulse rate and serum cholesterol in hypertensive postmenopausal women.

SUBJECTS, MATERIAL AND METHODS

Subjects

Thirty women with essential hypertension from Kasr Aini Hospital, Outpatient Clinic of Gynecology Department. Their ages ranged from 50 to 65 years. Any associated disorders as chest diseases, cardiac diseases, diabetes mellitus and musculoskeletal disorders are excluded. Informed consent form were signed by each woman before treatment.

Instruments

- 1- Weight-height scale to measure body weight and height then body mass index was calculated.
- 2- Electronic bicycle ergometer (ECD ergometer E405) was used for performing exercise program.
- 3- A mercury sphygmomanometer and stethoscope to measure blood pressure.

- 4- Pulsimeter (Tunturi TPM 400 Dc 6V) was used to measure pulse rate.
- 5- Disposable syringes were used to drain venous blood samples.

Procedures

A) Evaluative Procedures:

- Weight and height measurement then calculating body mass index which equal weight (kgs) / height (m²). It must not exceed 29 Kg/m².
- Blood Pressure Measurements:
Before starting and after the end of 4 weeks of treatment. Systolic and diastolic blood pressures were measured on the dominate arm for 3 trials with one minute intervals and mean was taken.
- Blood cholesterol level was assessed before and after treatment to determine the level of total cholesterol. A venous sample of 5 Cc. was drained. Patients were fasted for 12 hours before examination.
- Pulse rate measurement by using pulsimeter from half lying position, the ear sensor was attached to patient's ear lobe to measure pulse rate.

B) Treatment Procedures:

Patients were instructed to perform aerobic exercise on bicycle ergometer 3 days/week, for 30 minutes/day for 4 weeks.

The exercise was consisted of 5 minutes warm up in the form of pedaling at 60 revolution / minute without load and 20 minutes of active pedaling with adjusted load to achieve 60% of predictive age maximal heart rate (Maximal heart rate = 200 – age of woman in years), and 5 minutes cool down in form of pedaling without load.

Statistical Analysis

All variables were analyzed before and after 4 weeks of treatment. Mean, standard deviation and t-test were used.

RESULTS

- There were significant reduction in mean values of systolic and diastolic blood pressures ($P < 0.05$) when comparing between before and after treatment (Table 1 and Fig. 1).
- Total cholesterol was 190.36 ± 18.16 mg/dl before treatment while, after treatment, it became 160.64 ± 17.04 mg/dl and this was considered significant improvement ($P < 0.05$) (Table 2 and Fig. 2).
- The mean values of pulse rate showed significant decrease ($P < 0.05$) after treatment (Table 3 and Fig. 3).

Table (1): Mean values of systolic and diastolic blood pressure before and after treatment.

	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Before treatment	185.28 ± 23.12	105.32 ± 20.01
After treatment	150.02 ± 27.72	85.83 ± 15.51
t-value	4.2	2.55
P-value	$P < 0.05$	$P < 0.05$

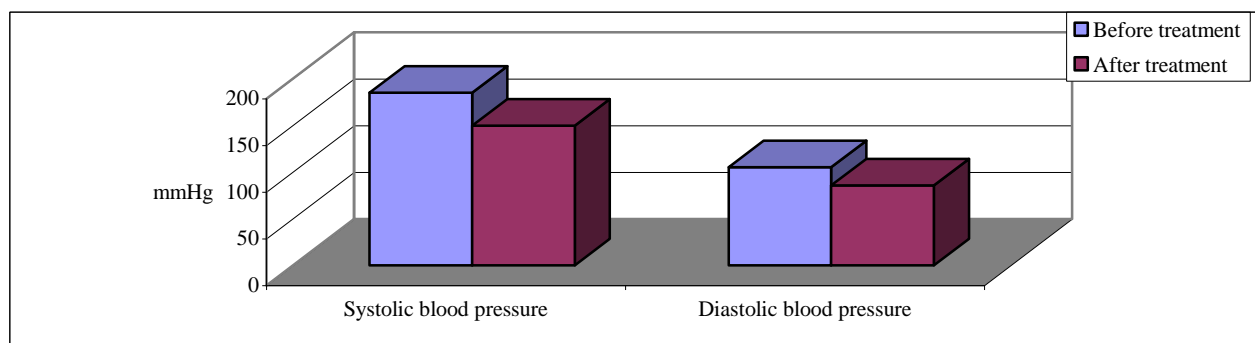


Fig. (1): Mean values of systolic and diastolic blood pressures before and after treatment.

Table (2): Mean values of total cholesterol before and after treatment.

	Total Cholesterol mg/dL
Before treatment	190.36 ± 18.16
After treatment	160.64 ± 17.04
t-value	4.32
P-value	$P < 0.05$

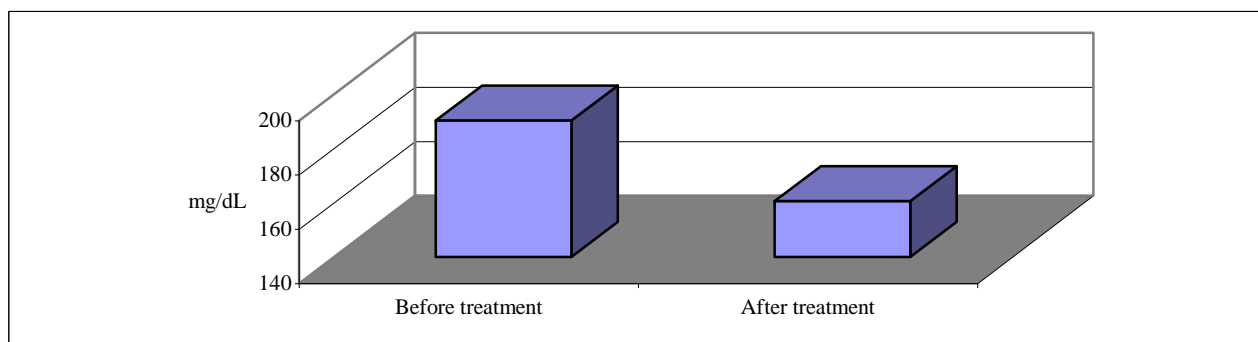


Fig. (2): Mean values of total cholesterol before and after treatment.

Table (3): Mean Values of Pulse Rate before and after Treatment.

	Pulse Rate (beat/minute)
Before treatment	95.22 ± 5.42
After treatment	88.26 ± 4.87
t-value	3.81
P-value	P<0.05

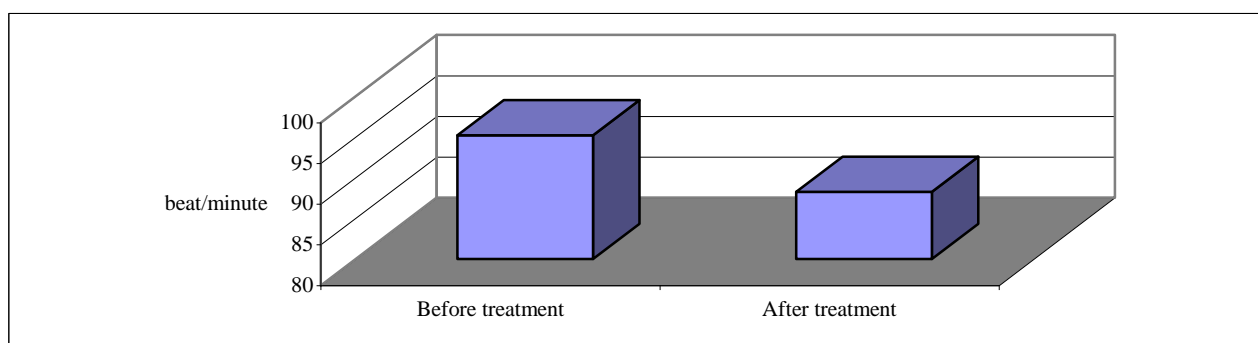


Fig. (3): Mean values of pulse rate before and after treatment.

DISCUSSION

A sedentary lifestyle is a major risk factor for heart and blood vessel (cardiovascular) disease. For example, people who are less active and less physically fit have a 30 to 50 percent greater incidence of hypertension. Physical activity may reduce blood pressure in hypertensive individuals^{1,12}.

The association between high serum cholesterol and the incidence of coronary heart disease is so pronounced in epidemiological studies. Recent overviews have indicated that

a 1% reduction in total serum cholesterol level yields a 2 to 3% reduction in the risk coronary heart disease^{11,13,14}. Aerobic exercise such as walking, jogging and bicycling reduce total cholesterol.

Our results agreed with Staessen et al. (2001)¹⁹ who studied the effect of exercise on high blood pressure. They revealed significant reduction in systolic and diastolic blood pressure.

Also, study done by Oberman et al. (2001)¹⁷ found that aerobic exercise is a

suitable treatment and can even play a role in the prevention of hypertension.

Additionally, Blumenthal et al. (2000)² stated that, even without changes in body weight, aerobic exercise reduce resting blood pressure, the blood pressure reduction did not seem to depend on the frequency or intensity of exercise or on type of exercise.

From puberty until menopause women generally have lower total cholesterol values than men. After menopause, their values equal or exceed those of men. This may partially explained by the relatively higher lipoprotein lipase activity in women. Also, estrogen seems to have a major role in lowering the risk of coronary heart disease⁸.

These results agree with those of Boyden et al. (1993)³ who stated that total cholesterol levels are lower in persons with high aerobic fitness compared to low aerobic fitness, he stated that activity as dynamic and vigorous exercise, such as running lower total cholesterol level.

Also, study by Haskell (2000)⁸ found that decrease in triglyceride concentration in the blood have been attributed to increase in the skeletal muscle and adipose tissue lipoprotein lipase activity resulting from aerobic training.

In addition, Martin et al. (2001)¹⁴ reported that the majority of studies comparing endurance athletes to sedentary controls or the general population, stated that the athletes have lower total cholesterol levels. This explained that increase in high density lipoprotein is due to increase in lipoprotein lipase activity in response to exercise which, accelerates the break down of triglycerides, resulting in a transfer of cholesterol and other substances to the high density lipoprotein.

From the previous results, it could concluded that aerobic exercises in a form of bicycling has an important role in the

treatment and prevention of hypertension in postmenopausal women, and can slow the progression of coronary heart diseases.

So, we can add regular exercise training to the list of life style modification that includes dietary changes, reduction in salt intake, low fat diet and avoid diet rich in cholesterol compliance with prescribed medications when they needed.

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الملخص العربي

فاعلية التمرينات الهوائية علي ارتفاع ضغط الدم في السيدات بعد انقطاع الدورة الشهرية

الهدف من هذه الدراسة هو معرفة تأثير التمرينات الهوائية علي ضغط الدم، نبضات القلب ومستوي الكوليسترول في الدم في السيدات المصابات بارتفاع في ضغط الدم بعد انقطاع الدورة الشهرية. لقد أجريت الدراسة علي 30 سيدة تراوحت أعمارهن بين 50-65 سنة . وقد أدت السيدات التمرينات المطلوبة باستعمال دراجة لمدة 30 دقيقة في اليوم ، 3 مرات أسبوعياً ولمدة 4 أسابيع متصلة . وتم التقييم عن طريق قياس ضغط الدم الانقباضي والانبساطي ، نبضات القلب ومستوي الكوليسترول في الدم قبل وبعد العلاج . أوضحت النتائج أن هناك تحسن ذو دلالة إحصائية في كل من ضغط الدم الانقباضي والانبساطي ، معدل نبضات القلب ، ومستوي الكوليسترول في الدم بعد العلاج عما قبله ومن هنا يمكننا استنتاج أهمية التمرينات الهوائية في علاج السيدات المصابات بارتفاع في ضغط الدم بعد انقطاع الدورة الشهرية .

الكلمات الدالة : التمرينات الهوائية – ضغط الدم – مستوي الكوليسترول في الدم – انقطاع الدورة الشهرية .