The effect of an aerobic training program on lowering essential blood pressure among elderly individuals: Experimental study

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Abstract:
Background and objective: Hypertension is a major public health challenge worldwide. Because of its high incidence and linked risks for cardiovascular, cerebrovascular, and kidney disorders, one of its causes is physical inactivity.This study aimed to evaluate the effect of an aerobic training program on blood pressure in a sample of retired teachers in the city of M'Sila who suffer from essential hypertension.
Material and methods:An aerobic training program, the study applied a purposive sample of 18 participants with basic hypertension, who were divided into two groups: an experimental group and a control group, with 9 participants in each group. The experimental group applied the aerobic training program for 3 months. Blood pressure was measured before and after the start of the experiment for both groups. Then, the differences before and after the application of the experiment between the two groups were calculated.**The resultsof study** showed a significant decrease in the level of systolic and diastolic blood pressure in the experimental sample, in contrast to the control sample, in which there was no decrease.**Conclusion:** Aerobic training programs have an effective role in reducing and managing blood pressure in patients with essential hypertension.
Key words: aerobic training, lowering, essential blood pressure.

Introduction:

Hypertension is a major public health problem and is common (Venkatesh & Dhanalakshmi, 2022). is one of the most important risk factors for cardiovascular illnesses(Sandeep et al., 2022) It often leads to fatal complications if left untreated (Kebryiaei et al., 2022). Hypertension is called the “silent killer” (Volantine et al., 2022). It causes more than 7.5 million deaths worldwide annually (Beyranvand et al., 2022).In 2000, the global prevalence of hypertension was approximately 26%, and it is expected to increase to 29% by 2025(Venkatesh & Dhanalakshmi, 2022). The primary causes of hypertension are male gender, age, smoking, high blood lipid (fat) levels, obesity, race, and a history of heart and kidney disease(Beyranvand et al., 2022) Also unhealthy lifestyle, including a diet high in salt and fat and physical inactivity(Dif et al., 2023). According to the 2019 World Health Organization (WHO) report, physical inactivity ranks as the fourth most common cause of death worldwide(Ismail et al., 2022).

Lifestyle intervention tries to decrease other hazards and lower blood pressure (BP). It is seen as a reasonable and effective approach at any time for any individual. Exercise is a powerful tool for changing one's lifestyle. According to the Chinese Guideline on Healthy Lifestyle to Prevent Cardiometabolic Diseases, exercise can be increased to 300 minutes of moderately intense exercise, 150 minutes of high-intensity aerobic exercise per week, or an equivalent combination of two intense exercises if one's physical condition permits(Xi et al., 2024).

Exercise on a regular basis can help lower blood pressure by 3–5 mmHg and drop blood pressure by 2-4 mmHg, while other publications indicate higher effects (6–10 mmHg). (Ozemek et al., 2017). Physical activity lowers blood pressure by widening the lumen of arteries, which decreases peripheral vascular resistance and decreases sympathetic nerve activity. Also, for those with hypertension, exercise can lower their left ventricular mass index, which in turn can lower their blood pressure(Shariful Islam et al., 2023). Regular physical exercise and the management of hypertension are strongly correlated, according to recent findings from interventional studies(Shariful Islam et al., 2023). Many studies have been conducted in this field, including: study of**Study (Dakhia, 2022)**: This study aimed to determine the effect of aerobic endurance training on arterial blood pressure by proposing a training program for a period of 12 weeks for a group of patients with high blood pressure. The study sample included 24 individuals from patients with arterial hypertension in the state of diabetes. One of the most prominent results of the research was that the proposed training program had a positive effect on reducing blood pressure in the experimental sample.Also **Study (Benkahla et al., 2021):** This study aims to identify the role of a proposed program for physical exercises in modifying high blood pressure in the elderly. For this purpose, we used an experimental approach with a design for two equal groups on a purposive sample consisting of 28 elderly people whose ages ranged between 65 and 70 years. The results show that the proposed program has a positive effect on reducing high blood pressure in the elderly. And **Study (Djerourou et al., 2020)**: This study was to find out the effect of using an aerobic activity program on some physical and physiological variables in the elderly. The experimental method was used to suit the problem of the research on a sample of three individuals between the ages of 50 and 60 years (experimental sample of 10 persons, control sample of 10 persons) using a series of physical and physiological tests (endurance, heartbeat, and blood pressure). After statistical treatment of the raw results, the importance of aerobic exercise in improving the physical and physiological variables in question was reached, and thus the physical health of the research sample was maintained in order to enjoy independence in daily life.

In an analytical study **(Belacel & Naceur, 2022),** which aimed to assess the benefits of physical activities in controlling high blood pressure and body weight in adults with obesity, the analysis included more than 18 studies identical to examining the effect of physical activities on high blood pressure and obesity. It has been concluded that physical activities are effective in reducing high blood pressure in people with obesity and blood pressure. Which concluded that the link between physical activities and high blood pressure is still calling for more research and increasing more than one question.

Accordingly, in this context, this field study is an experimental study that aims to determine the effect of an aerobic program on reducing essential hypertension.By asking the following question:

Does an aerobic training program have a role in lowering the essential blood pressure among elderly individuals?

2-**Material & methods:**

2.1- The method followed in the study:

The method is the way or style that the researcher follows to determine the steps of his research, through which a solution to a problem can be reached, as in all studies. It means following specific methods and means to collect, organize, display, and analyze data and reach conclusions (Al-Dulaimi, 2016). The type of research and the problem determine the type of approach followed. This study was conducted using the experimental approach with a two-group design (experimental and control) with a pre- and post-test for both groups. This is to suit the nature of the study.

2.2- Research Community: The study community consists of all members of the Retired Education Association of the M'Sila State, numbering 753 members of the association, 600

males and 153 females distributed over 8 districts: M'Sila District, number of members: 20 females, 160 males.

2.3- **Research sample**: The sample is a subset of the original study community, and it is selected in an appropriate manner. The study is then conducted on it, and the results are obtained and generalized to the original community(Al-Mahmoudi, 2019, p. 160)**.**

The research sample was chosen intentionally, where 18 individuals were chosen from the male members of the Education Retirees Association affiliated with the M'Sila district. They were divided into two groups: 9 individuals for the control group **(CG)** and 9 individuals for the experimental group **(EG)**.According to the following inclusion criteria:

Patients with first-degree hypertension, without other diseases,Doctor's approval to practice physical activity, and they are able to practice physical activity.

2.4. **Data collection tools:**

***** Questionnaire to collect information about the study sample.

***** Blood pressure measuring device [sphygmomanometer]

*** Intervention program**: It is an aerobic training program proposed by the researchers. The program was implemented for 3 months (1/10/2023–31/12/2023) and included outdoor walking, walking on a treadmill, and swimming.

3. RESULTS AND DISCUSSION:

3.1.RESULTS:

Table1: Paired Samples T Tests with two groups (pre-test)

Variables	Groups	Mean	Std. deviation	T- test	Sig	Sig. Level	Statistically significant
Systolic blood pressure	C G	150.56	5.59	0.04-	0.86	0.05	No
	E G	150.44	1.78				
Daistolic blood pressure	E G	92.56	3.39	0.00	0.52	0.05	No
	C G	92.56	4.12				

***Significant level:0.05 Source: Prepared by researchers using SPSS 23 program.**

Based on the results of the T-test for two groups in Table 1, the probability value (Sig) for the pre-test for the systolic and diastolic blood pressure variables was 0.86 and 0.52, respectively. These are less than the significance level. This means that there is no statistical significance for the pre-test between the two groups before applying the training program.

Table2: Paired Samples T Tests with two groups (post-test)

Variables	Groups	Mean	Std. deviation	T- test	Sig	Sig. level	Statistically significant
Systolicblood pressure	C G	151.56	6.44	11.56	0.000	0.05	Yes
	E G	125.78	1.78				
Daistolic blood pressure	C G	92.89	2.89	10.08	0.02	0.05	Yes
	E G	82.33	1.22				

***Significant level:0.05 Source: Prepared by researchers using SPSS 23 program.**

Based on the results of the T-test for two groups in Table 2, the probability value (Sig) for the pre-test for the systolic and diastolic blood pressure variables was 0.000 and 0.02, respectively. These are greater than the significance level. This means that there is statistical significance for the post-test between the two groups after applying the training program.

3.2. DISCUSSION:

The results shown in Table 2 resulted in statistically significant differences in systolic and diastolic pressure after applying the program training, which means that the program training had a great effect on lowering the blood pressure in the experimentalsample.

Research has indicated that engaging in physical exercise is among the best strategies for considerably reducing blood pressure (Mansoor et al., 2024), as is aerobic training. It also lowers all causes of mortality, including blood pressure regulation, and enhances general quality of life (Harun et al., 2022). Regular aerobic exercise is advised to enhance cardiovascular health as it lowers blood pressure and raises heart-rate variability markers.

Engaging in physical activity facilitates modifications in endothelial function and vascular remodeling, hence mitigating hypertension(Ferreira Junior et al., 2019).

Numerous mechanisms exist for how exercise therapy lowers blood pressure: it reduces sympathetic nerve excitability; it controls hormone production; it increases insulin sensitivity; it protects and improves vascular function; it prevents an overactive renin-angiotensin-aldosterone system; and it lowers inflammatory markers (Xi et al., 2024). The exercise is effective enough to increase the maximum capacity of the heart rate, stimulate muscle contraction, breakdown glycogen, and increase tissue oxygen. and can also reduce plaque formation through increased use of fat and increased use of glucose (Dwi Prajayanti & Septiana, 2023).

The results of our study align with the study (Benkahla et al., 2021). It found that the suggested program was effective in lowering high blood pressure in the elderly. In addition to the results of a study by Gacem et al. (2021), which concluded that the proposed aerobic program had a positive effect on the physiological and biochemical variables under study (heart rate at rest, blood pressure, body mass index, blood sugar levels, and hemoglobin concentration) for elderly women aged 50–60 years.

Conclusion:

Based on what has been reached through theoretical study and field research, it can be said that aerobic training programs have an effective role in reducing and managing blood pressure in patients with essential hypertension.

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Conflict of interest: The authors declare that they have no conflict of interest.

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