

Effect of walking on sand in reducing blood pressure in pre-hypertensive patients: Experimental study

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Abstract:

Background and objective: Hypertension are a major public health challenge worldwide, one of its causes is physical inactivity. This study aimed to evaluate the effect of walking on sand in reducing blood pressure in prehypertensive patients.

Material and methods: The study was applied to a deliberate sample of 11 participants males with pre-hypertension. and relied on the experimental method with a single-group design with a pre-test and a post-test. The sample applied the sand walking program for 3 months, and blood pressure was measured before and after starting the program; then the differences between the pre- and post-tests of the sample were calculated. **The resultsof study** showed a significant decrease in the level of systolic and diastolic blood pressure in the sample.

Conclusion: The walking on sand program has an effective role in reducing and managing blood pressure in patients with pre-hypertension.

Key words: walking, sand, reducing, blood pressure, prehypertensive.

Introduction:

The World Health Organization (WHO) has released a study on five major chronic non-communicable diseases (NCDs) that calls for effective action. One of these diseases is high blood pressure (Moussouni et al., 2022), which is characterized by persistently high blood pressure levels, is a multifaceted disease that can often lead to complications including heart disease, stroke, and kidney damage. It is a serious public health concern (Karajgi et al., 2024). It is seen as a public health concern in both economically developed and developing countries (Sindwani et al., 2023). The number of people with hypertension will keep rising as populations become older, lead unhealthy lifestyles, and gain weight (Fu et al., 2020). According to (Reshi et al., 2024), there are 972 million people worldwide with high blood pressure, or 26% of the population. It is expected that by 2025, 156 crore adults will be affected by hypertension (Akhter et al., 2024). Hypertension is one of the leading causes of high mortality among adults in Africa (Malik et al., 2022).

Pre-hypertension is a transitional stage preceding the development of actual hypertension and is defined as a systolic blood pressure (BP) of 120–139 mmHg and/or a diastolic BP of 80–89 mmHg among adults (Al-Kadi, 2022; Ishikawa et al., 2017; Jayanthi et al., 2020; Li et al., 2023). According to the American Guidelines on Hypertension, it was created in 2003 to alert people to elevated blood pressure as well as the possibility of cardiovascular disease and hypertension (Do Carmo Rocha et al., 2014). Prehypertension is an important risk factor for stroke and cardiovascular illnesses (Nesnawy et al., 2024). According to epidemiological research, up to 30 to 50% of the population under study has prehypertension, making it a prevalent disorder globally. 68% of people with prehypertension have at least one clinically relevant risk factor for heart disease or stroke, and 90% of those with prehypertension have at least one cardiovascular risk factor (Dimitrijević et al., 2024). According to Moussouni et al. (2022). Its prevalence rate in Algeria is 31.6%.

One of the most significant worldwide public health issues that needed to be addressed was physical inactivity. In actuality, almost 25% of individuals globally did not meet the WHO-recommended PA levels (Aliberti, 2023). Researchers have shown over the past 50 years that being physically unfit or inactive has serious detrimental effects on one's health at all stages of life (Guebli et al., 2021). Low levels of physical activity are a major contributor to the worldwide illness burden (Ibeneme et al., 2024). It is associated with an increased risk of cancer, diabetes, heart disease, hypertension, and other non-communicable illnesses (Hasan et al., 2023). physical inactivity ranks as the fourth most common cause of death worldwide (Ismail et al., 2022); it causes an

estimated 3.2 million deaths annually (Bardhan et al., 2024). According to reports, cutting down on inactive time can reduce the risk of non-communicable diseases by around 10% (Bardhan et al., 2024).

It has been established that non-pharmacological therapies, such as lifestyle changes, are useful methods for controlling blood pressure (Nesnawy et al., 2024). According to international standards, changing one's lifestyle is the best way to cure hypertension (Henkin et al., 2023). Physical activity and exercise are crucial for leading a healthy lifestyle. Exercise improves one's general health, level of fitness, and quality of life. Exercise and physical activity are known to have several health advantages. Regular exercise lowers the chance of developing hypokinetic illnesses, which include diabetes, heart disease, stroke, COPD, and other ailments (Singh & Singh, 2024). According to recent World Health Organization (WHO) recommendations, all adults between the ages of 18 and 64 should engage in physical activity (PA) for at least 150–300 minutes per week at a moderate intensity or 75–150 minutes per week at a vigorous intensity to reap significant health benefits (Martins et al., 2022). For older people, walking is a well-liked, dependable, appropriate, efficient, and free type of physical activity. It can last beyond old age and fits in perfectly with daily activities (Ibeneme et al., 2024). It is a basic kind of exercise that is easier to obtain and modify than other forms (Gheyasi et al., 2019) and appropriate for people of all ages (Balpande & Siddiqui, 2022). Research has demonstrated that walking improves physical fitness, metabolic health, psychological well-being, and exercise capacity in both healthy individuals and those with a variety of chronic illnesses (Kim et al., 2012). It has been demonstrated that it raises cardiac vagal tone, which lowers blood pressure (Punia et al., 2022).

Walking has been linked to several health advantages, including improved fitness, reduced fat and resting blood pressure, blood pressure management, weight reduction, depression, and a lower risk of cardiovascular disease, according to systematic reviews and meta-analyses (Hanson & Jones, 2015). According to a meta-analysis by Murtagh et al. (2015), walking treatment reduces a number of cardiovascular risk factors. This emphasizes how vital walking is for encouraging physical activity that improves health. In this context

Sand is an inexpensive and widely available resource, making it an intriguing addition to therapeutic interventions (Jafarnezhadgero et al., 2019). In comparison to the normal walking group, the study (Seyam et al., 2020) indicated that 4 months of regular sand walking combined with a balanced diet led to a statistically significant change in HbA1c, BMI, waist circumference, and quality of life. The researchers in this study wanted to identify the effect of walking on sand on reducing systolic and diastolic blood pressure in a group of men who suffer from high blood pressure before it occurs.

MATERIALS AND METHODS

Design

This study is based on the experimental method with a single-group design with a pre-test and a post-test. The main objective of the study is to know the effect of the independent variable, which is walking on sand, on the dependent variable, which is blood pressure.

Participants

Eleven (11) men with pre-hypertension participated in this study.

Inclusion criteria:

male sample members with pre-hypertension, aged between 40 and 50 years.

Exclusion criteria:

Individuals suffering from various illnesses, such as diabetes and obesity,

Smokers

Those taking medications.

requiring the study sample to have their blood pressure measured.

Ensure that the measuring tools are safe and adjusted.

Give recommendations regarding the dietary pattern, which revolves around reducing salt, avoiding fatty foods, and not drinking excessive coffee and tea.

Note: These instructions remain relatively applicable due to the difficulty of monitoring and the characteristics of the sample members.

Study limitations:

Human limits: eleven (11) males with pre-hypertension.

Time limits: the study was carried out from November 11, 2023, until January 31, 2024.

Spatial limits: the study was carried out at El Oued, also known as Oued Souf, a city in southeast Algeria.

Procedures

The research steps are as follows:

1. Identify the study sample and give instructions about the program to be applied. and The training program was presented to a group of 9 experts in the field, and then modified according to the experts' comments to arrive at the final version of the program.
2. Conduct a preliminary test by measuring blood pressure using a sphygmomanometer.
3. The sample undertook the proposed 12-week walking on sand training program, which consisted of three sessions per week.
4. Conduct a post-measurement by measuring blood pressure using a sphygmomanometer.
5. Once the data were collected, they were evaluated using a t-test.

Intervention program

Warm up: 5 min.

Principal part: Starting with 25 minutes and ending with 35 minutes at the end of the program.

Intensity: 50-70 VO₂^{MAX}.

participants Walking continuously on a flat surface

Cool Down 5 min: Stretching exercises focus on the lower extremities.

Data analysis

The statistical analysis in this study involved the use of SPSS V26 software. Descriptive tests were conducted to derive the mean, standard deviation, and standard error. Then, the T-test was used to test the differences between the means.

Results:

Table 1. Paired Samples T Tests of Blood pressure

	Pretest		Pretest		t	Sig.
	Mean	Std. Deviation	Mean	Std. Deviation		
systolic	129.18	5.153	123.27	2.101	5.732	0.000
Diastolic	84.45	2.544	80.27	1.848	5.587	0.000

Significant level:0.05

*** Source: Prepared by researchers using SPSS V26 program.**

As in Table 1: from the sample T-test, the Sig value of systolic blood pressure was obtained as $0.000 < 0.05$, which means that there is an effect of the sand walking program on systolic blood pressure. And the Sig value of diastolic blood pressure was $0.000 < 0.05$, which means that there is an effect of the sand walking program on diastolic blood pressure. The mean decrease in systolic blood pressure was 5.91 mmHg. The mean decrease in diastolic blood pressure was 4.18 mmHg.

Discussion:

The results shown in Table 1 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 reducing the blood pressure in the experimental sample.

Since hypertension is a condition associated with lifestyle choices, both regular, moderate exercise and a change in unhealthy habits can help prevent and treat hypertension(Malem et al., 2024).It has been established that non-pharmacological therapies, such lifestyle changes, are useful methods for controlling blood pressure (BP)(Nesnawy et al., 2024).

Exercise treatment can reduce blood pressure in a number of ways, including by decreasing sympathetic nerve excitability, regulating hormone production, boosting insulin sensitivity, safeguarding and improving vascular function, preventing an overactive renin-angiotensin-aldosterone system, and lowering inflammatory markers(Xi et al., 2024).

Research indicates that engaging in physical exercise is among the best strategies for considerably reducing blood pressure. Walking is one of the most well-liked exercise therapies for persons with hypertension. Due to their low cost, ease of accessibility, adaptability to people's lifestyles, and lack of equipment requirements, these therapies have grown in popularity in recent years(Mansoor et al., 2024).

Regular exercise has been demonstrated in recent studies to support the preservation of blood vessel flexibility. Walking properly requires the body to transfer blood to the muscles more easily when it is exercised on a regular basis. Due to the demands placed on the heart muscle during physical exercise, these modifications serve to lower blood pressure and heart rate in order to lessen the burden on the heart(Hikhmat et al., 2022)

Walking enhances health outcomes and helps to relieve cardiovascular illness (including high blood pressure) by decreasing physical inactivity (Ibeneme et al., 2024). Studies have shown that regular exercise and a constant commitment are linked to the physical advantages of walking (Chan et al., 2016)

Walking promotes the best possible cardiac function. Walking can help the heart work better to supply the body's tissues, cells, and organs with the energy they require. Venous return is boosted by increased skeletal muscle and respiratory activity. It results in an increase in stroke volume, which raises cardiac output and raises arterial blood pressure somewhat. There is a resting period following a rise in arterial blood pressure. This phase can thereby lower skeletal muscle and respiratory activity. The heart rate lowers as a result of this exercise's reduction of sympathetic nerve activity and adrenaline (Hikhmat et al., 2022)

Rezky's (2019) study discovered that walking for thirty minutes significantly lowers blood pressure. The mean arterial pressure reading pre-exercise is greater (3,40 mmHg) than the mean arterial pressure reading post-exercise (2,47 mmHg). The study conducted by Rachawarwati et al. (2019) revealed a reduction of 9.9 mm Hg in systolic blood pressure and 5.3 mm Hg in diastolic blood pressure. Walking activities were used in this trial as an adjunct to medication use. Regarding the study (Chalida et al., 2019a), the blood pressure drop was nearly identical to the results of our investigation, with a systolic blood pressure drop of 4 mm Hg and a diastolic blood pressure drop of 3.5 mm Hg.

Our study differed from the results of the study (Kucio et al., 2017), which concluded that there was no effect on blood pressure, as this study applied another type of walking, which is Nordic walking. Another research discovered that walking had no effect on blood pressure during pregnancy and had no influence on systolic and diastolic blood pressure (Bahadoran et al., 2015).

Conclusions

This study examined the effect of walking on sand on blood pressure. Our study found a decrease in blood pressure in people with pre-hypertension. The research showed the possibility of using walking as a tool to reduce and manage blood pressure. Therefore, including regular aerobic activity in the daily program contributes to the prevention and management of high blood pressure.

Further studies will be needed in the future that are more detailed and comprehensive and take into account other variables.

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

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