



Stepping Towards Better Health: The Effects of Walking Football for 12 Weeks on Cardiovascular Health in Hypertensive Male Senior Citizens

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Abstract

Background. The study deals with cardiovascular concerns in hypertensive elderly males, evaluating the effectiveness of a walking football program for targeted health improvement in this population.

Study purpose. This study aims to clarify and characterize changes in cardiovascular health due to a 12-week walking football training program in male seniors (60-70 years) with hypertension.

Materials and methods. This study engaged 60 hypertensive males aged 60 to 70 years from diverse regions of Kashmir, India. Purposive sampling was used to select individuals who hadn't participated in physical activities for a period of six months. In addition, participants were divided into two groups: experimental and control. The study's design and objectives were explained to participants one week before testing. Baseline data was collected a week prior to the 12-week program. The experimental group attended thrice-weekly, 1-hour walking football sessions consisted of 10-minute warm-up, 45-minute game, and 5 minute cool-down. Assessments were conducted at the end of the 4th, 8th, and 12th weeks. To analyze the data, a 2 (group: experimental, and control) × 4 (time: baseline, 4th week, 8th week, and 12th week) mixed ANOVA was conducted.

Results. During the study, the control group showed a slight decrease in systolic blood pressure (SBP) by week 8, which returned to baseline levels by week 12. Conversely, the experimental group demonstrated a consistent decline in systolic (SBP) and diastolic blood pressure (DBP), as well as resting heart rate (RHR), with a significant decrease observed by week 12. Additionally, basal metabolic rate (BMR) steadily increased in the experimental group over the 12 weeks. On the other hand, there were no significant changes in DBP, RHR, or BMR throughout the duration of the training program in the control group.

Conclusions. Walking football has been shown to be beneficial for hypertension, highlighting its public health potential. The study confirms its positive integration into physical activities aimed at ensuring the community well-being.

Keywords: basal metabolic rate, diastolic blood pressure, hypertension, resting heart rate, senior citizens, systolic blood pressure, walking football.

Introduction

Regular physical activity stands out as a simple yet powerful strategy for individuals and communities to mitigate the risk of cardiovascular disease (Lear & Yusuf, 2017). In the Indian population, cardiovascular disease is remarkably common and is frequently associated with age (Devi et al., 2013). The third most important risk factor in South Asia that increases the burden of cardiovascular disease is hypertension (Lim et al., 2012). The healthcare

infrastructure and cardiovascular health of India face considerable strain due to the prevalence of hypertension (Reddy et al., 2005).

In India, 57% of deaths from stroke and 24% from coronary heart disease are directly connected to hypertension (Gupta, 2004). Rural areas harbor hypertension in about 25% of the population, while urban areas see a prevalence of 33% (Anchala et al., 2014). Looking globally, data from 2005 revealed that hypertension was diagnosed in 20.6% of Indian men and 20.9% of Indian women. Projections indicate that by 2025, these figures will escalate to 22.9% for men and 23.6% for women (Kearney et al., 2005).

As individuals progress in age, their blood pressure tends to increase. This rise is attributed to the escalating arterial stiffness, causing a continuous elevation in systolic blood pressure over adulthood, while diastolic blood pressure reaches its zenith in the sixth decade before gradually diminishing. Consequently, as people grow older, their pulse pressure tends to widen (Kannel et al., 1981). Incorporating exercise into one's lifestyle emerges as a pivotal strategy for averting, addressing, and controlling hypertension. Engaging in exercise regimens primarily emphasizing endurance activities enables adults to sidestep hypertension development and maintain lower blood pressure levels.

Individuals diagnosed with hypertension experience the most significant reduction in blood pressure through endurance exercise, whether it's during a single exercise session (acute) or over a period of exercise training (chronic). Typically, blood pressure decreases by approximately 5-7 mm Hg after either type of exercise. Notably, after engaging in endurance exercise, blood pressure can remain lowered for up to 22 hours, a phenomenon termed post-exercise hypotension. The most substantial decreases are observed in individuals with initially elevated baseline blood pressure levels (Pescatello, 2004).

Consistent physical turns out to be a beneficial tactic for successfully controlling blood pressure levels. Among sports, football stands out as the most widely embraced globally. Its immense popularity could catalyze motivating individuals with hypertension to engage in exercise routines. This holds particular relevance for older adults and those with heightened health risks who have been less active in the past. A tailored training program emphasizing health and wellness benefits, while minimizing risks, might reignite interest in sports participation among many individuals. Football encompasses all essential components of a robust concept (Schrader et al., 2021).

Walking football, a rendition of the sport emerged in England in 1932 and has recently reemerged in the country, targeting individuals aged 65 and older. Its primary aim is to provide older adults with increased avenues for social engagement and physical activity. This adapted version of football, characterized by the rule of keeping one foot grounded at all times, has swiftly garnered international acclaim, particularly in regions such as Australia, North America, Europe, and Asia.

To minimize the risk of injuries, player-to-player physical contact is strictly forbidden, and there are restrictions on lifting the ball above head height. This skilled occupation is open to individuals of all genders, including those with limited mobility or medical conditions that restrict physical activity. The intensity of the game varies widely based on factors such as session duration and player age, with senior citizens and longer matches generally maintaining higher levels of intensity (Zainudin et al., 2022). Recent media coverage has increasingly highlighted the concept of walking football, emphasizing its positive impact on physical fitness and consequently, on overall health and wellbeing. Indeed, research has shown that engaging in regular exercise and physical activities like walking football can reduce mortality rates and mitigate various health-related conditions (Paffenbarger et al., 1986; Nocon et al., 2008).

While the physiological benefits of Association's football are well-documented, there remains a gap in

research concerning walking football. Notably, walking football, which prohibits running, involves lower absolute physiological intensity and energy expenditure compared to traditional football.

Researching walking football training programs for senior citizens provides a valuable avenue for low-impact exercise, particularly in a demographic vulnerable to hypertension. With its 12-week duration, this program facilitates insightful observations, rendering it a focused intervention for evaluating its cardiovascular benefits among older individuals. The study's primary goal was to analyze the impact of a 12-week walking football program on the cardiovascular health of hypertensive elderly men.

Materials and Methods

Study participants

Utilizing purposive sampling, a cohort of sixty (N=60) male participants, ranging in age from 60 to 70, were selectively recruited from diverse regions of Kashmir, India for the study. These individuals were then evenly divided into two groups: experimental (n=30) and control (n=30). Inclusion criteria encompassed males with hypertension aged 60 to 70 who had refrained from engaging in any form of fitness or health-related physical activities over the preceding six months. The primary aim of the research was to evaluate the outcomes of a 12-week walking football program conducted from June to August 2022.

Study organization

To ensure clarity and understanding, participants were provided with thorough explanations of the study's design and objectives one week prior to the commencement of testing. Initial samples were collected one week before the program's initiation. The measurements of blood pressure, resting heart rate, and basal metabolic rate were conducted using specialized devices: an Omron automatic blood pressure monitor (HEM 7120) and the Omron body composition analyzer (HBF-375) respectively, at Lifeline Healthcare clinic in Srinagar, India. Participants attended the clinic in the morning, and testing was carried out during the resting phase. The reliability of the data was ensured through the confirmation of instrument reliability and the competence of testers. The study's instruments, being manufactured by reputable companies, were considered reliable.

Over the course of 12 weeks, participants in the experimental group attended a 1-hour training session thrice a week. Each session commenced with a brief 10-minute warm-up, followed by a 45-minute walking football game, concluding with a 5-minute cooling-down phase. Six teams were formed, each with five members. The sessions consisted of 5-a-side games, each lasting 20 minutes, with a 5-minute break in between. At the end of the fourth, eighth, and twelfth weeks of the walking football program, the participants were tested.

The walking football sessions were planned after consulting with all of the participants to find out what days and times would be most convenient. To monitor adherence, attendance records were maintained for each participant throughout the 12-week intervention. Additionally,

participant feedback and engagement were regularly assessed to address any concerns or modifications needed to enhance compliance.

To analyze the data, a 2 (group: experimental, and control) X 4 (Time: baseline, 4th week, 8th week, and 12th week) mixed ANOVA was conducted.

Statistical Analysis

The study employed a Mixed ANOVA alongside descriptive statistics, including Mean and Standard Deviation, to assess the impact of a twelve-week walking football program on cardiovascular health among hypertensive male senior citizens. A significance level of 0.05 was chosen. Statistical analyses, both descriptive and inferential, were conducted using the software program SPSS.

Results

This research was conducted for twelve weeks, with a 1 hour session thrice a week. The results are obtained as follows.

Table 1 displays descriptive statistics of SBP, DBP, RHR, and BMR before and after a twelve-week training period for both experimental and control groups of hypertensive senior males in Kashmir.

Before training, the mean scores for SBP in the experimental group were (147.27±6.18) and in the control group were (148.43±7.93). Similarly, the mean scores for DBP in the experimental group were (99.53±7.21) and in the control group were (98.23±6.50), for RHR in the experimental group were (79.57±9.12) and in the control group were (80.00±6.25), and for BMR in the experimental group were (1525±102) and in the control group were (1530±81).

By the fourth week the mean scores for SBP in the experimental group were (144.30±6.09) and in the control group were (148.23±8.35). Similarly, the mean scores for DBP in the experimental group were (96.13±5.73) and in the control group were (96.83±5.87), for RHR in the experimental group were (77.87±9.43) and in the control group were (80.20±5.05), and for BMR in the experimental group were (1532±106) and in the control group were (1529±82).

At the eighth week, the mean scores for SBP in the experimental group were (141.57±6.61) and in the control group were (145.13±7.72). Similarly, the mean scores for DBP in the experimental group were (95.03±5.57) and in the control group were (97.13±7.42), for RHR in the experimental group were (77.37±9.08) and in the control group were (80.60±5.49), and for BMR in the experimental group were (1539±106) and in the control group were (1526±83).

Finally, by the twelfth week, the mean scores for SBP in the experimental group were (140.30±6.91) and in the control group were (146.97±8.60). Similarly, the mean scores for DBP in the experimental group were (94.83±6.18) and in the control group were (97.90±5.44), for RHR in the experimental group were (76.07±9.24) and in the control group were (80.67±5.32), and for BMR in the experimental group were (1548±109) and in the control group were (1527±82).

Table 2 displayed that the design of this study merited a mixed ANOVA, with time in weeks as the within subject

Table 2. Two-way repeated measures tests of within-subjects during different weeks of walking football training between experimental and control group

Variables	Sum of squares	df	Mean square	F	p	η^2p
SBP						
Time	841	3	280.3	21.72	0.00	0.27
Time*Group	228	3	76.1	5.90	0.00	0.09
DBP						
Time	303	3	100.94	10.91	0.00	0.16
Time*Group	162	3	53.9	5.83	0.00	0.09
RHR						
Time	89	3	29.6	4.41	0.01	0.07
Time*Group	106	3	35.4	5.27	0.00	0.08
BMR						
Time	3136	2.03	1546	13.0	0.00	0.18
Time*Group	5973	2.03	1991	24.7	0.00	0.30

Table 1. Descriptive analysis on SBP, DPB, RHR and BMR during different weeks of walking football training between experimental and control group

Variables	Group	Baseline	Week 4 th	Week 8 th	Week 12 th
SBP	Experimental	147.27±6.18	144.30±6.09	141.57±6.61	140.30±6.91
	Control	148.43±7.93	148.23±8.35	145.13±7.72	146.97±8.60
DBP	Experimental	99.53±7.21	96.13±5.73	95.03±5.57	94.83±6.18
	Control	98.23±6.50	96.83±5.87	97.13±7.42	97.90±5.44
RHR	Experimental	79.57±9.12	77.87±9.43	77.37±9.08	76.07±9.24
	Control	80.00±6.25	80.20±5.05	80.60±5.49	80.67±5.32
BMR	Experimental	1525.00±102	1532.00±106	1539.00±106	1548.00±109
	Control	1530.00±81	1529.00±82	1526.00±83	1527.00±82

Data is presented as mean± standard deviation

factor, and the intervention as the between subject factor, with a balanced sample size of 30 in each group. We ran a 2 (group: experimental, and control) × 4 (Time: baseline, 4th week, 8th week, and 12th week) Mixed ANOVA. The within subject effects analysis in SBP revealed that the time in weeks had a significant main effect, $F_{(3,28)} = 21.72$, $p=0.00$, partial eta squared = 0.27. This effect however is qualified by a significant interaction between time × treatment group $F_{(3,28)} = 5.90$, $p=0.00$, partial eta squared = 0.09. The within subject effects analysis in DBP revealed that the time in weeks had a significant main effect, $F_{(3,28)} = 10.91$, $p=0.00$, partial eta squared = 0.16. This effect is qualified by a significant interaction between time × treatment group $F_{(3,28)} = 5.83$, $p=0.00$, partial eta squared = 0.09. The within subject effects in RHR analysis revealed that the time in weeks had a significant main effect, $F_{(3,28)} = 4.41$, $p=0.01$, partial eta squared = 0.07. This effect is qualified by a significant interaction between time × treatment group $F_{(3,28)} = 5.27$, $p=0.00$, partial eta squared = 0.08. The within subject effects analysis in BMR revealed that the time in weeks had a significant main effect, $F_{(2,03,28)} = 13.0$, $p=0.05$,

partial eta squared = 0.18. However, the interaction between time and treatment is significant $F_{(03,28)} = 24.7$, $p=0.00$, partial eta squared = 0.30.

Analysis revealed a modest main effect of groups on systolic blood pressure (SBP) ($F_{(1,58)} = 4.96$, $p=0.03$, partial eta squared = 0.08). While In the control group, there is a slight decrease in systolic blood pressure by week 8th (145.13±7.72 mmHg) compared to the baseline test (148.43±8.35 mmHg). However, it subsequently increases to (146.97±8.60 mmHg) by week 12th, exhibiting no significant difference from baseline measurements. On the other hand, the experimental group demonstrates a consistent decline from baseline (147.27±6.18 mmHg) to (144.30±6.09 mmHg) at week 4th, (141.57±6.61 mmHg) at week 8th, and (140.30±6.91 mmHg) at week 12th, with a significant mean difference between groups from baseline at week 12 (Mean difference ± SE: 6.67 ± 2.02, $t_{(58)} = 3.31$, $p = 0.04$). Diastolic blood pressure (DBP) showed no main effect of groups ($F_{(1,58)} = 0.60$, $p=0.44$, partial eta squared = 0.01), yet the treatment group shows a continuous decline from baseline (99.53±7.21 mmHg) to (96.13±5.73 mmHg) at week 4th, (95.03±5.57 mmHg) at week 8th, and (94.83±6.18 mmHg) at week 12th. Resting heart rate (RHR) displayed no main effect of groups ($F_{(1,58)} = 1.77$, $p=0.19$, partial eta squared = 0.03), but the treatment group demonstrated a significant decline from pre-test (79.57 ± 9.12 bm^{-1}) to week 12 (76.07 ± 9.24 bm^{-1}). Basal Metabolic Rate (BMR) similarly showed no main effect of groups ($F_{(1,58)} = 0.10$, $p=0.75$, partial eta squared = 0.00), yet the treatment group showed a steady increase in basal metabolic rate from baseline (1525±102 kJ) to (1539±106 kJ) at week 8th and (1548±109 kJ) at week 12th. Moreover, a notable increase is observed in the experimental group at the 8th and 12th weeks compared to the 4th week, with a further increase from the 8th to the 12th week. Conversely, in the control group, diastolic blood pressure, resting heart rate, and basal metabolic rate show no significant changes throughout the 12 weeks of the training program Table (3 and 4).

Although between-group comparisons showed no overall difference except SBP, within-subjects analysis

Table 3. Two-way repeated measures test of between-subjects during different weeks of walking football training between experimental and control group

Variables	Sum of squares	df	Mean square	F	p	η^2p
SBP						
Group	882	1	882	4.96	0.03	0.08
DBP						
Group	78	1	78	0.60	0.44	0.01
RHR						
Group	375	1	375	1.77	0.09	0.03
BMR						
Group	3674	1	3674	0.10	0.75	0.00

Table 4. Pairwise comparisons of SBP, DBP, RHR and BMR using Bonferroni post hoc test during different weeks of training

Variables	Time	Group	Time	Group	Mean diff.	SE	df	t	p
SBP	Baseline	Exp.	Baseline	Control	1.17	1.83	58	0.64	1.00
	Baseline	Exp.	Week 4 th	Exp.	2.97	0.90	58	3.31	0.04
	Baseline	Exp.	Week 8 th	Exp.	5.70	0.95	58	5.99	0.00
	Baseline	Exp.	Week 12 th	Exp.	6.97	0.94	58	7.44	0.00
	Baseline	Control	Week 8 th	Control	3.30	0.95	58	3.57	0.03
	Baseline	Control	Week 12 th	Control	1.47	0.94	58	1.57	1.00
	Week 4 th	Exp.	Week 12 th	Exp.	4.00	1.03	58	3.89	0.01
DBP	Week 12 th	Exp.	Week 12 th	Control	6.67	2.02	58	3.31	0.04
	Baseline	Exp.	Week 4 th	Exp.	3.40	0.74	58	4.58	0.00
	Baseline	Exp.	Week 8 th	Exp.	4.50	0.74	58	6.08	0.00
RHR	Baseline	Exp.	Week 12 th	Exp.	4.70	0.87	58	5.42	0.00
	Baseline	Exp.	Week 12 th	Exp.	3.50	0.71	58	4.96	0.00
BMR	Baseline	Exp.	Week 8 th	Exp.	14.30	2.78	58	5.15	0.00
	Baseline	Exp.	Week 12 th	Exp.	23.30	3.00	58	7.75	0.00
	Week 4 th	Exp.	Week 8 th	Exp.	6.70	1.48	58	4.54	0.00
	Week 4 th	Exp.	Week 12 th	Exp.	15.70	2.22	58	7.01	0.00
	Week 8 th	Exp.	Week 12 th	Exp.	9.00	1.63	58	5.52	0.00

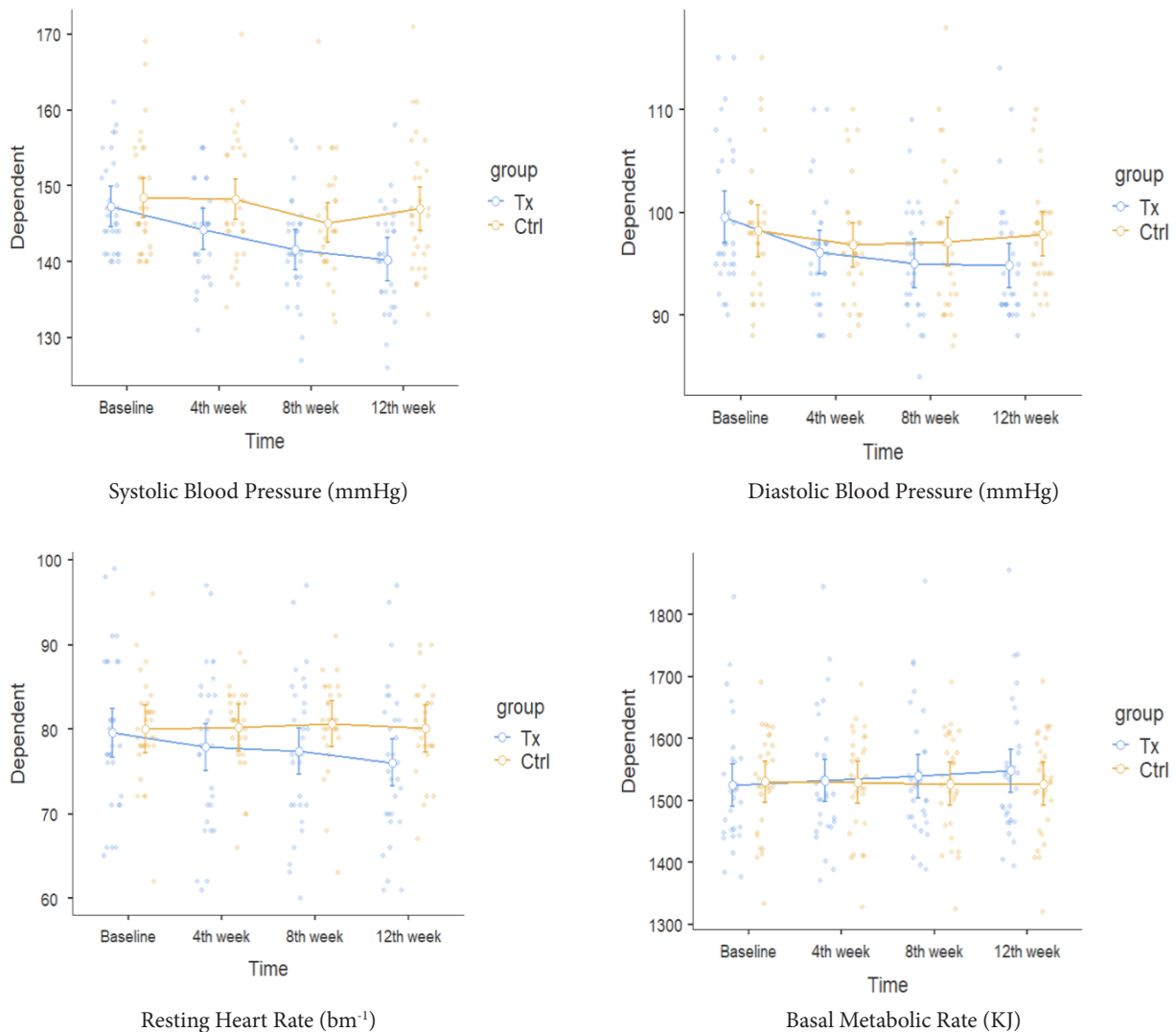


Fig. 1. Mean plots of variables in experimental (Tx) and control (Ctrl) groups

revealed the influence of both time and group allocation on outcomes, supported by significant interaction terms. These findings underscore the efficacy of the intervention in inducing favorable physiological changes over the 12-week period.

Discussion

The main objective of this research was to investigate the impact of a 12-week walking football program on the cardiovascular health of senior males diagnosed with hypertension. The results indicated positive changes in systolic and diastolic blood pressure between the participants. Numerous studies have noted a reduction in resting blood pressure among individuals having hypertension following physical activity (Biddle & Batterham, 2015; Cornelissen & Smart, 2013). Previous research has also suggested that engagement in walking football enhances overall fitness (Arnold et al., 2015), and regular walking exercises have been associated with reduced blood pressure levels (Hayashi et al., 1999; Ningsih, 2020). Health education interventions

often include walking exercise as an independent nursing measure for controlling blood pressure in hypertensive patients. Additionally, studies have consistently shown reductions in risk factors for cardiovascular disease like resting blood pressure, aerobic fitness, and body composition through regular walking (Murtagh et al., 2015). Alparslan et al., (2010) carried out a study demonstrating significant decrease in systolic and diastolic blood pressure between the participants engaged in a 12-week walking program designed to manage hypertension.

There is suggestive evidence that walking may reduce heart rate and diastolic blood pressure, as indicated by a study carried out by Lee et al., (2021). Additionally, a study by Stewart et al., (2005) found that a six-month aerobic and resistance training program reduced diastolic blood pressure in elderly people with mild hypertension. Furthermore, there exists some data suggesting a moderate likelihood that walking can decrease systolic blood pressure across different age groups.

The research outcomes revealed a significant influence on the resting heart rate and basal metabolic rate of the

experimental group. Walking football positively impacted heart rate (Yüce & Saygin, 2023). Furthermore, Kammoun et al. (2022) observed a modest decrease in heart rate and a considerable improvement in heart rate variability (HRV) among middle-aged men participating in a 4-week walking football program. Additionally, Kizilay (2016) found that an 8-week run-walk training regimen led to a noteworthy and significant increase in basal metabolic rate (BMR) among sedentary women. Therefore, it is imperative to devise a comprehensive strategy that includes educational initiatives alongside walking football programs to achieve optimal outcomes.

Conclusions

In summary, the 12-week Walking Football program has demonstrated its effectiveness in improving cardiovascular health. Findings from the study indicate notable increase in basal metabolic rate and reductions in resting heart rate, diastolic blood pressure, and systolic blood pressure among participants, underscoring the significance of walking football as a health-enhancing activity. With promising results particularly tailored for male senior citizens, there is a compelling case for clubs, communities, and governmental bodies to integrate similar programs into regular schedules to promote overall well-being. This research marks a pivotal starting point, advocating for continued investigation and implementation in this domain.

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Conflicts of interest

The authors guarantee that no conflicts of interest exist.

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Крокуючи до покращення стану здоров'я: вплив занять з пішого футболу протягом 12 тижнів на здоров'я серцево-судинної системи у чоловіків похилого віку з гіпертонічною хворобою

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 8 с., 4 табл., 1 рис., 25 джерел.

Історія питання. У дослідженні розглядаються проблеми з боку серцево-судинної системи у чоловіків похилого віку з гіпертонічною хворобою, проводиться оцінка ефективності застосування програми з пішого футболу з метою цілеспрямованого покращення стану здоров'я в даній категорії населення.

Мета дослідження. Це дослідження спрямоване на визначення та надання характеристики змін у стані здоров'я серцево-судинної системи внаслідок 12-тижневої програми тренувань з пішого футболу у чоловіків похилого віку (60-70 років) з артеріальною гіпертензією.

Матеріали та методи. У дослідженні взяли участь 60 чоловіків з гіпертонічною хворобою віком від 60 до 70 років з різних регіонів Кашміру, Індія. Для відбору осіб, які не брали участі у фізичних навантаженнях протягом шести місяців, використовували метод цільової вибірки. Крім того, учасники були розділені на дві групи: експериментальну та контрольну. За тиждень до тестування учасникам пояснили план та цілі дослідження. Збір вихідних даних проводився за тиждень до початку 12-тижневої програми. Експериментальна група відвідувала заняття з пішого футболу тричі на тиждень та тривалістю 1 годину, що складалася з 10-хвилинної розминки, 45-хвилинної гри та 5-хвилинної перерви на відновлення фізичних кондицій. Оцінка показників стану здоров'я проводилася наприкінці 4-го, 8-го та 12-го тижнів. Для аналізу даних було проведено 2 (група: експериментальна та контрольна) Х 4 (час: початковий рівень, 4-й тиждень, 8-й тиждень та 12-й тиждень) змішаний дисперсійний аналіз (ANOVA).

Результати. Під час дослідження в контрольній групі спостерігалось незначне зниження систолічного артеріального тиску (САТ) на 8-му тижні, яке на 12-му тижні досягло показників вихідного рівня. І навпаки, в експериментальній групі відзначалось послідовне зниження систолічного (САТ) і діастолічного артеріального тиску (ДАТ), а також частоти серцевих скорочень (ЧСС) у стані спокою, при цьому суттєве зниження спостерігалось на 12-му тижні. Також в експериментальній групі протягом 12 тижнів було зафіксовано стабільне зростання швидкості основного обміну речовин (ШООР). З іншого боку, в контрольній групі не було виявлено суттєвих змін у показниках САТ, ЧСС у стані спокою або ШООР впродовж усього періоду тренувальної програми.

Висновки. Доведено, що піший футбол є ефективним видом фізичної активності при артеріальній гіпертензії, що підкреслює його потенціал для зміцнення суспільного здоров'я. Дослідження підтверджує позитивну інтеграцію занять з пішого футболу до фізичної активності, спрямованої на забезпечення нормалізації показників стану здоров'я суспільства.

Ключові слова: швидкість основного обміну речовин, діастолічний артеріальний тиск, артеріальна гіпертензія, ЧСС у стані спокою, особи похилого віку, систолічний артеріальний тиск, піший футбол.

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