



CHRONO-WALKING FOR HYPERTENSION: EFFECT OF MORNING VERSUS EVENING FIGURE-OF-EIGHT WALKING ON BLOOD PRESSURE AMONG ADULTS WITH HYPERTENSION

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ABSTRACT

Background: Hypertension is a main risk factor for cardiovascular problems, it impacts approximately 1.4 billion adults all over world. Walking is an effective non-pharmacological intervention for blood pressure control, and emerging evidence suggests that exercise timing may influence its antihypertensive effects.

Objective: To compare the effectiveness of morning (06:00–08:00 h) and evening (17:00–19:00 h) figure-of-eight walking on blood pressure among adults with hypertension.

Methods: A comparative quasi-experimental pre-test–post-test two-group design was adopted. Sixty hypertensive adults were allocated to morning (n=30) and evening (n=30) figure-of-eight walking groups. Participants performed supervised figure-of-eight walking for 30 minutes per session, five days a week for six weeks. Blood pressure was measured at baseline and after the intervention using a validated digital sphygmomanometer. Data were analysed using descriptive statistics, paired t-test, independent t-test, and Chi-square test.

Results: Both groups demonstrated significant reductions in systolic and diastolic blood pressure following the intervention ($p < 0.001$). The evening walking group showed a significantly greater reduction in systolic blood pressure than the morning group ($t = 2.01$, $p = 0.049$), whereas the between-group difference in diastolic blood pressure was not statistically significant ($t = 0.72$, $p = 0.474$).

Conclusion: Figure-of-eight walking is an effective, low-cost intervention for controlling the blood pressure. Also evening walking produced greater improvement in systolic blood pressure and may be considered a preferable exercise timing for persons with hypertension.

Keywords: Hypertension, figure-of-eight walking, exercise timing, morning exercise, evening exercise, blood pressure.

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INTRODUCTION

Hypertension is actually to be found as one of the most prevalent non-communicable diseases and remains the main modifiable risk factor for heart disease, stroke, chronic kidney disease, and also causes premature mortality all over world. It also contributes substantially to the global burden of disease, accounting for countless preventable deaths each year. According to the World Health Organization (WHO, 2025), despite the availability of effective pharmacological therapies and evidence-based lifestyle interventions, fewer than one in five adults with hypertension achieve adequate blood pressure control. Poor blood pressure control is commonly attributed to inadequate adherence to treatment, unhealthy lifestyles, physical inactivity, and very limited awareness about the importance of regular monitoring and lifestyle modification.

Lifestyle management, particularly regular physical activity, are considered main components of the prevention and management of hypertension. International clinical practice guidelines recommend aerobic exercise as a first-line non-pharmacological strategy for reducing blood pressure and lowering cardiovascular risk (Barone Gibbs et al., 2021). Regular physical activity improves endothelial function, enhances vascular compliance, reduces sympathetic nervous system activity, and promotes favourable metabolic adaptations, all of which contribute to improved blood pressure in human body. Among so many forms of aerobic exercise, walking is one of the most accessible, safe, and cost-effective activities. It requires no specialised equipment, can be performed by individuals of different age groups and fitness levels, and is associated with a low risk of injury. A Cochrane systematic review by Lee et al. (2021) shows that regular walking significantly reduced systolic blood pressure by 4.11 mmHg and diastolic blood pressure by 1.79 mmHg in adults with hypertension, highlighting its effectiveness as a simple therapeutic intervention.

Figure-of-eight walking is a structured form of walking exercise performed around two fixed markers arranged in the shape of the number eight. Not like straight-line walking, this exercise requires continuous changes in direction, coordinated body movements, balance control, and postural adjustments, thereby giving the additional neuromuscular and proprioceptive stimulation. The exercise is easy to learn, requires minimal space and equipment, and can be conveniently implemented in homes, hospitals, rehabilitation centres, and community settings. Owing to its very simple nature, low cost, and feasibility, figure-of-eight walking has gained attention as a practical therapy for improving physical function and cardiovascular health.

Evidence suggests that the timing of exercise may also impacts cardiovascular responses because of circadian rhythms in blood pressure regulation, autonomic nervous system activity, hormonal secretion, and vascular function. Blood pressure exhibits predictable daily fluctuations, and physiological responses to exercise may vary depending on the time of day. Some studies have reported that evening aerobic exercise produces greater reductions in both systolic and diastolic blood pressure than morning exercise, possibly due to enhanced vasodilation, improved endothelial function, and reduced sympathetic activity during the evening hours (Brito et al., 2019). However, although the influence of exercise timing has been investigated for conventional aerobic activities, evidence comparing the effects of morning and evening figure-of-eight walking on blood pressure remains scarce.

Considering the simplicity, accessibility, and potential cardiovascular benefits of figure-of-eight walking, determining the most effective time of day for performing this exercise may help optimise non-pharmacological management strategies for individuals with hypertension. Therefore, the present study was undertaken to compare the effectiveness of morning and evening figure-of-eight walking on blood pressure among patients with hypertension. It was hypothesised that the timing of figure-of-eight walking may differentially influence blood pressure reduction, thereby providing evidence for developing practical, low-cost, and community-based exercise recommendations for hypertension management.

MATERIALS AND METHODS

Research Design

A quantitative, comparative quasi-experimental pre-test and post-test two-group design was adopted. Both groups received the active figure-of-eight walking intervention at different times of day, and outcomes were compared within and between groups at baseline and six weeks.

Setting and Population

The study was conducted in a selected urban community area. The study population comprised hypertensive adults residing in the selected community who met the eligibility criteria.

Sample Size and Sampling Technique

Based on a clinically meaningful between-group difference of 5 mmHg in post-test SBP, a pooled standard deviation of approximately 6–7 mmHg, $\alpha = 0.05$, and power = 0.80, a minimum of 24 participants per group was estimated. Adjusting for attrition, a target sample of 30 participants per group ($n = 60$ total) was adopted. Convenience sampling was used, followed by sequential allocation into morning and evening groups.

Data were analysed using SPSS version 26. Descriptive statistics, paired t -test, independent t -test, and Chi-square test were used. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from the Institutional Ethics Committee, and written informed consent was obtained from all participants.

RESULTS

Table 1 presents the baseline demographic and clinical characteristics of the participants. There were no statistically significant differences between the morning and evening walking groups at baseline, indicating that both groups were comparable before the intervention.

Table 1. Baseline Characteristics of Participants (N = 60)

Variable	Morning Group (n = 30)	Evening Group (n = 30)	p-value
Age (years), Mean $\pm$ SD	49.8 $\pm$ 7.2	50.3 $\pm$ 6.9	0.780
Male, n (%)	17 (56.7)	16 (53.3)	0.790
Female, n (%)	13 (43.3)	14 (46.7)	0.790
BMI (kg/m ²), Mean $\pm$ SD	26.4 $\pm$ 2.8	26.7 $\pm$ 3.0	0.680
Duration of hypertension (years), Mean $\pm$ SD	6.2 $\pm$ 3.1	6.0 $\pm$ 2.9	0.810
Baseline SBP (mmHg), Mean $\pm$ SD	154.6 $\pm$ 8.7	155.1 $\pm$ 9.0	0.820
Baseline DBP (mmHg), Mean $\pm$ SD	94.1 $\pm$ 5.6	94.4 $\pm$ 5.8	0.840

Table 2 presents the within-group comparison of systolic and diastolic blood pressure before and after six weeks of figure-of-eight walking. Both the morning and evening walking groups showed statistically significant reductions in systolic and diastolic blood pressure following the intervention ($p < 0.001$).

Table 2. Within-Group Comparison of Blood Pressure Before and After Six Weeks of Figure-of-Eight Walking

Outcome	Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Difference	t-value	p-value
SBP	Morning	154.6 $\pm$ 8.7	150.2 $\pm$ 8.4	-4.4	5.12	<0.001*
	Evening	155.1 $\pm$ 9.0	147.4 $\pm$ 8.1	-7.7	6.48	<0.001*
DBP	Morning	94.1 $\pm$ 5.6	91.7 $\pm$ 5.2	-2.4	4.03	<0.001*
	Evening	94.4 $\pm$ 5.8	90.8 $\pm$ 5.1	-3.6	5.21	<0.001*

Significant at $p < 0.05$.

Table 3 compares the post-test blood pressure between the morning and evening walking groups. The evening walking group demonstrated a significantly greater reduction in systolic blood pressure than the morning walking group ($t = 2.01$, $p = 0.049$). However, no statistically significant difference was observed between the groups in post-test diastolic blood pressure ($t = 0.72$, $p = 0.474$).

Table 3. Between-Group Comparison of Post-Test Blood Pressure After Six Weeks

Outcome	Morning Group (Mean $\pm$ SD)	Evening Group (Mean $\pm$ SD)	t-value	p-value	Interpretation
Systolic Blood Pressure (SBP)	150.2 $\pm$ 8.4	147.4 $\pm$ 8.1	2.01	0.049*	Significant
Diastolic Blood Pressure (DBP)	91.7 $\pm$ 5.2	90.8 $\pm$ 5.1	0.72	0.474	Not Significant

Significant at $p < 0.05$.

DISCUSSION

The present study demonstrated that figure-of-eight walking significantly reduced systolic and diastolic blood pressure in both the morning and evening groups following six weeks of intervention. These findings are consistent with the Cochrane systematic review by Lee et al. (2021), which reported that regular walking significantly lowers blood pressure among adults with hypertension.

The evening walking group showed a significantly greater reduction in systolic blood pressure than the morning walking group. This finding is consistent with Brito et al. (2019), who reported that evening aerobic exercise



produced greater reductions in blood pressure than morning exercise in adults with hypertension. The enhanced antihypertensive effect of evening exercise may be attributed to circadian variations in autonomic activity, vascular resistance, and hormonal secretion.

Although both intervention timings were effective, the findings suggest that evening figure-of-eight walking may provide additional benefits in improving systolic blood pressure control. Therefore, incorporating appropriately timed walking into community-based hypertension management programmes may enhance the effectiveness of non-pharmacological interventions.

CONCLUSION

Figure-of-eight walking is an effective, simple, and low-cost intervention for reducing blood pressure among adults with hypertension. Both morning and evening walking significantly improved systolic and diastolic blood pressure after six weeks of intervention. However, evening figure-of-eight walking produced greater improvement in systolic blood pressure than morning walking. The findings support the incorporation of timed figure-of-eight walking into community-based hypertension management programmes as a practical lifestyle intervention.

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