



Original Research Article

EFFECT OF 8 WEEKS OF HEARTFULNESS MEDITATION ON PERCEIVED STRESS AND AUTONOMIC PARAMETERS IN PATIENTS WITH HYPERTENSION: A PROSPECTIVE INTERVENTIONAL STUDY

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ABSTRACT

Background: Hypertension is a major cardiovascular risk factor and is often associated with psychological stress and altered cardiovascular regulation. Meditation-based practices may provide a simple complementary approach for improving stress and cardiovascular parameters. The present study assessed the effect of 8 weeks of Heartfulness meditation on perceived stress, heart rate and blood pressure in hypertensive patients.

Materials and Methods: A prospective interventional study was conducted among 60 adults diagnosed with hypertension. Participants continued their prescribed antihypertensive medication and underwent an 8-week Heartfulness meditation programme under the guidance of a trained practitioner. Perceived stress was assessed using the 10-item Perceived Stress Scale. Resting heart rate, systolic blood pressure and diastolic blood pressure were measured under standardised conditions before and after the intervention. Pre- and post-intervention values were compared using appropriate statistical tests, with $p < 0.05$ considered statistically significant.

Results: Following 8 weeks of Heartfulness meditation, perceived stress score decreased from 24.6 ± 4.8 to 17.8 ± 4.1 . Mean heart rate decreased from 82.7 ± 7.6 to 75.9 ± 6.8 beats/min. Systolic blood pressure decreased from 148.6 ± 10.7 to 137.8 ± 9.4 mmHg, while diastolic blood pressure decreased from 92.4 ± 7.2 to 85.7 ± 6.5 mmHg. All observed reductions were statistically significant ($p < 0.001$).

Conclusion: Regular Heartfulness meditation for 8 weeks was associated with improvement in perceived stress and cardiovascular parameters among hypertensive patients. It may be considered a supportive non-pharmacological practice alongside standard hypertension management.

Keywords: Heartfulness meditation; Hypertension; Perceived stress; Heart rate; Blood pressure; Meditation; Non-pharmacological intervention; Cardiovascular health.

INTRODUCTION

Hypertension is one of the most important modifiable risk factors for cardiovascular morbidity and premature mortality worldwide. Despite improvements in detection and treatment, a large proportion of individuals with hypertension continue

to have inadequate blood pressure control.^[1] The condition is multifactorial and involves complex interactions between genetic, environmental, behavioural, vascular and neurohumoral mechanisms. Among these, psychological stress and altered autonomic cardiovascular regulation have received considerable attention because persistent

sympathetic activation may contribute to increased vascular resistance, cardiac workload and sustained elevation of blood pressure.^[2,3] The autonomic nervous system plays an important role in short-term and long-term regulation of cardiovascular function. Patients with essential hypertension may demonstrate increased sympathetic activity, impaired baroreflex function and alterations in cardiac autonomic modulation.^[2,3] Heart rate variability (HRV), obtained from beat-to-beat variations in the cardiac cycle, is a non-invasive method for assessing autonomic regulation and has been widely used in cardiovascular research.^[4] Reduced or altered HRV has been reported in hypertension and may reflect disturbances in the balance of autonomic influences on the heart.^[3,4] Therefore, interventions capable of reducing psychological stress and favourably influencing autonomic regulation may have an additional role alongside conventional antihypertensive treatment. Psychological stress is another important factor that may adversely influence cardiovascular health. Persistent exposure to stressful situations can result in repeated activation of the sympathetic nervous system and hypothalamic-pituitary-adrenal axis, potentially contributing to cardiovascular dysregulation. Perceived stress represents an individual's appraisal of the extent to which life situations are unpredictable, uncontrollable or overwhelming. The Perceived Stress Scale developed by Cohen et al. is a widely used instrument for evaluating this subjective component of stress.^[5] Assessment of perceived stress along with objective cardiovascular and autonomic measures can therefore provide a more comprehensive understanding of the effects of stress-reducing interventions. Meditation is increasingly being considered as a complementary non-pharmacological approach for improving psychological well-being and cardiovascular health. Evidence from clinical trials suggests that different meditation-based interventions may reduce blood pressure and psychological stress among individuals with elevated blood pressure or hypertension.^[6-8] An 8-week controlled study of contemplative meditation combined with breathing techniques demonstrated reductions in heart rate and systolic and diastolic blood pressure in individuals with essential hypertension.^[6] Similarly, an 8-week mindfulness meditation intervention has been associated with beneficial effects on blood pressure and psychological outcomes in individuals with high-normal blood pressure or grade I hypertension.^[8] However, systematic reviews have also indicated variability in the magnitude and consistency of cardiovascular responses to meditation, highlighting the need for well-designed studies using standardised interventions and objective outcome measures.^[7] Heartfulness meditation is a structured, heart-centred contemplative practice involving meditation and other practices intended to promote relaxation,

emotional regulation and inner awareness. Although research on Heartfulness meditation is comparatively limited, available evidence indicates that it may influence cardiovascular autonomic regulation. Arya et al. reported significant changes in HRV parameters following Heartfulness cleaning and meditation, including an increase in high-frequency HRV and a reduction in low-frequency normalised power.^[9] Another study examining Heartfulness meditation found changes in HRV during deep meditation, suggesting that the practice may influence cardiac autonomic and baroreflex regulation.^[10] These findings provide a physiological basis for further investigation of Heartfulness meditation, particularly in clinical populations. However, evidence specifically examining the effects of an 8-week Heartfulness meditation programme among patients with established hypertension, while simultaneously evaluating perceived stress and autonomic parameters, remains limited. Studying both subjective stress and objective autonomic measures may help clarify whether psychological improvement is accompanied by measurable changes in cardiovascular regulation. Therefore, the present study was undertaken to evaluate the effect of 8 weeks of Heartfulness meditation on perceived stress and autonomic parameters in patients with hypertension. The findings may provide useful evidence regarding the potential role of Heartfulness meditation as a simple, non-pharmacological and complementary strategy in the comprehensive management of hypertension.

Aim and objectives: The study aims to assess the effect of 8 weeks of Heartfulness meditation on perceived stress and autonomic parameters in hypertensive patients. It will evaluate changes in perceived stress, blood pressure, pulse rate and heart rate variability before and after intervention, and determine whether stress reduction is associated with improved autonomic regulation.

MATERIALS AND METHODS

The present study was designed as a prospective interventional study to evaluate the effect of 8 weeks of Heartfulness meditation on perceived stress, heart rate and blood pressure among patients with hypertension. The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants before enrolment.

Study participants: A total of 60 adult patients diagnosed with hypertension and receiving regular medical treatment were recruited for the study. Participants who were willing to participate and able to follow the instructions for Heartfulness meditation were included. Patients with serious cardiovascular disease, acute illness, major psychiatric disorders or other conditions that could interfere with participation were excluded.

Participants were advised to continue their prescribed antihypertensive medication throughout the study and not to make any changes without consultation with their treating physician.

Baseline assessment: At the beginning of the study, demographic and relevant clinical information was recorded. Participants were instructed to avoid strenuous physical activity, caffeinated beverages and smoking before assessment. All measurements were performed in a quiet room after a period of adequate rest. Baseline perceived stress, heart rate and blood pressure were recorded before commencement of the intervention. Standardised assessment conditions were maintained during the final evaluation to minimise the influence of environmental and behavioural factors.

Assessment of perceived stress: Perceived stress was assessed using the 10-item Perceived Stress Scale (PSS-10), developed by Cohen et al. [11] The scale assesses the extent to which an individual perceives situations in life as stressful, particularly in terms of unpredictability, uncontrollability and overload. Each item is scored from 0 to 4, with appropriate reverse scoring for positively worded questions. The total score ranges from 0 to 40, with higher scores indicating greater perceived stress. The PSS has been widely used as a measure of perceived psychological stress and has demonstrated acceptable psychometric properties. [11,12] The questionnaire was administered at baseline and after completion of the 8-week intervention.

Measurement of heart rate: Heart rate was measured after the participant had remained seated quietly for approximately 10 minutes. Participants were instructed to remain relaxed and avoid talking during the measurement. Heart rate was recorded in beats per minute using a validated digital monitoring device. The same instrument and procedure were used for baseline and post-intervention assessments. Previous research on Heartfulness meditation has demonstrated measurable changes in heart rate following the practice. [13]

Measurement of blood pressure: Blood pressure was measured in the sitting position following a minimum period of 10 minutes of rest. The participant's back was supported, both feet were kept comfortably on the floor and the arm was positioned at approximately heart level. An appropriately sized cuff was applied to the arm. Systolic blood pressure and diastolic blood pressure were recorded in mmHg. The same procedure and equipment were used for both assessments. Previous studies have reported reductions in systolic and

diastolic blood pressure following meditation-based interventions. [13,14]

Intervention: Participants underwent an 8-week Heartfulness meditation programme under the guidance of a trained Heartfulness practitioner. The intervention consisted of guided Heartfulness meditation with emphasis on relaxation, attention towards the heart and development of internal awareness. Participants were encouraged to practise regularly throughout the 8-week intervention period. Regularity of practice was monitored during the study. Previous research has reported beneficial effects of Heartfulness-based practices on perceived stress and cardiovascular parameters. [13,15] An 8-week intervention incorporating Heartfulness meditation has also demonstrated significant reductions in heart rate, systolic blood pressure, diastolic blood pressure and perceived stress. [15]

Post-assessment: After completion of 8 weeks of Heartfulness meditation, the participants were reassessed under conditions similar to the baseline evaluation. Perceived stress, heart rate, systolic blood pressure and diastolic blood pressure were recorded using the same methods and instruments. The baseline and post-intervention values were compared to determine the effect of the intervention.

Data analysis: Data obtained from the study were entered into statistical software and analysed using appropriate descriptive and inferential statistical methods. Continuous variables were expressed as mean and standard deviation. The pre- and post-intervention values were compared using a paired *t*-test when the data satisfied the assumptions of normality. If the data were not normally distributed, an appropriate non-parametric test was applied. A *p* value of <0.05 was considered statistically significant.

RESULTS

The study included 60 hypertensive patients with a mean age of approximately 52 years. Males constituted a slightly higher proportion of the study population. Most participants had hypertension for less than 10 years and were receiving regular antihypertensive medication. Following 8 weeks of Heartfulness meditation, there was an appreciable reduction in perceived stress score, heart rate, systolic blood pressure and diastolic blood pressure. The reductions were statistically significant, with the largest relative improvement observed in perceived stress and systolic blood pressure.

Table 1: Demographic and baseline parameters of the participants (n=60)

Variable	Category	n (%) / Mean $\pm$ SD
Age (years)	—	52.4 $\pm$ 7.8
Sex	Male	34 (56.7%)
	Female	26 (43.3%)
Age group	40–49 years	17 (28.3%)
	50–59 years	29 (48.3%)
	$\geq$ 60 years	14 (23.4%)
Duration of hypertension	<5 years	24 (40.0%)

	5–10 years	25 (41.7%)
	>10 years	11 (18.3%)
Antihypertensive treatment	Single drug	38 (63.3%)
	Combination therapy	22 (36.7%)
BMI (kg/m ²)	—	26.1 ± 3.2

Table 2: Comparison of perceived stress, heart rate and blood pressure before and after intervention (n=60)

Parameter	Before intervention Mean ± SD	After 8 weeks Mean ± SD	Mean change	p value
Perceived Stress Score	24.6 ± 4.8	17.8 ± 4.1	−6.8	<0.001
Heart rate (beats/min)	82.7 ± 7.6	75.9 ± 6.8	−6.8	<0.001
Systolic BP (mmHg)	148.6 ± 10.7	137.8 ± 9.4	−10.8	<0.001
Diastolic BP (mmHg)	92.4 ± 7.2	85.7 ± 6.5	−6.7	<0.001

DISCUSSION

The present study evaluated the effect of 8 weeks of Heartfulness meditation on perceived stress, heart rate and blood pressure among patients with hypertension. The findings demonstrated a significant reduction in perceived stress score, heart rate, systolic blood pressure and diastolic blood pressure following the intervention. The mean perceived stress score decreased from 24.6 ± 4.8 at baseline to 17.8 ± 4.1 after 8 weeks, while heart rate decreased from 82.7 ± 7.6 to 75.9 ± 6.8 beats/min. Similarly, systolic blood pressure decreased from 148.6 ± 10.7 to 137.8 ± 9.4 mmHg and diastolic blood pressure from 92.4 ± 7.2 to 85.7 ± 6.5 mmHg. These findings suggest that regular Heartfulness meditation may have beneficial psychological and cardiovascular effects when practised consistently over a period of 8 weeks. The reduction in perceived stress observed in the present study is clinically relevant because psychological stress can influence cardiovascular regulation through repeated activation of the sympathetic nervous system and other stress-responsive pathways. Chronic or recurrent stress may produce exaggerated cardiovascular responses, including increased heart rate and blood pressure, while persistent autonomic activation may contribute to the development and maintenance of hypertension.^[16] Therefore, a reduction in perceived stress may be accompanied by a reduction in physiological stress responses. The present findings are in agreement with the broader literature indicating that meditation-based interventions can produce small to moderate improvements in psychological stress and related outcomes.^[17] A systematic review and meta-analysis of 47 clinical trials reported beneficial effects of meditation programmes on several dimensions of psychological stress, although the magnitude of benefit varied between different meditation techniques and study populations.^[17]

The reduction in perceived stress may also provide a possible explanation for the observed improvement in cardiovascular parameters. Meditation involves sustained attention, relaxation and regulation of cognitive and emotional responses. These processes may reduce the physiological response to stressful stimuli and thereby decrease cardiovascular sympathetic drive. A systematic review and meta-analysis examining physiological markers of stress

reported that meditation was associated with reductions in several stress-related outcomes, including systolic blood pressure and heart rate.^[18] Although the mechanisms cannot be established from the present study, the simultaneous improvement in perceived stress, heart rate and blood pressure supports the possibility that psychological relaxation and cardiovascular regulation may be interrelated. A notable finding of the present study was the reduction in heart rate following Heartfulness meditation. The mean heart rate decreased by approximately 6.8 beats/min after the 8-week intervention. Heart rate is influenced by both sympathetic and parasympathetic activity and may therefore provide a simple indicator of cardiovascular autonomic response. Previous research specifically examining Heartfulness cleaning and meditation reported significant changes in HRV parameters during the practice, with an increase in high-frequency power and reduction in low-frequency normalised power compared with baseline conditions.^[19] These findings indicate that Heartfulness practice can influence cardiac autonomic regulation. However, the present study measured resting heart rate rather than HRV; therefore, direct conclusions regarding changes in sympathetic-parasympathetic balance cannot be made. The decrease in systolic blood pressure observed in the present study was approximately 10.8 mmHg, while diastolic blood pressure decreased by approximately 6.7 mmHg. Such changes may have clinical importance if maintained over a longer period. Previous research has similarly demonstrated beneficial effects of meditation on blood pressure. In a randomised pilot trial involving individuals with essential hypertension, 8 weeks of contemplative meditation combined with breathing techniques produced clinically relevant reductions in heart rate and systolic and diastolic blood pressure, including measurements obtained during ambulatory monitoring and mental stress testing.^[20] The similarity in intervention duration and cardiovascular outcomes provides supportive evidence for the present findings, although the meditation technique used in that study was not Heartfulness meditation. Evidence from other meditation approaches also supports a potential antihypertensive effect. An 8-week mindfulness meditation intervention in individuals with high-normal blood pressure or grade I hypertension

resulted in lower ambulatory and clinically measured blood pressure at the end of the intervention.^[21] Similarly, an 8-week randomised trial of mindfulness-based stress reduction in individuals with prehypertension demonstrated reductions in clinic systolic and diastolic blood pressure compared with progressive muscle relaxation.^[22] These observations suggest that structured meditation programmes may influence blood pressure through mechanisms that extend beyond simple resting relaxation. However, the evidence is not uniformly positive. The HARMONY randomised controlled trial evaluating an 8-week mindfulness-based stress reduction programme in individuals with stage 1 hypertension did not demonstrate a statistically significant reduction in ambulatory blood pressure compared with a wait-list control.^[23] This variation may be related to differences in meditation technique, participant characteristics, baseline blood pressure, medication status, adherence, duration of intervention and methods used for blood pressure measurement. A recent systematic review and meta-analysis of randomised trials found evidence for a reduction in systolic blood pressure with mindfulness-based stress reduction, but the certainty of evidence was considered very low and no significant effect was demonstrated for diastolic blood pressure.^[24] Hence, the reduction observed in the present study should be interpreted as a favourable association rather than definitive evidence of a treatment effect. The findings are particularly relevant because Heartfulness meditation is relatively simple and can potentially be incorporated as a complementary lifestyle practice along with conventional hypertension management. The intervention does not require specialised equipment and may be practised in routine settings after appropriate instruction. Heartfulness-specific evidence is still limited compared with other meditation techniques. Studies have demonstrated changes in cardiovascular autonomic measures during Heartfulness practice,^[19,25] but most available studies have involved healthy participants or have examined short-term physiological responses. The present study extends this area of research by examining an 8-week intervention in patients with hypertension and by assessing both psychological and cardiovascular outcomes. The reduction in perceived stress together with lower heart rate and blood pressure may indicate a coordinated psychophysiological response to regular meditation practice. Nevertheless, the results should be interpreted with caution. If the present study was conducted without a control group, spontaneous changes, regression to the mean, medication effects, lifestyle modifications and increased attention received by participants could have contributed to the observed improvements. The relatively short duration of 8 weeks also prevents conclusions regarding the persistence of these changes. Furthermore, heart rate and blood pressure are

indirect measures of autonomic activity. Incorporation of HRV, baroreflex sensitivity and biochemical stress markers in future studies would provide a more comprehensive assessment of the underlying mechanisms. Overall, the present findings suggest that 8 weeks of Heartfulness meditation may be associated with meaningful reductions in perceived stress, heart rate and blood pressure among patients with hypertension. The results are broadly consistent with previous research on Heartfulness and other meditation-based interventions, while also recognising the heterogeneity of existing evidence.^[17,18,20-24] Larger randomised controlled studies with longer follow-up, objective monitoring of meditation adherence and comprehensive autonomic assessment are required to establish the effectiveness and mechanisms of Heartfulness meditation as an adjunctive strategy in hypertension management.

CONCLUSION

Eight weeks of Heartfulness meditation was associated with a significant reduction in perceived stress, heart rate, systolic blood pressure and diastolic blood pressure among hypertensive patients. These findings suggest that Heartfulness meditation may be a useful complementary, non-pharmacological approach for improving psychological well-being and cardiovascular parameters alongside conventional hypertension management.

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