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Research Article

Effect of Heartfulness Meditation Practices on Blood Pressure and Quality of Life in Patients with Hypertension – A Randomized Clinical Study

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ABSTRACT:
Background: Heartfulness meditation practices are modified form of Raja Yoga and gaining popularity worldwide. Studies have demonstrated the beneficial effects of heartfulness meditation on physical health, psychological health, emotional intelligence, heart rate variability, sleep and even on telomere length.
Methods: This is a randomized control study conducted in patients with hypertension to assess the effect of heartfulness meditation practices on blood pressure and quality of life. A total of 112 participants were randomized in 1:1 ratio to either intervention group or control group for a study period of four months. Intervention group were trained on heartfulness meditation practices by certified trainers on three consecutive days and were asked to practice them daily at their home. Quality of life was assessed by MINICHAL scale.
Results: After the intervention, there was a significant reduction in mean systolic and diastolic blood pressure in the intervention group compared to baseline (136.71 ± 8.64 vs 130.31 ± 8.78, p <0.001 for systolic BP and 82.78 ± 7.30 vs 77.44 ± 7.55, p <0.001 for diastolic BP). Comparison of BP changes between both the groups after the intervention showed significant reduction in both systolic (p=0.009) and diastolic BP (p=0.002) in the intervention group. There was also a significant improvement in mental domain, somatic domain, and overall quality of life in the intervention group.
Conclusion: The four months heartfulness meditation practices resulted in a significant reduction in the mean systolic and diastolic pressures. There was also improvement in the scores related to various aspects of quality of life.

Keywords: heartfulness, meditation, cleaning, prayer, quality of life, hypertension.

INTRODUCTION

Hypertension is the emerging burden in the globe contributing to cardiovascular disease and all-cause mortality. An estimated 1.28 billion adults aged 30–79 years worldwide have hypertension, and two-thirds of them living in low- and middle-income countries.[1] According to the report by WHO only 54% of adults with hypertension are diagnosed, while 42% receive treatment, and just 21% achieve optimal blood pressure control.[2] In 2015-16, the prevalence of hypertension in India among individuals aged 15 to 49 years was 11.3%.[3] In a recent study published in 2024, the overall prevalence of hypertension in India has been estimated at 22.6%, with a higher prevalence observed in men (24.1%) compared to women (21.2%).[4]

Hypertension, cigarette smoking, diabetes mellitus, and dyslipidaemia are well-established, modifiable risk factors for cardiovascular disease (CVD). Among these, hypertension exhibits the strongest causal association with CVD and remains one of the most prevalent risk factors globally.[5] Current treatment guidelines for hypertension include health-promoting life style modifications like dietary changes, weight control and regular exercise along with pharmacotherapy.[6] An expert panel from the International Society of Hypertension recommends lifestyle management as the first-line strategy for preventing and controlling hypertension in adults. These lifestyle measures include maintaining a healthy weight, being physically active, eating healthy, avoiding smoking and

alcohol, and managing stress and sleep along with continuing the prescribed medication.[7] The current Joint National Committee 8 (JNC 8) guidelines for treatment of hypertension further support the recommended lifestyle measures.[8] The concept of "Meditation" is currently gaining a lot of popularity worldwide owing to its various health benefits and other advantages such as safety and ease of practice. American Heart Association scientific statement systematically reviewed the data on the potential benefits of meditation on cardiovascular risk and given a guideline stating that meditation may be considered as an adjunct to guideline-directed cardiovascular risk reduction.[9] There are different types of meditation such as heartfulness, mindfulness, vipassana, and transcendental, each utilizing different techniques, and the benefits of one cannot be extrapolated on another. Heartfulness meditation practice has been gaining popularity worldwide as a refined and modified form of Raja Yoga (yoga of mind).[10] Many studies have shown the beneficial effects of heartfulness meditation practices on burnout, perceived stress, anxiety, overall well-being, improved sleep quality and telomere length.[11-13] Additionally, techniques of heartfulness meditation have demonstrated improvement in heart rate variability and blood pressure. [14,15] The studies on the effect of meditation on blood pressure are meagre. So, the present study was conducted with the aim to assess the effect of heartfulness meditation practices on blood pressure and quality of life in patients with hypertension.

MATERIAL AND METHODS

This study was a randomized open-label controlled intervention study conducted in the department of cardiology of a tertiary care centre in India. Based on the previous studies, it was observed that Mind Body Interventions (MBI) like yoga and meditation can bring about a reduction in SBP/DBP by 4-6/2-3 mm Hg.[16] The sample size is calculated based on Cohen's d effect size. By convention Cohen's d effect sizes of 0.2, 0.5 and 0.8 are considered small, medium, and large respectively. Anticipating the effect of intervention (heartfulness meditation practices) to be moderate (Cohen's d effect size = 0.5) on the reduction of BP, the desired statistical power to be 0.8 and probability level to be 0.05, and substituting the same in online A-priori sample size calculator for students t-tests [17], the minimum sample size per group was estimated to be 51. Taking into consideration the attrition to be 10% and adding the same to the above derived sample size, the sample size for each group is calculated as 56.

Patients attending to the out-patient department and who fulfilled the study criteria were included in the study. Diagnosis of hypertension was made as per the Joint National Committee 8 guidelines.[8] Hypertensive patients of either sex between 18 to 60 years of age, who are willing to participate in the study and were on medication for at least three months prior to enrolment were included in the study. Pregnant women and women planning to conceive during the study period, newly diagnosed cases of hypertension who are being prescribed medication for the first time, patients with structural heart diseases and systolic dysfunction, patients with other diseases like renal disorders, hepatic dysfunction, neurological disorders, psychiatric illnesses and malignancies and patients already practicing any form of meditation were excluded from the study.

The study was started after obtaining approval from the institutional ethics committee (IEC no. 911). Written informed consent was taken from the patients before enrolling into the study. Patients were randomized to either of the groups by lottery system and the investigators involved in the patient care were blinded till the allocation of the patients by SNOSE (serially numbered opaque sealed envelopes) method. All the patients enrolled in the study received the treatment as per JNC 8 guidelines.[8]

Demographic details and all the relevant clinical information of the patients related to management of hypertension was captured in a predesigned standard patient information sheet. Baseline values of heart rate, BP, were assessed before the start of the study. Both the control group and interventional group patients were given standard care as per the guidelines along with health education about life style modifications. All the patients were asked to come for follow-up at the end of 4th month by sticking on to their daily routine as per the group to which they were allotted. At the end of 4th month, heart rate, BP and quality of life were assessed.

Heart rate and BP were measured by trained clinical staff in a quiet, climate-controlled room. Participants were asked to refrain from

consuming coffee/tea for at least 60 minutes prior to their appointment time. BP was assessed on their non-dominant arm while sitting in a chair with their feet flat on the floor and their arm supported at heart level. Patients were rested quietly for 10 minutes, and then 3 seated BP readings were taken, each 5 minutes apart. The average of the three readings were taken as the measure of blood pressure. BP was recorded using Omron HBP 1300. BP assessment procedures remained the same at the BP screening, pre-test, and post-test assessment visits. Measurement of heart rate was taken as per recording on Omron HBP 1300 BP recording apparatus.

Health related quality of life in both the groups before and after the intervention was assessed using MINICHAL scale, a validated tool for use in hypertensive patients in the clinical setting. [18,19] This scale has 17 items and each item is scored on a four-point scale from 0 to 3 (0 - No, not at all; 1 – Yes, somewhat; 2 – Yes, a lot; 3 – Yes, very much). Of the 17 items, 9 items were related to state of mind dimension (mental domain, scores from 0-27) and 7 items to somatic dimension (somatic domain, scores from 0-21). The last item is related to quality of life affected by hypertension and its treatment. Total score ranged between 0 (signifying best level of health) and 51 (signifying worst level of health).[20]

Intervention [10,11,14]:

Patients randomized to the intervention group were introduced to the 3-day heartfulness meditation practices which is being conducted for a duration of 1 hour daily on three consecutive days by a certified heartfulness meditation trainer. These 3-day sessions enable the patients to practice the key elements of heartfulness practices – meditation, cleaning, and prayer. All these sessions were conducted by certified trainers of Heartfulness Institute. Each participant was allotted to a trainer for follow up sessions.

Patients were asked to follow all the three components of heartfulness meditation practices daily at home – meditation: every morning for 30 to 60 minutes; cleaning: every evening at the end of day's work for 20 to 30 minutes; and bedtime prayer-meditation: at bedtime for 10 to 15 minutes. All the participants were provided with a book related to the three basic practices of heartfulness. The participants were asked to make a note of their daily meditation practice in a diary provided to them. As part of follow up, the participants were asked to participate in a one-on-one individual meditation session with the trainer once in every 15 days. This individual meditation session helps the trainer to track participants' individual practice and provide the participant an opportunity for clarifications related to meditation practices.

The collected data was entered in Microsoft excel and analysed using IBM SPSS 26th version. Categorical variables were presented as frequency and percentages and continuous variables were presented as mean and standard deviation. Chi-square test/Fisher exact test was used to test the significant difference between categorical variables. Student t-test was used to test the significant difference between two means. A p-value of less than 0.05 was considered as statistically significant.

RESULTS

Mean age of the participants in the intervention group was 52.2±7.9 years and in control group was 51.9±7.1years. Among 55 participants in intervention group, 36 (65.5%) were males and among 53 participants in control group 27 (51%) were males. There was no significant difference in relation to age, gender, status of dyslipidaemia, diabetes mellitus, smoking, alcohol, previous history of coronary artery disease, chronic kidney disease and the number of antihypertensives used in both the groups at baseline as mentioned in table 1.

Before the start of intervention, there was no significant difference in the mean systolic BP (136.71 ± 8.63 vs 136.55 ± 9.69, p=0.927) and diastolic BP (82.78 ± 7.30 vs 83.53 ± 8.89, p=0.634) among the intervention and control groups. There was also no significant difference in relation to BMI, heart rate, and mental domain scores, somatic domain scores and quality of life scores as measured by MINICHAL scale at baseline as mentioned in table 2.

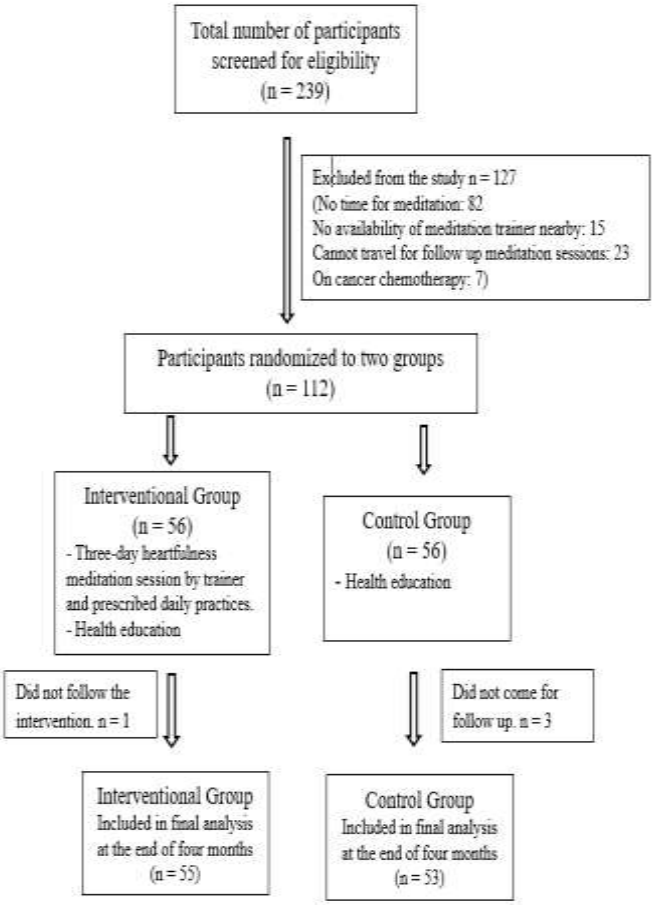

Figure 1: CONSORT flow diagram

Table 1: Comparison of baseline characteristics.

Variable	Intervention Group (n=55)	Control Group (n=53)	p-values
Mean Age (years)[#]	52.2 ± 7.9	51.9 ± 7.1	0.82
Gender: n (%) Male Female	 36 (65.5) 19 (34.5)	 27 (51) 26 (49)	0.17
Dyslipidemia n (%)	16 (29)	18 (34)	0.59
Diabetes mellitus n (%)	29 (52.7)	29 (54.7)	0.84
Smoking n (%)	0	1 (1.9)	0.31
Alcoholics n (%)	03 (5.5)	06 (11.3)	0.27
CAD n (%)	03 (5.5)	0	0.08
CKD n (%)	01 (1.8)	0	0.32
No. of Antihypertensives n (%) Single Dual Triple	 32 (58.2) 16 (29.1) 07 (12.7)	 29 (54.7) 19 (35.9) 05 (9.4)	0.70

[#]indicates Independent Student's t-test & rest are χ^2 test.

At the end of intervention of 4 months, it was observed that there was a significant reduction in systolic BP (p=0.009), diastolic BP (p=0.002) in the intervention group compared to the control group. There was also significant improvement in the mental domain scores (p<0.001) and the overall quality life (p=0.001) in the intervention group compared to control group as shown in table 3.

Table 2: Comparison of pre-intervention vitals, biochemical parameters, and quality of life between the intervention and control groups.

Variable	Intervention Group (n=55)	Control Group (n=53)	p-values
BMI (kg/m^2)	28.18 ± 5.14	28.13 ± 6.07	0.963
Heart rate	80.01 ± 13.04	82.61 ± 7.80	0.213
Systolic BP mmHg	136.71 ± 8.63	136.55 ± 9.69	0.927
Diastolic BP mmHg	82.78 ± 7.30	83.53 ± 8.89	0.634
Quality of life (MINICHAL Scale)			
Mental Domain	14.64 ± 4.05	15.38 ± 4.32	0.359
Somatic Domain	10.82 ± 2.30	11.45 ± 4.03	0.315
Quality of life	27.15 ± 5.91	28.64 ± 8.00	0.270

Independent Student's t-test. *Indicates significant p-value.

Table 3: Comparison of post-intervention vitals, biochemical parameters, and quality of life between the intervention and control groups.

Variable	Intervention Group (n=55)	Control Group (n=53)	p-values
BMI (kg/m^2)	28.06 ± 5.02	28.13 ± 6.07	0.925
Heart rate	78.84 ± 13.61	82.01 ± 9.39	0.165
Systolic BP mmHg	130.31 ± 8.78	134.53 ± 7.54	0.009*
Diastolic BP mmHg	77.44 ± 7.55	82.17 ± 8.09	0.002*
Quality of life (MINICHAL Scale)			
Mental Domain	11.80 ± 1.74	14.75 ± 5.29	<0.001*
Somatic Domain	9.76 ± 2.27	11.04 ± 4.43	0.061
Quality of life	22.84 ± 3.17	27.42 ± 9.70	0.001*

Independent Student's t-test. *Indicates significant p-value.

Intragroup analysis showed a significant reduction in systolic BP ($p<0.001$), diastolic BP ($p<0.001$) and significant improvement of mental domain scores ($p<0.001$), somatic domain scores ($p=0.003$) and quality of life ($p<0.003$), in the intervention group. No significant changes were observed in the control group as mentioned in table 4.

DISCUSSION

This was a randomized study conducted to assess the effect of heartfulness meditation practices on blood pressure, and quality of life in hypertensive patients on medication. This is a four-month interventional study that compared the effects between the intervention group (n=55) and control group (n=53). Before the start of intervention, there was no significant difference between both the groups regarding body mass index, heart rate, systolic BP, diastolic BP, quality of life measures as measured by MINICHAL scale. After the intervention by four months of heartfulness meditation practices, it was observed that there was a significant decrease in both the systolic and diastolic BP compared to baseline and improvement in quality-of-life measures in the intervention group.

In a randomized controlled trial by Hughes JW et al. [21], conducted on prehypertensive participants (SBP 120–139 mmHg, DBP 80–89 mmHg) who are not yet started on any antihypertensives, participants were either randomized to Mindfulness-Based Stress Reduction (MBSR) (n=28) or Progressive Muscle Relaxation (PMR) (n=28). Duration of intervention was for 8 weeks that included meditation, body scan, and non-strenuous yoga in MBSR group while the PMR group participants focused on muscle tension-relaxation cycles. There was a significant reduction in systolic BP (4.8 mmHg vs. 0.7 mmHg, $p = 0.016$) and diastolic BP (1.9 mmHg vs 1.2 mmHg, $p = 0.008$) in the MBSR group compared to PMR group.

Table 4: Intragroup analysis - comparison of pre- and post-intervention vitals, biochemical parameters, and quality of life in both the groups.

Variable	Intervention group (n=55)			Control group (n=53)		
	Pre	Post	P value	Pre	Post	P value
BMI (kg/m^2)	28.18 ± 5.14	28.06 ± 5.02	0.369	28.13 ± 6.08	28.13 ± 6.07	0.904
Heart rate	80.01 ± 13.04	78.84 ± 13.61	0.408	82.61 ± 7.80	82.01 ± 9.39	0.595
Systolic BP	136.71 ± 8.64	130.31 ± 8.78	<0.001*	136.55 ± 9.70	83.53 ± 8.90	0.207
Diastolic BP	82.78 ± 7.30	77.44 ± 7.55	<0.001*	134.53 ± 7.54	82.17 ± 8.09	0.307
Quality of life (MINICHAL Scale)						
Mental Domain	14.64 ± 4.05	11.80 ± 1.74	<0.001*	15.38 ± 4.32	14.75 ± 5.29	0.359
Somatic Domain	10.82 ± 2.30	9.76 ± 2.27	0.003*	11.45 ± 4.03	11.04 ± 4.43	0.390
Quality of life	27.15 ± 5.91	22.84 ± 3.17	<0.001*	28.64 ± 8.00	27.42 ± 9.70	0.268

Paired Student's t-test. *Indicates significant p-value.

Similar findings were observed in the present study though the participants in both the groups were known hypertensives and on medication during the entire study period. In a different study by Momeni, JJ et al. [22], conducted in 60 cardiac patients randomized to 8 weeks of MBSR training (n=30) or the control group (n=30) with no psychological training, it was observed that SBP, perceived stress and anger were significantly improved ($p < 0.01$) in the MBSR group compared to control group.

In a systematic review and metanalysis conducted by Bai Z et al. [23], to investigate the effect of transcendental meditation (TM) on blood pressure, that included 12 RCTs and 996 participants, with control groups either with health education or no treatment or waiting list participants, showed that TM has brought about reduction in BP by 4.26/2.33 mmHg when compared to control ($P<0.05$). In a RCT conducted by Schneider RH et al. [24], in 201 adults with coronary artery disease treated with a TM program or health education showed that systolic BP fell by 4.9 mmHg in TM group compared to control group ($p=0.01$). Similar findings of reduction in systolic BP was observed in the present study by heartfulness meditation practices.

In a systematic review and metanalysis conducted by Shi et al. [25], to evaluate the impact of meditation interventions on blood pressure, that included a total of 19 RCT (12 studies on TM and 7 studies of non-transcendental meditation – MBSR, Breathing Awareness Meditation) showed that both TM and non-TM interventions significantly reduced systolic BP and diastolic BP and office BP measurements showed larger reductions than ambulatory BP monitoring.

A randomized, observer-blind controlled pilot trial was conducted by Manikonda et al. [26], that included 52 untreated essential hypertension patients randomized either to Contemplative Meditation with Breathing Techniques (CMBT) group (practiced meditation + breathing techniques for 8 weeks) or control group (no intervention - but received one session of lifestyle counselling based on hypertension guidelines). After 8 weeks of follow up, it was observed that there is significant reduction in systolic BP and diastolic BP for office BP readings and 24-hour ambulatory BP monitoring in the CMBT group compared to control group. The reduction in systolic BP and diastolic BP are consistent with the present study though the meditation techniques were differing in both the studies.

Haripriya M et al. [27], conducted a study on patients with established coronary artery disease as a single group study (pre-test and post-test design) to study the effect of three months of heartfulness meditation practices on changes in blood pressure and quality of life. It was observed that there was a significant

reduction in systolic BP, diastolic BP, and heart rate after the intervention. In the 12-item Short Form Health Survey (SF-12) used to assess health related quality of life, showed significant improvement in mental component summary of SF-12 with no difference in physical component summary. Similar findings related to decrease in systolic BP, diastolic DBP and improvement in quality of life were observed in the present study conducted on patients with hypertension. In a study by Arya et al. [14], on 30 heartfulness meditation practicing volunteers, it was observed that there was a significant reduction in systolic BP ($p<0.01$) after meditation with no significant difference in diastolic BP. There was also significant reduction in heart rate during meditation indicating autonomic relaxation. Participants also reported high levels of happiness and well-being.

There are many studies published that show that various meditation practices can improve wellbeing and quality of life.[28-31] The scales used for measurement of health-related quality of life and well-being were different across the studies. The same was observed in the present study that showed significant improvement in mental domain, somatic domain and overall wellbeing in the intervention group compared to control group. It was suggested that improved wellbeing and quality of life might emerge as one of the positive benefits with regular practice of meditation. [32]

The exact mechanism by which meditation lowers blood pressure remains unclear. It is possible that long-term neurophysiological changes associated with meditation may influence blood pressure through autonomic nervous system regulation.[33,34] Though most of the meditations showed reductions in blood pressure in the studies mentioned, there is difference in the amplitude of reduction in both systolic BP and diastolic BP with different meditations. This difference could be due to the difference in the technique of meditation, differences in how they are being taught and practiced. The variation in results could be due to differences in study populations, study designs, data collection methods, study duration, baseline blood pressure levels, and blood pressure measurement techniques employed.

The present study had some limitations. Due to the nature of the intervention, the participants were not blinded to the group they were assigned. Compliance to the daily meditation practices was measured based on the self-report by the participants. Blood pressure was measured only at the start and end of the study, despite its tendency to fluctuate throughout the day.

CONCLUSION

Four months of heartfulness meditation practices resulted in a significant reduction in both systolic and diastolic blood pressure. There was also significant improvement in different aspects of quality of life. The results of this study could help health care providers in suggesting alternative nonpharmacological interventions along with routine medication to patients with hypertension for better outcomes.

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