Benefits of meditation in reducing blood pressure and stress in patients with high blood pressure

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Abstract

Introduction: Hypertension is considered a major cardiovascular risk factor worldwide, with about 35% of the adult population affected.

Objective: to evaluate an intervention on the possible effect of meditation in a group of hypertensive patients.

Methods: This prospective, randomized, open-label, prospective, single-blinded, open-label study included 42 patients.

Results: Differences were observed when taking antihypertensive drugs, with more frequent morning administration in the intervention group.

Conclusions: mindfulness meditation is an effective tool to reduce clinical BP, mainly clinically measured SBP and 24h and nocturnal SBP.

Keywords: meditation, arterial hypertension, primary care, source intervention: DeCS

Resumen

Introducción: La hipertensión se considera un factor de riesgo cardiovascular importante en todo el mundo, con alrededor del 35% de la población adulta de afectados.

Objetivo: evaluar una intervención sobre el posible efecto de la meditación en un grupo de pacientes hipertensos.

Método: Este estudio de valoración ciego prospectivo, aleatorizado y abierto incluyó un total de 42 pacientes.

Resultados: Se observaron diferencias en el tiempo de toma de medicamentos antihipertensivos, con administración matutina más frecuente en el grupo de intervención.

Conclusiones: la meditación de atención plena es una herramienta eficaz para reducir la PA clínica, principalmente PAS medida clínicamente y PAS de 24h y nocturna.

Palabras clave: meditación, hipertensión arterial, atención primaria, intervención fuente: DeCS

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Introduction

Hypertension is considered a major cardiovascular risk factor worldwide, with around 35% of the adult population estimated to be affected[1]. It has also been estimated that, of the European population over 50 years of age, 45.7% have had at least one psychiatric episode in their lifetime, 17.4% currently have a mental disorder, and the prevalence of anxiety is 29.4%[2].

The main cardiovascular effect of stress and depression is acute and chronic activation of the sympathetic nervous system, which can lead, in predisposed individuals, to the development of hypertension or to a worsening of blood pressure (BP) levels in patients who are already hypertensive[3]. An accessible, cost-effective, reproducible therapeutic technique such as meditation could considerably reduce this pathology and subsequent organ damage. A high proportion of patients with hypertension take various pharmacological agents to treat their BP but generally fail to control BP[4].

Stress reduction through meditation is a potentially crucial nonpharmacological treatment that could reduce polypharmacy and improve BP control[5]. In the current guidelines on cardiovascular risk prevention and treatment of hypertension, the level of evidence for meditation is II B. It would be helpful to assess psychosocial factors through interviews or standardized questionnaires, as this would improve individualized clinical management to improve patients' quality of life and prognosis. However, despite the evidence, most patients do not receive adjuvant treatment for stress and depressive symptoms[6].

The benefits of meditation have been demonstrated for BP and other conditions associated with vascular risks, such as glycemic control in diabetes mellitus, cardiovascular risk reduction, memory improvement and even adjuvant therapy for pain control in cancer patients[7].

There is increasing evidence of the positive effect of meditation on BP. For example, a meta-analysis by Rainforth et al. (2007) concluded that meditation is the only psychological stress intervention that obtained significant BP benefits for patients diagnosed with prehypertension or arterial hypertension (AHT). However, the same meta-analysis reported less beneficial results with other techniques, such as muscle relaxation, biofeedback, and stress management[8].

A recently published meta-analysis demonstrates that relaxation techniques are effective and safe alternatives to pharmacotherapy, although the benefits vary according to the population, age and meditation technique used. In another review, age was an independent predictor of reduced systolic BP (SBP) and diastolic BP (DBP) values, regardless of the technique and BP measurement method used. These investigators comment that older people (aged 54-56 years) may benefit more from meditation regarding BP reduction, as they may be more motivated to adhere to behavioral interventions[9].

However, methodological differences in the studies published to date make it impossible to extrapolate the benefits of meditation to different populations, mainly middle-aged populations. In addition, no comparable studies have been published, and no data comparing physiological and psychological variables have been obtained.

Few studies have evaluated BP response using 24h ambulatory mean ambulatory blood pressure monitoring (PAMA), a technique that rules out any possible placebo (white coat) effect associated with psychological techniques and also allows smaller samples to be studied[10].

Studies of meditation and ABPM demonstrate the superiority of meditation over other techniques in reducing BP in the intervention groups compared to the control groups. In contrast, no significant BP reduction was observed with meditation for ABPM in patients with untreated grade 1 HTN[11].

Another topic of debate has been the duration of the meditation program and the follow-up period needed to measure benefits. A meta-analysis on the long-term effects of stress reduction on

mortality reported, after a mean follow-up of 8 years, a fall in total and cardiovascular mortality of 23% and 30%, respectively, in the intervention compared to control groups[12]. Another study with a similar methodology showed that BP benefits were evident and consistent from the third month of follow-up[9].

According to a review, more evidence is needed to demonstrate the usefulness of meditation and identify suitable candidate populations and variables that might predict a good response[13]. Therefore, the study's main objective was to evaluate an intervention on the possible effect of meditation in a group of hypertensive patients.

Method

A prospective, randomized, open-label, prospective, blinded assessment study included 42 patients in primary care practices in the city of Ambato. Once confirmed that the subjects met the inclusion criteria and had given written consent, they were randomly assigned, 24 to meditation (intervention and 18 to the health education group for control).

Excluded were patients with a medical history of symptomatic heart failure (New York Heart Association-NYHA class II-IV). Alternatively, left ventricular ejection fraction (LVEF) <60%; patients with coronary artery disease, cerebrovascular disease, or any other condition that could lead to death before the end of the study; patients concomitantly using BP-modifying drugs (cyclosporine, nonsteroidal anti-inflammatory drugs (NSAIDs), steroids, vasoconstrictors, etc.); pregnant women; patients participating in another clinical trial; and patients with previous experience in meditation, meditation, yoga, taichi, chikung or similar techniques.

In weekly 2 h sessions for 8 weeks, the intervention group received a stress reduction group therapy based on mindfulness skills, delivered by a psychiatrist trained in this technique, drawn from various formal and informal mindfulness-based cognitive therapy practices, which included mindfulness of breathing, thoughts, bodily sensations, sounds, and everyday activities. Patients in the intervention group were also encouraged to practice meditation at home for 45 minutes daily. In addition, the control group received weekly health education during the same period.

For both groups, therapeutic regimens and pharmacological doses remained unchanged until the end of the follow-up. The study was evaluated and approved by an independent review board according to international standards and was conducted following Good Clinical Practice (GCP) guidelines and protocols following the principles of the Declaration of Helsinki. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

The database and statistical processing of the data were performed and analyzed in the statistical program SPSS 26 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

Of the 42 patients included in the study (73.8% employed), 52.4% had dyslipidemia,14.3% had diabetes, 19% were smokers, and 2.4% had chronic kidney disease. In addition, 61.9% and 21.4% had a history of anxiety or depression, respectively. In terms of baseline characteristics, there were no significant differences in baseline variables between the intervention and control groups, except for age, which was higher in the intervention group (57.1 (5.4) years vs. 5.7 (10.2) years; $p<0.05$).

Most patients (65%) were on antihypertensive treatment (with no differences in the number, class or pharmacological molecule administered). However, differences were observed in the timing of antihypertensive medication intake, with more frequent morning administration in the intervention group compared to the control group (94.1 vs. 66.7%; $p=0.05$).

Table 1: Baseline characteristics of patients in the intervention (meditation) and education (control) groups

Variables	Education (n=18)	Meditation (n=24)	Total	p
Media				
Abdominal circumference (cm)	90,5	92,9		0,97
Years of age	55,7	57,1		0,05
Body mass index	26,8	28,2		0,48
N (%)				
Male	7 (38,9)	11 (45,8)	18(42,9)	0,65
Dyslipidemia	9 (50)	13 (54,2)	22 (52,4)	0,79
Diabetes mellitus	3 (16,7)	3 (12,5)	6 (14,3)	0,70
Smoker	3 (16,7)	5 (20,8)	8 (19)	0,8
Chronic kidney disease	0	1 (4,2)	1 (2,4)	0,38
Atrial fibrillation	2 (11,1)	3 (12,5)	5 (11,9)	0,59
Sleep apnea	2 (11,1)	3 (12,5)	5 (11,9)	0,59
Hyperuricemia	1 (5,6)	1 (4,2)	5 (27,8)	0,83
Depression	4 (16,7)	9 (21,4)	0	0,65
Anxiety	11 (61,1)	15 (62,5)	26 (61,9)	0,66
Active labor	16 (88,9)	15 (62,5)	31 (73,8)	0,10
Family history of				
Premature delivery	2 (11,1)	3 (12,5)	5 (11,9)	0,99
Acute myocardial infarction				
Sudden death	1 (5,6)	0	1 (2,4)	0,5
Antihypertensive treatment	12 (66,7)	17 (70,8)	29 (69)	0,77

Source: statistical analysis, $p \leq 0.05$.

Discussion

The study points to the benefits of meditation for BP control. In the education (control) group, clinically measured mean BP values increased from baseline to the final visit by +1.61mmHg for SBP and +2.02 mmHg for DBP. In contrast, for the meditation (intervention) group, there was a statistically significant and clinically relevant reduction of +5.8 mmHg and +3.62 mmHg in mean SBP and DBP values, respectively.

This benefit was maintained, although without statistical significance, from the follow-up visit (4 weeks after the end of the intervention), when the mean values of SBP and DBP were +13mmHg in the meditation group. The BP values measured by MAPA confirm the findings for clinically measured BP. The most striking findings were

observed overnight when patients in the meditation group experienced a reduction of up to +2.6mmHg in SBP and +2.1mmHg in DBP. These patients also experienced a significant reduction in 24-hour SBP.

The results are encouraging since the average reduction in BP was similar to that achieved with standard validated nonpharmacological measures implemented in routine clinical practice, such as regular aerobic exercise, which has been shown to reduce resting BP by +3.0 to +2.4 mmHg in the general population and by -6.9 to -4.9 mmHg in patients with HT. Moreover, the impact of these results is even greater if we consider that a reduction of -3mmHg in SBP is estimated to reduce stroke mortality by 8% and cardiovascular mortality by 5%.

In contrast to our findings, a study published in 2012 found no beneficial effect on clinically measured BP[14]. The authors of that study refer to different possible explanations, such as the existence of white coat HT, the contribution of behavioral factors to clinically measured BP (e.g., activity patterns), and seasonal changes (starting a study in a summer month and making comparisons with data collected in winter months, as reported in a meta-analysis[15]. Indeed, seasonal factors may have contributed partly to the lack of statistical significance in the study at the end of follow-up and the fact that patients were recruited in early fall (September), and the study was completed in early spring (March).

Another interesting but real possibility, also discussed, is that patients can better apply the principles learned during the intervention when BP is measured at rest in a controlled room than in their daily lives[16]. What is well reflected in the study is that the findings are not attributable to anthropometric (e.g., height, weight), demographic (e.g., socioeconomic class), or occupational status differences[21,22].

Other key findings of the study are the results of the psychological variables; for example, in the meditation group, a greater capacity for non-judgment was observed. This essential element of mindfulness is associated with a greater ability to accept a present experience.

Better anxiety symptoms, depressive symptoms and stress levels were also observed, and less fatigue and confusion. In the study, the effect of stress on BP was reflected in both groups but was more relevant for DBP in the intervention group.

These results corroborate those obtained in other published studies[9,11,13,15–19], which reported that university students who received meditation training improved emotional regulation after five consecutive weeks of two 1-hour sessions. In addition, these results reinforced the evidence of the benefits of meditation[3,5–8,10,14,20].

Conclusions

As a conclusion of the study of individuals aged 18 to 65 years with normal-high BP or grade I HT who received 8 weeks of weekly 2h sessions of mindfulness training, the results suggest that mindfulness meditation is an effective tool to reduce clinical BP, mainly clinically measured SBP and 24h and nocturnal SBP as measured by MAPA. In addition, the findings of improved ability to avoid making judgments, improved depressive symptoms, and greater mental clarity confirm the psychological benefits of practicing mindfulness already reported in several published studies. Although the study suggests that the reported benefits of meditation could be extrapolated to other areas of health, more research is needed to analyze this possibility.

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