







Effects of auriculotherapy on blood pressure levels in hypertensive adults and older adults

Efeitos da auriculoterapia nos níveis pressóricos de adultos e idosos hipertensos

How to cite this article:

Santos VHM, Weis-Maia MC, Cenzi CM, Lima JC, Santos CS, Bittencourt MN. Effects of auriculotherapy on blood pressure levels in hypertensive adults and older adults. Rev Rene. 2025;26:e94304. DOI: <https://doi.org/10.15253/2175-6783.20252694304>

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Conflict of interest: the authors have declared that there is no conflict of interest.

EDITOR IN CHIEF: Ana Fatima Carvalho Fernandes
ASSOCIATE EDITOR: Adriana Cristina Nicolussi

ABSTRACT

Objective: to evaluate the effect of auriculotherapy on blood pressure and well-being parameters in hypertensive adults and older adults. **Methods:** a quasi-experimental, before-and-after study of a group undergoing a course of auriculotherapy. The initial sample was 41 people and the final sample was 29. Blood pressure was measured before the intervention, immediately after and five days later. The analysis of variance test was applied to compare the blood pressure means at the three time points. The World Health Organization-Five Well-Being Index questionnaire was used to check well-being. **Results:** there was a statistically significant difference between the systolic blood pressure levels before and after the intervention ($p=0.001$), with means of 133.17 mmHg pre-intervention, 127.07 mmHg immediately after care and 127.58 mmHg after five days. The well-being score improved significantly between the pre-intervention and the fifth day ($p=0.023$). **Conclusion:** auriculotherapy had beneficial effects on systolic blood pressure levels and the well-being of the population it served, proving to be a collaborative strategy in the management of hypertension. **Contributions to practice:** auriculotherapy can help regulate blood pressure, promote greater autonomy for nurses and patient-centered care. Brazilian Registry of Clinical Trials: RBR-6r8y39d.

Descriptors: Auriculotherapy; Hypertension; Adult; Aged; Non-Randomized Controlled Trials as Topic.

RESUMO

Objetivo: avaliar o efeito da auriculoterapia nos parâmetros de pressão arterial e de bem-estar de adultos e idosos hipertensos. **Métodos:** estudo quase-experimental, do tipo antes e depois de um grupo, com aplicação de um atendimento de auriculoterapia. A amostra inicial foi de 41 pessoas e a final de 29. A pressão arterial foi aferida antes da intervenção, imediatamente após e cinco dias depois. Aplicou-se o teste de análise de variância para comparar as médias da pressão arterial nos três momentos. Para verificação do bem-estar, utilizou-se o questionário *World Health Organization-Five Well-Being Index*. **Resultados:** houve diferença estatisticamente significativa entre os níveis pressóricos sistólicos antes e após a intervenção ($p=0,001$), com médias de 133,17mmHg pré-intervenção, 127,07mmHg imediatamente após o atendimento e 127,58 mmHg após cinco dias. O escore de bem-estar melhorou significativamente entre a pré-intervenção e o quinto dia ($p=0,023$). **Conclusão:** a auriculoterapia surtiu efeitos benéficos nos níveis sistólicos e no bem-estar da população atendida, revelando-se como estratégia colaborativa no manejo da hipertensão. **Contribuições para a prática:** a auriculoterapia pode colaborar na regulação pressórica, promover maior autonomia ao enfermeiro e um cuidado centrado no paciente. Registro Brasileiro de Ensaios Clínicos: RBR-6r8y39d.

Descritores: Auriculoterapia; Hipertensão; Adulto; Idoso; Ensaios Clínicos Controlados não Aleatórios como Assunto.

Introduction

Systemic Arterial Hypertension (SAH) is an asymptomatic, chronic and non-communicable disease of great magnitude for public health, due to its multifactorial condition and its relationship with cardiovascular diseases⁽¹⁾. Globally, the number of people living with the disease doubled between 1990 and 2019, from 650 million to 1.3 billion⁽²⁾. In Brazil, this prevalence has increased over the last two decades, reaching 38 million individuals, around 27.9% of the population, aged 18 or over⁽³⁾. This increase reflects the population's lifestyle habits, including high alcohol consumption, smoking and lack of physical activity, among other factors⁽⁴⁻⁵⁾.

The treatment of hypertension involves various health promotion strategies, including lifestyle changes such as dietary reeducation, weight control, adherence to physical activity, as well as stress management and the use of antihypertensive medication^(1-2,4). Since 2002, the Hypertension and Diabetes Program (Hiperdia) has been monitoring and dispensing medication to registered individuals with hypertension and diabetes⁽⁶⁾. However, although pharmacological treatment for control is widely available, there are still challenges in terms of adherence by participants, which may be related to low levels of education, poor access to information^(1-2,4) or adverse drug reactions⁽⁷⁾, which demonstrates the importance of complementary therapeutic methods.

The prevention and control of SAH requires integrated and coordinated actions between the Unified Health System and health professionals⁽⁴⁾. In this sense, nurses play an essential role in implementing these strategies⁽¹⁾, by adopting integrated measures of guidance, support and health promotion^(1,8), which can include the construction and implementation of care protocols with integrative and complementary practices in health services⁽⁹⁾. Among the integrated care strategies is auriculotherapy, recommended internationally by the World Health Organization⁽¹⁰⁾ and nationally by the National Policy for Integrative and

Complementary Health Practices, for the management of various health needs through stimulation of the auricular pavilion⁽¹¹⁾.

Auriculotherapy is considered a non-invasive, accessible and easy-to-apply approach, with minimal adverse effects, which has gained increasing prominence as a treatment option for chronic non-communicable diseases, especially in the care of people with SAH^(8,12-13). When combined with antihypertensive drugs, it has the potential for superior efficacy compared to the use of medications alone in controlling hypertension⁽¹³⁾.

Thus, the action of auriculotherapy is due to its apparent ability to modulate the autonomic nervous system, decreasing sympathetic activity and promoting a relaxing effect, as well as the potential to regulate blood pressure through the release of acetylcholine and nitric oxide in the tissues during stimulation of the vagal auricular branch⁽¹⁴⁾. In addition, stimulation of the auricular points has been shown to be effective in hypertensive emergencies⁽¹⁵⁾, in the management of preoperative blood pressure⁽¹⁶⁾ and in reducing symptoms such as headache and blurred vision⁽¹⁷⁾. The integration of auriculotherapy as a complementary therapy can offer additional benefits, such as stimulating autonomy and the perception of well-being, contributing to comprehensive care through humanized service^(8,18).

Thus, this study is justified by the relevance of hypertension as a public health problem, the need for therapeutic alternatives that complement conventional treatment, the encouragement of the Federal Nursing Council to use Integrative and Complementary Health Practices⁽⁸⁾ and especially the potential of auriculotherapy as an effective non-pharmacological strategy for SAH management^(10,12,16).

The hypothesis is that one session of auriculotherapy can help control blood pressure levels in the population undergoing the intervention. The aim of this study was to evaluate the effect of auriculotherapy on blood pressure and well-being parameters in hypertensive adults and older adults.

Methods

This is a quasi-experimental study, evaluating a single group before and after the intervention, carried out with adults and older adults diagnosed with SAH, from two Family Health Units in the city of Cuiabá, Mato Grosso, which has a total of 89. Of these, 13 units offer integrative and complementary practice services⁽¹⁾, two of which were chosen for the study. Data was collected in the third quarter of 2023. The recommendations of the Consolidated Standards of Reporting Trials (CONSORT) guided the study design.

The aforementioned Family Health Units have 2,010 people registered with Hiperdia. This register included adults and older adults with a medical diagnosis of SAH, stage I and II, who came to the place of application to receive auriculotherapy. Stage I SAH is defined as: Systolic blood pressure (SBP) between 140-159mmHg and diastolic blood pressure (DBP)

90-99mmHg, and stage II: SBP between 160-179mmHg and DBP 100-109mmHg⁽¹⁾. The exclusion criteria were: presence of infection, inflammation or injury to the pinna; presence of an ear piercing; allergy to adhesive plaster; being pregnant, in the puerperium and/or breastfeeding. The participants included read and signed the Informed Consent Form before entering the study.

The sample was non-probabilistic, and participants were recruited over a period of 30 days through invitations sent out on community WhatsApp® groups and delivered during home visits by community workers, as well as through posters put up in Family Health Units, with information about the aim of the study, inclusion and exclusion criteria, risks and benefits of the research and the day and place where the auriculotherapy would be applied. Thus, a total of 43 participants showed up for the intervention and the final sample was 29 (Figure 1).

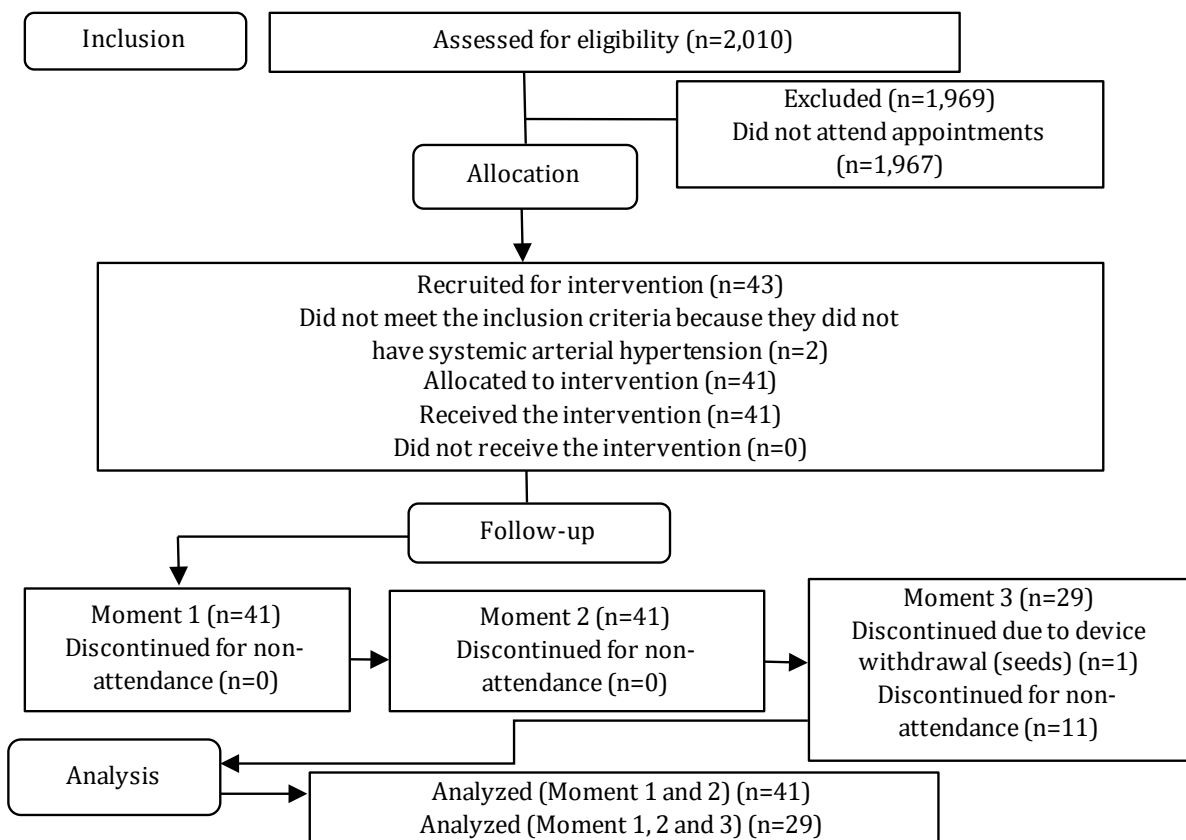


Figure 1 – Flowchart of recruitment and study participant allocation. Cuiabá, MT, Brazil, 2023

The 41 participants were attended to by a nurse trained in auriculotherapy, with three years' practical experience. The protocol was used in the intervention: Shenmen; heart; liver, ear apex, upper fossa and hypotensive groove, established on the basis of previous studies attesting to the action of the chosen points⁽¹⁷⁻²⁰⁾. In addition, the choice of points was reconciled with the knowledge of Traditional Chinese Medicine, which deals with maintaining a balanced life⁽¹¹⁾, considered a preventive attitude in relation to hypertension⁽¹⁾. The auricular acupuncture map standardized by the World Federation of Acupuncture and Moxibustion Societies, translated into Portuguese by Neves, was used to identify the points⁽²¹⁾.

Each participant received a course of auriculotherapy. Their blood pressure was measured before starting the procedure (moment 1), immediately after the mustard seeds were applied to the points mentioned (moment 2) and, finally, five days after the treatment (moment 3), in order to check the continuity of the therapeutic effect on blood pressure levels and well-being. (Figure 1).

Blood pressure was measured by a nurse who was a member of the study and had more than four years' professional experience. To do this, participants were asked to sit with their legs uncrossed, feet flat on the floor and their back against the chair. The right arm was freed from the garment, positioned at heart level, resting with the palm facing upwards. The volunteers were asked about their usual medication intake, to determine whether they were at rest (5 minutes), with an empty bladder and had not consumed stimulant drinks, tobacco or other drugs for at least 30 minutes before the blood pressure check. A manual sphygmomanometer and stethoscope were used for the measurements, both duly calibrated and registered with the National Health Surveillance Agency and the National Institute of Metrology, Quality and Technology.

The mustard seeds were added to a small 12x14cm seed plate containing 169 cells on each side, which could accommodate seeds up to 2.1mm in size. These were overlaid with beige adhesive plaster and

then, using a stylus, cut into squares of approximately 1cm.

The auricles were aseptically cleaned using absorbent cotton soaked in 70% alcohol. Next, the application points for auriculotherapy were investigated with a hand-held auricular pressure probe, and then the adhesive plaster attached to the mustard seeds was removed from the plate using straight serrated tweezers and attached to one of the six points. The procedure was carried out unilaterally, standardized on the left ear, with the time varying between 10 and 20 minutes.

Afterwards, the participants were instructed to massage each point three times a day, using their index finger and thumb for 1 minute or until the area became sensitive. They were also asked to remove the material if they showed signs of allergy in the pinna. Only one person withdrew the seeds, claiming that the service caused him tachycardia, and was therefore excluded from the study.

A social and demographic questionnaire drawn up by the researchers was used to characterize the study participants and applied before the auriculotherapy treatment (moment 1); and the World Health Organization-Five Well-Being Index (WHO-5 Well-Being Index), a self-administered questionnaire consisting of five questions and answered on a Likert-type scale ranging from "all the time" (=5) to "at no time" (=0), whose objective is to assess well-being, validated for Brazil, with a Cronbach's alpha of 0.83. The raw score is calculated by adding up the values of the five answers and can vary from 0 to 25 points, with higher scores indicating a better quality of life⁽²¹⁾. The questionnaire was answered at the time of reception (moment 1) and five days after the auriculotherapy treatment, i.e. when the patient returned to have their blood pressure checked and the seeds removed (moment 3). There was also an attendance form to record each participant's blood pressure and other information about the appointments (moments 1, 2 and 3).

The study's outcome of interest was a reduction in SBP (< 140mmHg) and DBP (< 90mmHg). The

secondary outcome was an increase in well-being scores according to the WHO-5 Well-Being Index.

The data was processed using Microsoft Excel and the Stata/SE 16.1 for Windows program. Descriptive statistics were carried out using frequencies (absolute and relative) and measures of central tendency (mean and median).

The Shapiro-Wilk test and graphical analysis were used to verify the normality of the systolic and diastolic blood pressure variables. Variance analysis (ANOVA) was used to compare the means of SBP and DBP measurements before and immediately after the intervention and after five days. In addition, the t-test was used to compare the WHO-5 Well-Being Index (pre-intervention and after five days). A linear regression model was used, with pre-intervention SBP as the dependent variable and post-intervention SBP as the independent variables, adjusted for age and gender. Residual analysis was also carried out to check the fit of the model. When comparing systolic and diastolic blood pressures pre and post-intervention and after 5 days, only SBP was significant, which is why it was considered in the multiple linear regression model. Variables with $p < 0.05$ were considered statistically significant.

The study complied with Resolution 466/2012 and was approved by the Human Research Ethics Committee of the Júlio Müller University Hospital under opinion number 6.080.113/2023 and Certificate of Submission for Ethical Appraisal 67368923.7.0000.5541 and by the Brazilian Registry of Clinical Trials (ReBEC) with identifier RBR-6r8y39d.

Results

A total of 43 participants were recruited for the study. After applying the inclusion criteria, 41 hypertensive adults and older adults remained in the sample, the majority of whom were women (75.6%). The mean age was 55.6 years (standard deviation: ± 11.89) and the median 54 years, with a predominant age range of 40-49 years, the majority self-declared as bro-

wn, had a partner and eight years or more of schooling (Table 1).

Most of them were undergoing health monitoring and taking medication for hypertension and other comorbidities. A small proportion of the participants had polypharmacy, consumed alcohol and tobacco, and practiced some physical activity (Table 1).

Table 1 – Distribution of participants according to sociodemographic characteristics (n=41). Cuiabá, MT, Brazil, 2023

Variables	n (%)
Gender	
Female	31 (75.6)
Male	10 (24.4)
Age group (years old)	
27-39	4 (9.8)
40-59	22 (53.7)
60-79	15 (36.6)
Marital status	
Without a partner	18 (43.9)
With a partner	23 (56.1)
Schooling (years)	
< 7	15 (36.6)
≥ 8	26 (63.4)
Color	
White	3 (7.3)
Black	10 (24.4)
Brown	26 (63.4)
Indigenous	2 (4.9)
Smoking*	
No	37 (90.2)
Yes	4 (9.8)
Alcoholism [†]	
No	30 (73.2)
Yes	11 (26.8)
Physical activity [‡]	
No	24 (60.0)
Yes	16 (40.0)
Track health	
No	9 (22.0)
Yes	32 (78.0)
Uses medication	
No	1 (2.4)
Yes	40 (97.6)
Polypharmacy	
No	32 (78.0)
Yes	9 (22.0)

*Smokers were considered to be those who consumed five cigarettes a day;

[†]Drinkers were considered to be those who drank two doses a day; [‡]Physical activity was considered to be that done three times a week

A statistically significant difference was found between blood pressure levels before and after the intervention, and it was possible to see a reduction in

blood pressure and the continued effects of the auriculothrapy treatment after the fifth day of intervention. Before the intervention, the mean SBP was 133.17 and DBP 83.36. Immediately after the therapy, there was a reduction in blood pressure levels, with the mean SBP being 127.07 and DBP 81.22, and after five days of intervention, the mean systolic and diastolic pressures

remained at 127.58 SBP and 79.65 DBP (Table 2).

In the ANOVA test, there was a statistically significant difference in SBP before and after the immediate intervention and after 5 days ($p < 0.001$). The final sample, i.e. participants who took part in all stages of the study, consisted of 29 hypertensive adults and older adults (Table 2).

Table 2 – Distribution of blood pressure values before and after the intervention, and after five days. Cuiabá, MT, Brazil, 2023

Blood pressure values	Pre-Intervention (n=41)		Post-Intervention (n=41)		After 5 days (n=29)	
	Systolic pressure (*CI95%)	Diastolic pressure (CI95%)	Systolic blood pressure (CI95%)	Diastolic pressure (CI95%)	Systolic blood pressure (CI95%)	Pressure diastolic (CI95%)
Mean	133.17 (127.5-138.9)	83.36 (80.0-86.7)	127.07 (121.2-133.0)	81.22 (78.0-84.4)	127.58 (121.4-133.7)	79.65 (74.4-84.9)
Standard deviation	18.08	10.57	18.74	10.05	16.18	13.75
Minimum	100	60	70	50	100	50
Maximum	180	110	180	100	170	110

*CI: Confidence interval

In the linear regression model adjusted for age and gender, immediate post-intervention SBP decreased by 20% when compared to pre-intervention SBP (Table 3).

Table 3 – Linear regression model of factors associated with systolic blood pressure after immediate intervention (model 1) and linear regression model of factors associated with blood pressure after five days of intervention (model 2) (n=41). Cuiabá, MT, Brazil, 2023

Variables	Coefficient (*CI95%)
Model 1	
Post-intervention systolic blood pressure	0.80 (0.65-0.96)
Age	0.11 (-0.13-0.35)
Male gender	6.90 (0.23-13.60)
Model 2	
Systolic blood pressure after 5 days	0.52 (0.18-0.86)
Age	0.15 (-0.35-0.64)
Male gender	10.55 (-4.27-25.40)

*CI: Confidence interval

In relation to well-being, among the 29 participants who completed the follow-up, there was a statistically significant difference between the mean score on the WHO-5 Well-Being Index pre-intervention and the mean score after five days ($p = 0.023$). The mean WHO-5 Well-Being Index pre-intervention was 13.9 (95%CI 11.8-16.1) and after five days it was 17.0 (95%CI 14.8-19.2), emphasizing that higher scores represent better well-being.

Discussion

The results of this study show a significant reduction in SBP before and after the intervention, as well as the maintenance of this effect after five days, reinforcing the therapeutic potential of auriculothrapy in SAH management. Similar findings, aimed at analyzing the immediate effects of auricular therapy on hypertensive individuals in an emergency unit, indicated a significant reduction in SBP and DBP after auricular bleeding, showing that manipulation of the auricular pavilion can promote immediate results in

blood pressure parameters⁽¹⁵⁾. In other words, auriculotherapy has positive effects on reducing blood pressure levels, with an immediate effect on reducing blood pressure, promoting functional benefits, triggering physiological responses similar to baroreceptors⁽¹³⁾, in the cardiovascular system of hypertensive patients, as identified by systematic reviews and meta-analysis⁽¹⁶⁻¹⁷⁾. In addition, the findings of this study corroborate evidence from previous research⁽²²⁾, which shows that auriculotherapy is more effective in reducing blood pressure levels than conventional medical treatment.

The use of this technique can enhance blood pressure regulation and contribute to more comprehensive, patient-centered care, due to its effective and safe stimulus, which emphasizes welcoming listening, enabling the formation of a therapeutic bond and the integration of the individual with the environment in which they live^(11,13-15,17). In addition, its application can be associated with stress reduction and improved well-being and quality of life, which are often correlated with negative outcomes in hypertensive patients⁽¹⁴⁾, demonstrating its role as an innovative practice in nursing care.

In addition, the legitimization of the nurses' role in the application of integrative and complementary practices as a form of care, through the Resolution of the Federal Nursing Council⁽⁹⁾, aligned with the guidelines of the National Policy of Integrative and Complementary Practices in Health⁽¹¹⁾, represents an advance for the professional practice of nursing, as it allows nurses to act in an autonomous and qualified manner in the implementation of therapies, as well as promoting the expansion of the scope of health care procedures available to the population. Thus, auriculotherapy not only complements the pharmacological approach, but also promotes comprehensive care for the individual^(11,13).

In this study, many of the participants took regular medication to control their blood pressure, but they still had difficulties controlling their blood pressure. This difficulty can be attributed to the simulta-

neous use of medications to control hypertension and their adverse effects, which consequently impact on adherence to treatment⁽²³⁻²⁴⁾, often associated with a lack of knowledge about the disease, the medications prescribed and resistance to changes in lifestyle habits⁽¹⁾. Thus, despite the scope of the Hiperdia program, there is a need for compensation strategies for the treatment of hypertension, highlighting the importance of educational strategies and the integration of non-pharmacological practices, such as auriculotherapy, for better outcomes in nursing care in SAH control^(1,10,23-24).

The specific protocol used in this study has advantages such as safety, ease of application and the possibility of being carried out by nurses⁽⁹⁾, who are professionals who are part of primary care teams in Brazil and in other countries that have public health systems⁽¹⁾. The mechanism of action of auriculotherapy seems to be related to the presence of spinal and cranial nerves, the latter predominantly in the central region of the auricle⁽²⁰⁾, which connect to the brainstem, associated with the control of autonomic functions such as heart rate and blood pressure^(20,25). By stimulating the central concha of the auricle, via the auricular branch of the vagus nerve, acetylcholine is released which acts on the myocardium, reducing heart rate and blood pressure, possibly resulting in responses similar to those of the baroreceptors in regulating cardiovascular function^(14,16,20,25).

In relation to psychological well-being, the findings showed a statistically significant difference in the WHO-5 Well-Being Index scores between pre-intervention and after five days. An international study carried out in Germany, which used the same scale, corroborates this result, pointing to an improvement in the well-being scores of the population treated with an auriculotherapy session⁽²⁶⁾. It is believed that the increase in vagal tone promoted by auriculotherapy has a positive impact on restoring homeostasis, which results in an improvement in depressive symptoms^(20,25) reinforcing the benefits of this therapy.

The sociodemographic profile of the partici-

pants in this study provides important reflections for nursing practice in the care of people with SAH. The highest prevalence of the disease is among women of advanced age⁽¹⁾, who seek health services more frequently⁽²⁷⁾, as observed in this study, which corroborates the literature, which indicates an increased risk of chronic and cardiovascular diseases, especially during the senility process^(1,3). Despite the association of SAH with black and brown skin color⁽¹⁾, this study found no significant difference between people's skin color and SAH prevalence, although socioeconomic status and lifestyle habits were the main associated factors.

Although the majority of the participants had an educational level of eight years or more, diverging from other studies which have found hypertensive populations with lower educational levels^(1,15), the "income" variable seems to have a greater association with the prevalence of SAH than years of schooling⁽¹⁾, but this was not investigated in this study. In addition, the low consumption of alcohol and tobacco among the participants is a positive finding, considering that excessive alcohol consumption can be associated with up to 30% of hypertension cases, while tobacco and other forms of smoking such as cigars and electronic cigarettes are risk factors for SAH and central elements in the risk of cardiovascular diseases⁽¹⁾. However, the sedentary lifestyle present in a large part of the sample is noteworthy, since physical inactivity contributes to higher blood pressure and mortality⁽¹⁾. The need to encourage the practice of physical activity for at least 30 minutes, five to seven days a week, as this contributes as a non-pharmacological action to control SAH⁽¹⁾.

In this context, encouraging self-care and integrating non-pharmacological practices, such as auriculotherapy, is essential for planning health promotion and SAH management strategies, in line with individual-centered care and the principles of public health policies such as the National Primary Care Policy and the National Policy for Integrative and Complementary Health Practices^(1,11).

Study limitations

The limitations of this study are related to the random selection of health units because it was carried out in units that already offered integrative and complementary practices, the small sample size, the loss to follow-up (29.3%), as well as the lack of randomization and comparison groups, and finally, the lack of prolonged follow-up, which compromises the interpretation of the durability of the effects observed.

In addition, the ANOVA statistical test, although safe and widely used to compare means between groups, has the limitation of not being effective in controlling confounding variables that were not controlled in the study design. However, the results should not be invalidated, as statistically significant differences were found. However, it is necessary to carry out controlled experimental studies with more robust analyses in order to mitigate the aforementioned limitations.

Contributions to practice

This care approach can be used as a collaborative strategy with conventional treatment, contributing to better results in the control of systemic arterial hypertension, as well as having a positive impact on the perception of well-being, according to the results revealed.

Furthermore, it is an intervention that can be carried out by properly trained nurses, contributing to the autonomy of the profession and strengthening comprehensive, patient-centered nursing care, enriching the care offered, especially in Primary Health Care.

Conclusion

The study showed that one session of auriculotherapy for hypertensive adults and older adults in two primary care centers had a significant impact on blood pressure levels and well-being when compared

to pre-intervention values. These results were observed up to the fifth day of evaluation, suggesting a potential short-term benefit of the intervention.

Even so, the results reinforce the promising potential of auriculotherapy as a complementary strategy in the treatment of systemic arterial hypertension, especially when integrated into the actions of the Hipertensão program.

Authors' contributions

Conception and design, analysis, interpretation of data, writing of the article, relevant critical review of the intellectual content: Santos VHM, Weis-Maia MC, Cenzi CM. Interpretation of the data, writing of the article, relevant critical review of the intellectual content: Lima JC, Santos CS. Writing of the article or relevant critical review of the intellectual content: Bittencourt MN. Final approval of the version to be published and agreement to be responsible for all aspects of the manuscript being properly investigated and resolved: Santos VHM, Weis-Maia MC, Cenzi CM, Lima JC, Santos CS, Bittencourt MN.

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