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RESEARCH

Multi-professional intervention in adults with arterial hypertension: a randomized clinical trial

Intervenção multiprofissional em adultos com hipertensão arterial: ensaio clínico randomizado

Intervención multiprofesional en adultos con hipertensión arterial: ensayo clínico randomizado

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ABSTRACT

Objective: assess the influence of an intervention, comprised of counseling related to health and aerobic physical training for lowering pressure values, in anthropometric indicators and in the adjustment of biochemical parameters in individuals with hypertension. **Method:** intervention study of the randomized clinical trial variety, with 42 individuals. The intervention-group followed the protocol of health counseling, nutrition and physical activity. **Results:** two intervention groups were considered: intervention-group (a) and intervention-group (b). Intervention-group (a) showed significant decrease in measurements of systolic and diastolic arterial pressure, of high-density lipoprotein parameters, hip circumference values and waist-hip ratio. Intervention-group (b) presented significant decrease in systolic arterial pressure values. **Conclusion:** it was found that the health intervention in conjunction with physical activities were effective in decreasing and/or controlling values for pressure, biochemical and anthropometric indicators.

Descriptors: Clinical Trial; Hypertension; Motor Activity; Cardiovascular Nursing; Health Education.

RESUMO

Objetivo: avaliar a influência de uma intervenção, constituída por orientações relacionadas à saúde e treinamento físico aeróbio, na diminuição dos valores pressóricos, dos indicadores antropométricos e na adequação dos parâmetros bioquímicos de indivíduos com hipertensão. **Método:** estudo de intervenção do tipo ensaio clínico randomizado, com 42 indivíduos. O grupo-intervenção seguiu o protocolo de orientações de saúde e nutricionais e da realização de atividade física. **Resultados:** consideraram-se dois grupos de intervenção, grupo-intervenção (a) e grupo-intervenção (b). O grupo-intervenção (a) revelou diminuição significativa dos valores de pressão arterial sistólica e diastólica, dos parâmetros de lipoproteína de alta densidade e dos valores de circunferência do quadril e relação cintura–quadril. O grupo-intervenção (b) apresentou diminuição significativa para o valor de pressão arterial sistólica. **Conclusão:** destaca-se que a intervenção em saúde atrelada à atividade física mostrou-se eficiente na diminuição e/ou controle dos valores pressóricos, bioquímicos e dos indicadores antropométricos.

Descritores: Ensaio Clínico; Hipertensão; Atividade Motora; Enfermagem Cardiovascular; Educação em Saúde.

RESUMEN

Objetivo: evaluar la influencia de una intervención consistente en orientaciones relativas a la salud y entrenamiento físico aeróbico, en la disminución de valores de presión, de indicadores antropométricos y en adecuación de parámetros bioquímicos de individuos con hipertensión. **Método**: estudio de intervención, tipo ensayo clínico randomizado, con 42 individuos. El grupo-intervención siguió el protocolo de orientaciones de salud, nutricionales y de realización de actividad física. **Resultados**: Se consideraron dos grupos de intervención: grupo-intervención (a) y grupo-intervención (b). El grupo-intervención (a) mostró disminución significativa de valores de presión arterial sistólica y diastólica, de parámetros de lipoproteína de alta densidad y de valores de circunferencia de caderas y relación cintura-caderas. El grupo-intervención (b) mostró disminución significativa

de valor de presión arterial sistólica. **Conclusión**: se evidencia que la intervención en salud ligada a la actividad física mostró eficiencia en disminución y/o control de los valores de presión, bioquímicos y de indicadores antropométricos.
Descriptores: Ensayo Clínico; Hipertensión; Actividad Motora; Enfermería Cardiovascular; Educación en Salud.

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INTRODUCTION

Arterial hypertension is high among global mortality risks, with an estimate of 9.4 million deaths worldwide in 2010[1]. It is an important risk factor for cardiovascular diseases, and its prevalence is similar for all social groups, although lower among individuals with higher income[2]. In 2000, global prevalence was 25%, and the estimate for 2025 is 29%[3]; in the Brazilian population, the estimate in 2013 was 21.4%[4].

Some factors contribute to the high prevalence of arterial hypertension, such as being overweight and obesity, aging, lack of physical activity, inadequate diet, harmful use of alcohol, psychological stress, genetic factors and socioeconomic determinants[5].

The adoption of healthy habits, such as regular physical activity and adequate diet, are important actions for the treatment of arterial hypertension and the implementation of public policies[6]. In this context, health education in association to lifestyle changes are important tools for the promotion of health[7]. Among professionals involved in health education, nurses have a central role, acting as agents in the process of social change. Through health education and using dialogic teaching methods, nurses can value, respect and empower individuals' autonomy in searching for better health conditions[8].

Although health education programs for groups of individuals with arterial hypertension and other chronic diseases are frequent, there are still gaps in knowledge related to the practice of the health team in these programs. Moreover, results of this practice on patients' life conditions and on work performance are not systematically assessed .The aim of this study was to assess the influence of an intervention, comprised of counseling related to health such as aerobic physical training, in lowering pressure values, anthropometric indicators and in the adjustment of biochemical parameters in individuals with hypertension.

METHOD

Ethical aspects

The study was approved by the Permanent Committee for Human Research Ethics (COPEP) – CAAE 0114.093.000-10 and by the Brazilian Registry of Clinical Trials (RBR-6673s5). All participants read and signed a free and informed consent form.

Design, location of study and period

Intervention study of the randomized clinical trial variety, parallel, open, with two divisions. The intervention was carried out in the period from February until May 2012. The population comprised hypertensive individuals aged between 20 and 60 years who lived in the city of Paiçandu, state of Paraná, Brazil. They were identified in the research "Population inquiry on the prevalence of cardiovascular risk factors", which detected that, among 415 individuals interviewed, 94 self-identified as hypertensive, thus being considered eligible for the study. Selection was randomized and they were split in two grups: Intervention (IG) and Control (CG).

Population and sample

For IG, the following inclusion criteria were adopted: medical certificates for aptitude for physical activity, interest and availability to regularly attend intervention activities three times per week for four months. Of the 49 randomly chosen individuals, 21 (17 women and four men) met those criteria. For CG, inclusion criteria were accepting and finishing all physical and biochemical assessments at two different times. Of the 45 randomly chosen individuals, 21 (16 women and five men) accepted to be part of research. All participants conducted anthropometric and biochemical assessments, with measurement of arterial pressure.

Protocol of study

The intervention was carried out during 16 weeks, with a total of 48 meetings, which were coordinated by a nurse and a physical education professional. Intervention for IG adopted the following protocol:

1. Nutritional counseling – Once a month, in a total of four meetings with a nutritionist, there was counseling on different types of food, their functions and importance, different approaches in their preparation and orientations about dietary practices, in addition to answering questions. All orientations had the goal of motivating adherence to new and healthy dietary behaviors.
2. Heath counseling – Activity coordinated by a nurse, with participation of other invited health workers, once a week, with a total of 12 meetings lasting 60 minutes each. The authors and the participants of the intervention-group established the themes addressed at each meeting, which were planned in advance. Actions for health promotion and prevention that were addressed during the 12 meetings had the goal of controlling arterial hypertension and other cardiovascular risk factors, especially focusing on the adoption of healthy lifestyle habits – physical activities and leisure – and also on the control and monitoring of arterial pressure, in addition to the relinquishment of habits that could jeopardize the health of hypertensive individuals.
3. Aerobic physical activities practice –For 16 weeks, in a total of 48 meetings, lasting 60 minutes each. Physical exercises were carried out under guidance of a physical education professional. They were monitored by a nurse and involved three stages: warm-up and initial stretching (15 minutes), aerobic activity, followed by focused exercises (35 minutes), and final stretching (10 minutes). Exercise intensity varied from light to moderate, with each

individual's limits being observed, using heart rate monitors to estimate adequate rhythm, with the goal of increasing benefits and detecting undesirable changes early. Cardiac rhythm was calculated with the formula [220 (-) age], being established at 40% to 60% of maximum frequency.

4. Arterial pressure was measured by the nurse at all sessions - At the beginning and end of activities, after 15 minutes of rest, according to recommendations from VI Diretrizes Brasileiras para Hipertensão (VI Brazilian Guidelines for Hypertension). A manual arterial pressure monitor was used, with pressure being considered high when systolic arterial pressure (SAP) was ≥ 140mmHG and diastolic (DAP) was ≥ 90mmHg[9].

Anthropometric measurements – weight and anthropometric indicators – body mass index (BMI), waist-hip ratio (WHR) and body fat percentage (BFP) were determined by measuring body composition (multi-frequency bioimpedance made by In Body, model 520®), observing: four-hour fast; no moderate or vigorous physical activity in the previous 8 hours; emptying of bladder 30 minutes before the test and pause in diuretic drug use for at least 24 hours[10].

Adopted anthropometric indicators were BMI, abdominal circumference (AC), waist-hip ratio (WHR) and hip circumference (HC). Cut-off points for BMI were those recommended by WHO[11], with obesity starting at BMI ≥ 30 kg/m^2. AC was measured at the middle point between the border of the back and the iliac crest with a metric tape, and it was considered altered when higher than 102 cm for men and 88 cm for women. Waist-hip ratio was considered inadequate when above 0.90 cm for men and 0.85 cm for women.

Biological material was collected for analysis of blood levels of total cholesterol (TC), high-density lipoprotein (HDL-C), low-density lipoprotein (LDL-C), triglycerides (TG) and glucose. All individuals were instructed to fast for 12 hours.

Analysis of results and statistics

Data were registered at a databank in software Microsoft Office Excel 2007®, with double typing. Data were processed and analyzed with the statistical package Statistic 11.0. Comparisons between the two measurements (before and after the intervention) of arterial pressure values, anthropometric data and biochemical values were determined through a Student's T-test, with significant results starting at $p < 0,05$. To measure arterial pressure values (individual), a chart was created at each training session to show variations in systolic and diastolic pressure during the four months of study.

RESULTS

The CONSORT diagram (Figure 1) presents allotment, follow-up and analysis of participants.

Mean participant age in IGa was 51.2 ± 10.0 years, with a variation from 27 to 60 years. Mean participant age in IGb was 54.6 ± 6.3 years, with a variation from 41 to 60 years. Mean participant age in CG was 52.6 ± 8.1 years, varying from 27 to 60 years. Most participants in each group were women, in economical class C, and white. Regarding civil status, in IGb, half the participants lived alone; in the other two groups, most lived with their partners. Every participant had at least one commorbidity: diabetes mellitus, obesity, hypothyroidism, dyslipidemias and osteoarticular diseases. Only one participant was not under continuous medication.

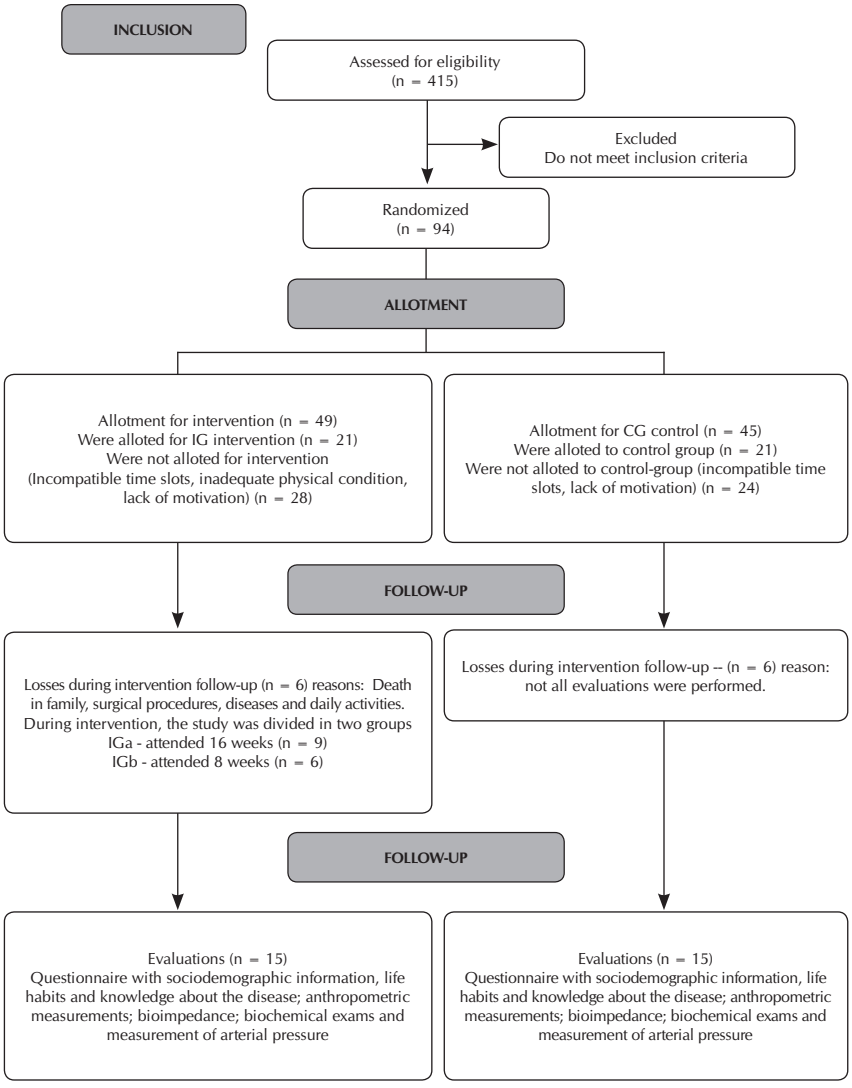

Figure 1 – CONSORT diagram for allotment, follow-up and analysis, Paiçandu, state of Paraná, Brazil.

Comparison of arterial pressure before and after the intervention (Table 1) showed that IGb had the highest initial SAP and presented a higher decrease in its values, with a significant statistical difference (143.3 ± 11.0 to 121.7 ± 14.6, p = 0.024). IGa presented significant decrease in SAP and DAP (132.2 ± 13.9 to 118.9 ± 8.7, p = 0.036 and 86.7 ± 9.4 to 77.8 ± 6.3, p = 0.041, respectively). CG presented non-significant decrease in SAP and DAP values.

A high variation in behaviors of SAP and DAP can be observed in Figure 2 (IGa), with some individuals presenting increase in initial values. However, there was a trend for decrease after the first month, especially among participants who presented a more elevated initial pressure. This behavior remained in the second month of intervention, and, after the third month, the trend for decrease in arterial pressure became more evident for all participants in this group. In the fourth month, all participants presented values close to normality (120 mmHg systolic pressure and 80 mmHg diastolic pressure).

Figure 3 shows that IGb participants also presented, starting in the first month, a trend of decreasing arterial pressure, especially between those who presented higher initial pressure values. It also shows a high variation in SAP and DAP behaviors, with some individuals presenting increase in arterial pressure, a characteristic that persisted in the second month.

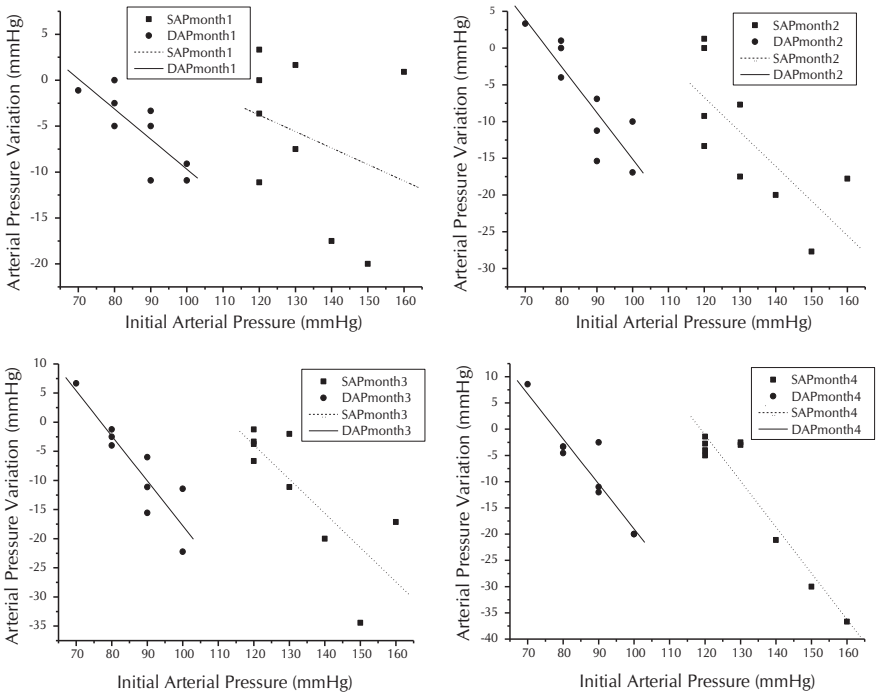

Figure 2 – Variation in diastolic arterial pressure and systolic arterial pressure in relation to initial arterial pressures during the four months of participation in intervention-group "a"

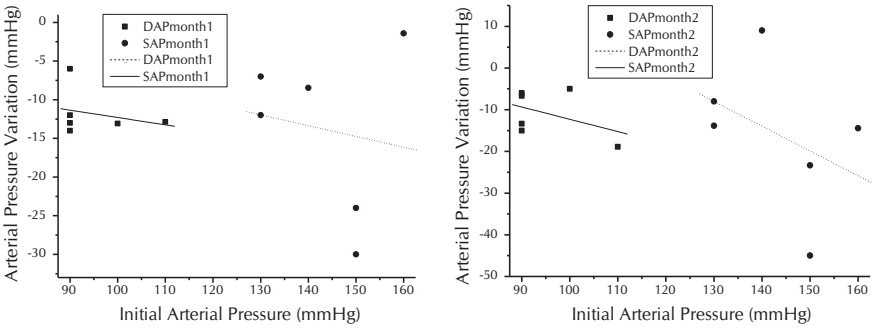

Figure 3 – Variation in diastolic arterial pressure and systolic arterial pressure in relation to initial arterial pressures during the two months of participation in intervention-group "b"

Table 1 – Characteristics of values for diastolic arterial pressure and systolic arterial pressure from participants in intervention groups "a" and "b" and control group, before and after intervention, Paiçandu, Brazil

Variables	Groups								
	Intervention (n = 15)						Control (n = 15)		
	Intervention group a (n = 9)			Intervention group b (n = 6)					
	Pre	Post	*P* value	Pre	Post	*P* value	Pre	Post	*P* value
SAP (mmHg)	132.2 ± 13.9	118.9 ± 8.7	0.036	143.3 ± 11.0	121.7 ± 14.6	0.024	138.7 ± 13.8	128.7 ± 16.3	0.112
DAP (mmHg)	86.7 ± 9.4	77.8 ± 6.3	0.041	95.0 ± 7.6	83.3 ± 12.5	0.104	88.7 ± 11.5	84.7 ± 9.6	0.324

Note: SAP - Systolic Arterial Pressure; DAP - Diastolic Arterial Pressure

Table 2 – Biochemical and anthropometric characteristics of participants in intervention groups "a" and "b" and control group, before and after intervention, Paiçandu, Brazil

Biochemical variables	Groups								
	Intervention (n = 15)						Control (n = 15)		
	Intervention-group "a" (n = 9)			Intervention-group "b" (n = 6)					
	Pre	Post	*p* value	Pre	Post	*p* value	Pre	Post	*p* value
Glucose (mg/dl)	94.1 ± 7.9	90.0 ± 8.0	0.170	92.2 ± 14.1	90.3 ± 7.7	0.598	120.1 ± 30.9	108.5 ± 30.7	0.331
TC (mg/dl)	205.2 ± 41.9	195.3 ± 33.0	0.454	196.0 ± 40.3	202.2 ± 30.9	0.689	187.5 ± 35.4	181.8 ± 34.4	0.353
HDL-C (mg/dl)	50.4 ± 6.6	54.2 ± 7.8	0.034	54.0 ± 19.6	57.2 ± 23.2	0.574	48.2 ± 15.6	51.7 ± 17.4	0.080
LDL-C (mg/dl)	119.5 ± 29.2	114.3 ± 32.4	0.640	110.3 ± 25.8	118.0 ± 22.6	0.377	102.9 ± 32.9	104.3 ± 25.5	0.820
TG (mg/dl)	187.3 ± 87.9	146.0 ± 52.3	0.123	189.5 ± 196	134.7 ± 65.3	0.409	182.7±103.9	141.8 ± 78.5	0.249
Anthropometric variations									
Weight (Kg)	75.9 ± 21.4	73.3 ± 19.1	0.111	68.2 ± 12.1	68.2 ± 13.3	0.969	73.5 ± 9.4	73.7 ± 9.3	0.584
BMI (Kg/m²)	30.6 ± 6.2	29.7 ± 6.2	0.121	27.2 ± 4.5	27.1 ± 4.5	0.881	29.5 ± 2.4	29.6 ± 2.5	0.575
BFP	39.9 ± 7.2	38.4 ± 8.5	0.056	34.5 ± 8.9	34.8 ± 7.7	0.642	38.0 ± 6.4	37.9 ± 6.9	0.828
AC	95.0 ± 14.2	93.2 ± 15.6	0.183	93.0 ± 11.0	93.2 ± 10.1	0.947	96.1 ± 8.3	97.1 ± 8.2	0.210
HC (cm)	108.9 ± 11.6	106.4 ± 12.1	0.042	104.2 ± 10.1	102.5 ± 12.3	0.195	105.3 ± 6.4	103.6 ± 5.7	0.456
WHR	1.00 ± 0.07	0.99 ± 0.07	0.030	0.98 ± 0.06	0.97 ± 0.05	0.363	0.99 ± 0.04	1.0 ± 0.05	0.451

Note: TC = Total cholesterol; HDL-C = High-Density Lipoprotein; LDL-C = low-density lipoprotein; TG = triglycerides; BMI = body mass index; AC = abdominal circumference; WHR = waist-hip ratio; BFP = Body Fat Percentage; HC = hip circumference.

IGa presented changes in all analyzed biochemical variables, but the difference was only statistically significant for HDL, which went from 50.4 ± 6.6 to 54.2 ± 7.8 (p = 0.034). IGb and CG showed changes in biochemical parameters (glucose, HDL and TG; and glucose, TC, HDL and TG, respectively), however, both had no statistically significant differences (Table 2).

IGa participants presented decrease in mean values for all anthropometric variables (Table 2), and this was statistically significant for HC (p = 0.042) and WHR (p = 0.030). IGb presented decrease only in WHR (0.98 ± 0.06 to 0.97 ± 0.05) and CG in percentage of body fat (38.0 ± 6.4 to 37.9 ± 6.9) and HC (105.3 ± 6.4) to 103.6 ± 5.7), however, difference were not statistically significant.

DISCUSSION

Six subjects of the intervention-group did not participate until the end because of various and personal reasons (death in families, surgery procedures, diseases and daily activities, among others). Another study asserts that non-adherence to intervention groups can be related to socioeconomic, environmental and low self-esteem factors[12].

Mean values for SAP and DAP in IGa participants and for SAP in IGb significantly decreased, presenting results similar to other intervention studies with individuals over 18 years of age. These studies also involved physical training and health counseling during various time lengths, in other words, 24 weeks, 16 weeks and 12 weeks; there was also significant decrease in SAP and DAP[13-14].

The literature points out the processes possibly involved in the anti-hypertensive effects of exercise. They include direct mechanisms, among which are a reduction of sympathetic activity, increase in baroreflex sensitivity and improvement in endothelial function. They also include indirect mechanisms such as obesity reduction and improvement of metabolic profile. Thus, the inclusion of regular physical activity is a recommendable non-pharmacological procedure for hypertension treatment, not only for its beneficial effects on arterial pressure, but especially for the possibility of reducing cardiovascular risk factors[15-18].

In this study, despite the few weeks of intervention, there was significant HDL increase for IGa and also decrease of other lipid and glycemic values (TC, LDL, TG and glucose). These findings can be related to physical activity in association with health and nutritional counseling. Research conducted with an obese and sedentary population after 15 weeks of physical exercise demonstrated significant increase in HDL levels and decrease in total cholesterol[19], confirming that physical exercise causes changes in lipid parameters[19].

Significant differences in WHR and HQ were also observed in IGa participants. IGb and CG participants did not present significant differences. In another study, intervention with health counseling without association to physical activities was also efficient in decreasing SAP, anthropometric variables and in lipid profile[20]. However, changes in lifestyle habits can lead to prevention of cardiovascular diseases.

Effecting habit changes in populations with chronic problems through group activities enables improvements in discussions related to health issues, since the group can help participants

better handle their limitations through regaining autonomy and the possibility of living more harmoniously with their health conditions[21]. Coping with cardiovascular diseases and other chronic diseases demands multidisciplinary and multi-professional approaches, with strategic emphasis on prevention, treatment and control[22]; It also requires actions that have positive results on these diseases and their risk factors[23].

The type of intervention employed in this study is an important and feasible tool for health workers when treating individuals with CNCDs, especially for nurses, since health education is part of their routine, and also because these professionals have a significant role in the prevention and promotion of health. This type of strategy is an important ally in planning health actions, in the promotion, prevention and control activities for arterial hypertension and also other cardiovascular diseases, with possible success in decreasing mortality by chronic non-communicable diseases.

The limitations and difficulties found in this study result from some participants not attending the complete proposed period. However, since the strategy was efficient, it is worth adapting to frequency, time and location in order to favor the participation of a larger number of individuals.

CONCLUSION

The intervention was effective. Aerobic physical training and health and nutritional counseling with a multi-professional team were adequate/efficient to decrease and/or control pressure, anthropometric and biochemic values, especially for those who participated in the study during the whole 16 weeks, according to what was proposed in the intervention protocol.

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