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Physical performance and quality of life of hypertense patients in an educational guidance program

Desempenho físico e qualidade de vida de pacientes hipertensos em um programa de orientação educacional

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RESUMO | INTRODUÇÃO: Intervenções educacionais, que incluem aumento no nível de atividade física e controle da hipertensão arterial, podem ser estratégias eficazes e de baixo custo. **OBJETIVO:** Avaliar os efeitos de um programa educacional no controle da pressão arterial (PA), desempenho físico e qualidade de vida (QV) de hipertensos. **MATERIAIS E MÉTODOS:** Estudo de intervenção, controlado, não randomizado, com adultos hipertensos, ambos os gêneros, acompanhados ambulatoriamente. O programa multiprofissional constituiu-se de 12 encontros com orientações sobre DCV e mudanças no estilo de vida. Aplicou-se o teste de caminhada dos seis minutos (TC6M), questionários QV Minnesota e Internacional de Atividade Física (IPAQ) e medidas de PA. Utilizou-se os testes t-Student pareado ou de Wilcoxon e ANOVA para medidas repetidas. **RESULTADOS:** Participaram 20 pacientes, 82% mulheres, 62±11 anos. Houve redução da pressão arterial sistólica (147,0 vs 126,0) e diastólica (85,0 vs 70,0), aumento na distância percorrida (458±83 vs 499±77 p<0,001), redução nos sintomas de fadiga (4±3 vs 2±3 p<0,001) e dispneia (4±2 vs 2±2 p<0,05) aos esforços e referência de maior nível de AF (sedentários 2 vs 0; irregularmente ativos 12 vs 5; ativos 8 vs 11; muito ativos 0 vs 4). Redução na pontuação de todos os domínios na QV foi significante: Físico (14,5±11,7 vs 8,9±9,9 p=0,004); Emocional (8,4±6,5 vs 5,3±6,6 p=0,004); Outros (9,5±8,5 vs 6,6 p<0,001); Total (32,5±25,5 vs 19,7±23,5 p<0,001). **CONCLUSÃO:** Programas educacionais, envolvendo aumento da atividade física, são eficazes no controle da PA, aumento no desempenho físico e melhora na QV de pacientes hipertensos.

PALAVRAS-CHAVE: Hipertensão. Educação. Qualidade de vida. Exercício.

ABSTRACT | INTRODUCTION: Educational interventions, including increased physical activity and control of hypertension, can be effective and cost-effective strategies. **OBJECTIVE:** To evaluate the effects of an educational program on the control of blood pressure (BP), physical performance and quality of life (QOL) of hypertensive patients. **MATERIALS AND METHODS:** Non-randomized controlled intervention study with hypertensive adults, both genders, followed up on an outpatient basis. The multiprofessional program consisted of 12 meetings with guidance on CVD and lifestyle changes. The six-minute walk test (6MWT), the QL Minnesota and International Physical Activity Questionnaires (IPAQ) and BP measurements were applied. The paired Student t test or Wilcoxon and ANOVA tests were used for repeated measures. **RESULTS:** Twenty patients participated, 82% women, 62 ± 11 years old. There was a reduction in systolic (147.0 vs 126.0) and diastolic (85.0 vs 70.0) blood pressure, increased distance covered (458 ± 83 vs 499 ± 77 p <0.001), reduction in symptoms of fatigue (4 ± 3 vs 2 ± 3 p <0.001) and dyspnea (4 ± 2 vs 2 ± 2 p <0.05) on exertion and reference of higher PA level (sedentary 2 vs 0; irregularly active 12 vs 5; active 8 vs 11; very active 0 vs 4). Reduction in the score of all domains in QOL was significant: Physical (14.5 ± 11.7 vs 8.9 ± 9.9 p = 0.004); Emotional (8.4 ± 6.5 vs 5.3 ± 6.6 p = 0.004); Others (9.5 ± 8.5 vs 6.6 p <0.001); Total (32.5 ± 25.5 vs 19.7 ± 23.5 p <0.001). **CONCLUSION:** Educational programs involving increased physical activity are effective in controlling BP, increasing physical performance and improving QoL of hypertensive patients.

KEYWORDS: Hypertension. Education. Quality of life. Exercise.

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Introduction

Cardiovascular diseases (CVD) are the main cause of death worldwide[1]. The first cause of CVD morbidity and mortality is arterial hypertension (HA)[2], which affects around 26.4% of the world adult population[3]. HA is present in about 30-45% than European population[4], 20% in the Canadian[5], 78 million adults in United States (USA)[6] and 30% in the Brazilian population[7].

Clinical studies have showed that primary prevention and early detection of AH and other modifiable risk factors are the most effective ways to prevent CVD and should be a priority purpose for health professionals[7,8].

The Community Preventive Services Task Force (CPSTF) recommends the involvement of a multi-professional team[9], which implements hypertension control measures and guides lifestyle changes. Educational strategies have contributed to the reduction in systolic blood pressure (SBP) at significant levels, weight reduction, restriction of salt intake, increased physical activity (PA) and moderate alcohol ingest[10]. Smoking cessation and stress reduction are also included as non-pharmacological recommendations for the treatment of hypertension[2,4,5-7]. Hypertensive educational interventions can be an effective and inexpensive alternative for blood pressure (BP) control. However, there are few studies about the implementation of these programs, their organization, how this information is transmitted and the results control[11].

In the Heart Institute, University of São Paulo, School of Medicine, the Hypertension Unit has faced a similar situation in the control of hypertension in their patients. To increase their knowledge and adherence, a multi-professional team outlined an orientation program faced on lifestyle changes, reinforcing their self-care and increasing the level of physical activity. This study aimed to evaluate the effects of this educational program on physical performance, quality of life (QoL) and BP control.

Methods

An interventional study, controlled and non-randomized was carried out with patients from the Ambulatory of Hypertension of a tertiary referral Cardiology Hospital, from April 2014 until November 2014. The Research Ethics Committee, CAPPES/HCFMUSP, Brazil, approved this study and all the patients signed the Informed Consent Form.

Inclusion Criteria

Adults patients (aged ≥ 18 years old), both genders, with AH diagnosis, from a Hypertension Department record database.

Exclusion Criteria

Patients who could not participate in the orientation sessions; those with musculoskeletal disability that prevented the practice of daily walking; those with chronic kidney disease with indication to undergo dialysis and those who gave up the program.

Protocol

Personal data (age and gender) and clinical data (medications, diagnosis and comorbidities) were obtained through the records database. Anthropometric data (height and body mass) was gauged in the beginning and end of the program.

The educational program consisted of 12 meetings, lasting 2 hours per week. The patients received educational classes, which approached aspects of AH, risk factors and lifestyle changes, given by a multidisciplinary team (social worker, nurse, pharmacist, physical therapist, nutritionist, psychologist and physician). The activities involved the integration between the multi-professional team being development through lectures and practical activities. The professionals were present at all meetings to clarify doubts. The nurse measured the BP with the patient seated and

rest of 5 minutes, and the educational orientations occurred from the first until the 11th meeting. The 12th meeting consisted of explanation and feedback to patients.

The physical therapeutic intervention occurred in three meetings. The first meeting focused on the benefits of PA and healthy eating, led by physical therapist and nutritionist. In the 6th meeting, practical exercise was performed, including stretching, aerobic and resistance exercises; at the moment, a leaflet was delivered with the exercises and recommendation of his/her daily practice. The physiotherapist and nurse added guidelines about risk factors for fall. In the 9th meeting, physiotherapist taught relaxation and slow breathing techniques, and the psychologist guided how to coping with stress.

In the first meeting, all received orientations of walking practice according American College of Sports Medicine[12]. It was recommended practicing in a flat terrain, six days per week, with starting duration of 10 minutes. The time increase (10 minutes more) occurred every three meetings, reaching 40 minutes. The time and reason for not performing the walk should be noted in the walking diary.

The evaluation of physical performance was gauged in a day before the first meeting and after the 12th meeting though Six-Minutes Walk Test (6MWT) and the International Physical Activity Questionnaire (IPAQ) short version, while QoL was measured through the Minnesota Living with Heart Failure Questionnaire (MLHFQ).

Physical Performance

The 6MWT was performed according the recommendations of American Thoracic Society[13], in a hall of 24 meters of extension. At the beginning and at the end of test, the variables of BP, heart rate (HR), peripheral oxygen saturation (SpO_2), respiratory rate (f) and the references of the perception of dyspnea and fatigue or lower limbs (LL) by the Modified Borg Scale were collected.

The measurement of the time spent weekly in the performance of PA was based on the application of IPAQ. This instrument classifies the intensity of PA as of moderate to vigorous and the individual's state as to the physical level in sedentary, irregularly active, active and very active[14].

Quality of Life

The QoL was measured applying the MLHQL, an instrument used in patients with heart failure. The questions were read by the physiotherapist accompanied by patient, marking the best answers in the form. The MLHQL consists of three domains: physical, emotional and others, with a score from 1 to 5, which 0 represents no limitations and 5 corresponds to the maximum limitation. This instrument can reach a maximum score of 105, which corresponds to a worse general state of health[15].

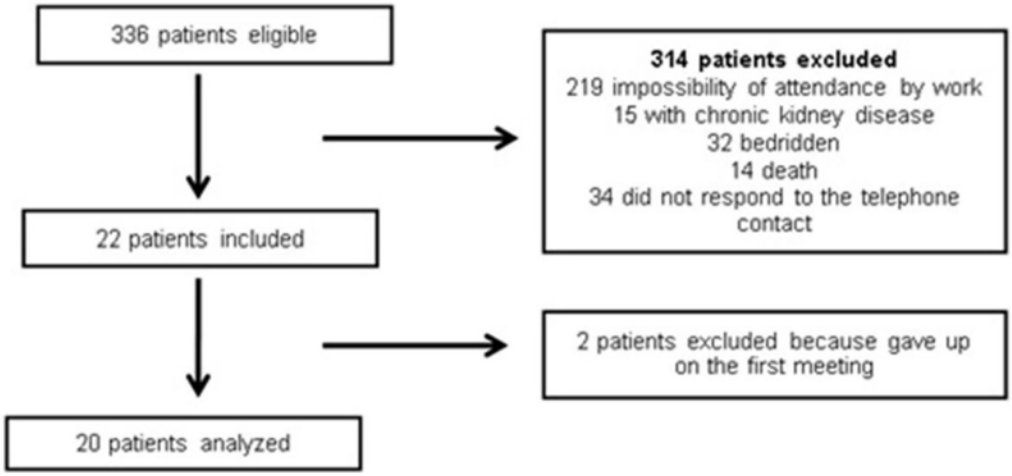
Statistical Analysis

Sigma Stat 2.0 Program was used for analysis. Categorical data are described using frequencies and numerical data are presented as mean ± standard deviation or median and interquartile range (IQR). The paired t-Student and Wilcoxon tests were used for parametric and non-parametric data, respectively. ANOVA ONE WAY was applied for repeated measures in the BP analysis over time. A p value <0.05 was considered significant.

Results

Our study contacted 336 patients; 314 were not included due to the impossibility of attendance by work (n=219), death (n=14), bedridden (n=32), with chronic kidney disease with indication to undergo dialysis (n=15) and 34 that did not respond to the telephone contact. Twenty-two patients were included on this study; of these, 2 gave up on the first meeting. Data analysis was performed with the 20 patients that completed the study. At the beginning during the study period, all the patients were in optimized clinical treatment. Figure 1 shows the flow diagram of the patients.

Figure 1. Flow diagram of the hypertensive patients. São Paulo, 2014



Sample characteristics are detailed in Table 1, in pre-intervention and post-intervention. The mean age was 62±11 years old, predominantly female, with obesity. The most prevalent comorbidities were Diabetes (DM, 73%) and dyslipidemia (68%). After intervention, there were significant reductions in body weight and body mass index (BMI).

Table 1. Personal data, anthropometrics and clinical pre and post intervention in hypertensive patients. São Paulo, 2014

Data	Pre-intervention	Post-intervention
N	20	20
Gender M/F (%)	18/82	18/82
Age (years)	62±11	62±11
Height (m)	1.61±0.07	1.61±0.07
Wight (kg)	84.71±15.80	83.63±16.34*
BMI (kg/m²)	32.63±6	32.21±6*
Comorbidities		
Diabetes (n,%)	16 (73)	
Dyslipidemia (n,%)	15 (68)	
Alcoholism (n,%)	1 (4)	
Ex-alcoholic (n,%)	1 (4)	
Smoking (n,%)	2 (9)	
Ex-smoker (n,%)	9 (40)	
Medicaments		
Diuretics	22	22
ACEI	13	13
B-blockers	15	15
ARB	7	8
Direct vasodilators	4	1
Calcium channel blocker	15	13
Adrenergic antagonist	10	10
Dyslipidemia medications	18	18
Antiplatelet drugs	13	13
Hypoglycemic drugs	16	16

n=patients; M/F=male/female; BMI= body mass index; ACEI= angiotensin converting enzyme inhibitors; ARB= angiotensin receptor blocker.

*p<0.001 pre *vs* post-intervention (paired t-Student test).

Physical performance is illustrated in Table 2. There were significant increases in cardiorespiratory variables and feeling of effort in the end of each 6MWT. At the end of the program, the 6-minute walk distance (6MWD) was significant higher with lower fatigue references and sensation of dyspnea.

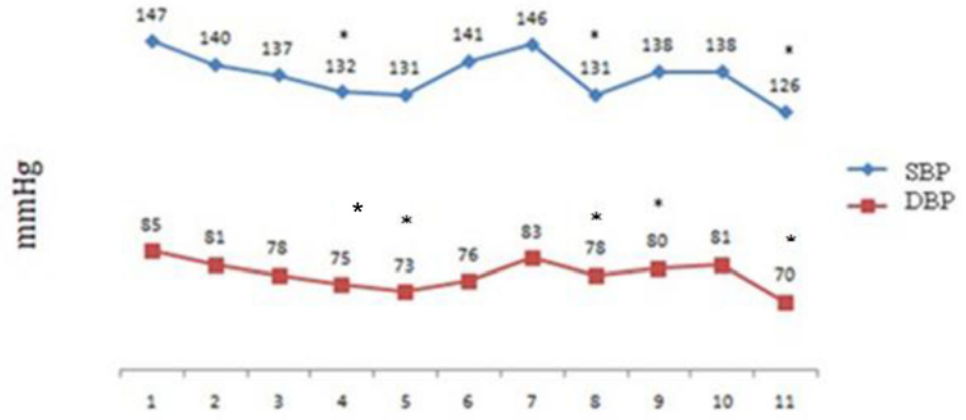
Table 2. 6MWT variables pre and post-intervention in hypertensive patients. São Paulo, 2014

	pre-intervention	post-intervention	p (pre vs post)
SBP initial$_{(mmHg)}$	137±21	135±19	0.770
SBP final$_{(mmHg)}$	150±21*	152 ±2*	0.861
DBP initial$_{(mmHg)}$	80 (65-90)	73 (64-86)	0.177
DBP final$_{(mmHg)}$	84±16*	79±13*	0.096
HR initial$_{(bpm)}$	77±14	75±16	0.527
HR final$_{(bpm)}$	103±14*	102±17*	0.809
SpO_2initial$_{(\%)}$	95±2	94±2	0.413
SpO_2final$_{(\%)}$	94±2*	95±2*	0.893
f initial $_{(rpm)}$	19±3	16±3	**<0.001**
f final $_{(rpm)}$	24±3*	23±3*	**0.018**
Borg Fatigue initial	1 (0-4)	0 (0-0,5)	**0.002**
Borg Fatigue final	4±3*	2±3*	**<0.001**
Borg Dyspnea initial	0,75 (0-3)	0,00 (0-0,25)	**0.002**
Borg Dyspnea final	4±2*	2±2*	**<0.001**
DP initial $_{(bpm/mmHg)}$	10629±2821	10256±2877	0.503
DP final $_{(bpm/mmHg)}$	15360±3280*	15616±3901*	0.730
6MWD $_{(meters)}$	458±83	499±77	**<0.001**

SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = Heart rate; SpO_2 = peripheral oxygen saturation; f = respiratory frequency; DP = double product; 6MWD = distance walked in 6 minutes test.
*p<0.001 initial *vs* final (paired t-Student test or Wilcoxon test)

Figure 2 shows the SBP values during the study, with significant reductions in the 4th, 8th and 11th meeting, when compared to the first (147±24 vs 132±30, p=0.038; vs 132±12, p=0.020; vs 126±22, p=0.007). The mean value of DBP at the beginning of the program was 85±13 mmHg, with significant reduction in the 4th meeting (vs 75±14 mmHg p=0.006), 5th meeting (vs 73±14 mmHg p=0.004), 6th meeting (vs 76±13 mmHg p=0.008), 8th meeting (vs 78±9 mmHg p=0.021), 9th meeting (vs 80±13 mmHg p=0.041) and 11th meeting (vs 70±11 mmHg p≤0.001).

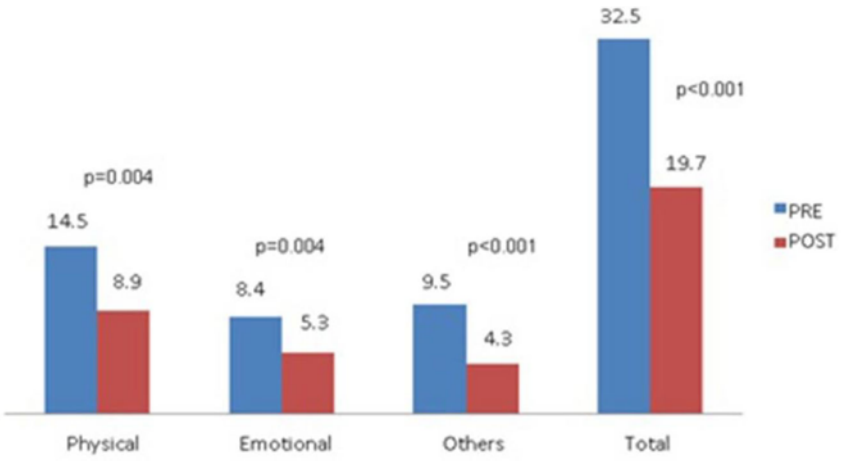
Figure 2. Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) in hypertensive patients. São Paulo, 2014



*p<0.05 (ANOVA ONE WAY for repeated measures)

The MLHFQ showed significant reductions in all domains: emotional and physical (p=0.004), others and total (p<0.001). Figure 3.

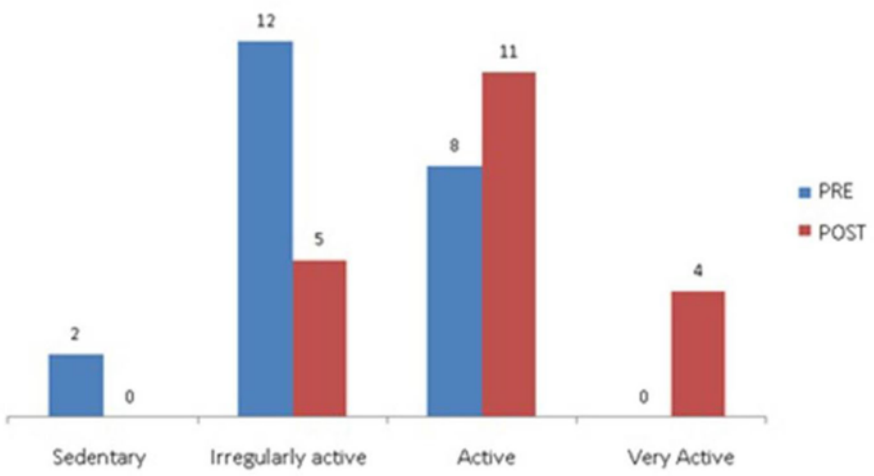
Figure 3. MLHFQ pre and post-intervention in hypertensive patients. São Paulo, 2014



*p<0.05 (paired t-Student test)

The Figure 4 shows the changes in the levels of PA: sedentary (2 vs 0), irregularly active (12 vs 5), active (8 vs 11) and very active (0 vs 4).

Figure 4. International Physical Activity Questionnaire (IPAQ) pre and post-intervention in hypertensive patients. São Paulo, 2014



Discussion

A multi-professional educational orientation program applied over 12 weekly meetings provided better BP control, increased physical performance and better QoL in patients from the Ambulatory of Hypertension of a tertiary referral Cardiology Hospital.

AH is one of the risk factor for CVD and it could be reversible through lifestyle changes. The promotion of regular physical activity (PA) is that factors which have beneficial repercussions on the development of CVD and could reduce SBP between 4 and 8 mmHg (Class I of recommendation and level A of evidence)[7]. The recommended modality is aerobic activities, which cause relaxation of arteries through nitric oxide release. Furthermore, chronically, PA could attenuate sympathetic nerve activity and increased the sensitivity of baroreceptors, resulting in decreased peripheral vascular resistance. Both mechanisms reduce BP[16,17].

Although there are large options of antihypertensive drugs, the control of BP, obesity, smoking, physical activity and stress is a big challenge for hypertensive patients[11].

Currently, patient's participation is the gold standard to chronic disease control. Self-care is based on behavioral theory and an interaction between patients and health professionals. Through a multi-professional team, the patients receive guidance for their own care and it strengthen adhered medication treatment and promote healthy practices[18].

Oriented patients supported by a healthcare team have greater efficiency in BP control. However, educational programs present difficulties in implementing and dissemination results[9].

Our study has similar results of Kitaoka[19] and Daniali[20], which show that oriented patients about self-care may have significant BP reductions. In Japanese hypertensive adults and elderly hypertensive people, an interventional program for healthy lifestyle resulted in a reduction in SPB (150.0-141.5)[19], while Iranian hypertensive and obese women reduced average 7mmHg[20]. Our data show significant decreases in SBP (21 mmHg) and DBP (15 mmHg), which explains the reduction of number of patients receiving direct vasodilators at the end of program. Other drugs dosage adjustments were made during the program, which were not documented in this study.

We believe that our patients were benefited from BP control because they adopted higher levels of PA, such as walking and proposes exercise, as verified by the reduction in the number of irregularly active and sedentary individuals at the end of program. The PA effects on BP have been demonstrated in several clinical studies with interventionists programs. A meta-analysis showed reductions in SBP (− 8.3 mmHg) and DBP (− 5.2 mmHg)[21].

As a consequence of adoption of a higher level of daily PA, we verified an increase of 41 meters in the 6MWD and lower levels of fatigue and dyspnea at the end of program. The clinically significant difference in the 6MWD in hypertensive patients is unknown to us, but differences between 40 and 45 meters were considered significant in patients with chronic heart failure, which was associated a moderate changes in aerobic capacity and better QoL[22]. This data allowed the inference that our patients increased considerably their performance, adhering to the guidelines.

The inclusion of daily walking in our program is justified because the low cost, involves large muscle groups, does not require instruments and can be performed with gradual increase in training volume, in either frequency or time. The adherence to this training and the hypotensive effect shows the importance of promoting education among hypertensive people[11,21].

Our sample consisted mostly of obese women. Although we found statistical significance in reducing BMI, the absolute values have not changed so much. However, being obese or overweight reinforced the warning that hypertensive patients tends to gain weight. Therefore, it cannot be treated with pharmacological therapy alone, because others risks factors contributes to the maintenance of AH. This finding is present in the study of Ribeiro et al.[23] with healthy and hypertensive women with DM, chose BMI values are similar those we found.

The best perception of QoL reported by our patients at the end program occurred in all domains, and the greatest difference was in the physical domain (-5.6). It is possible to relate this wellness to the increase in the level of PA. Hypertensive people have lower QoL levels and it could be related to presence of comorbidities and difficult with BP control, although the effects of PA in QoL in hypertensive patients are poorly studied[24].

The PA, by releasing neurotransmitters such as serotonin, dopamine or norepinephrine and inhibiting nociceptive fibers, increases the sense of well-being. Regular PA practices had a favorable impact on their QoL reference, especially on physical aspects[24]. Other authors studied educational interventions similar to ours. The adoption of an educational program in adult and elderly patients verified by Lauziere et al.[25] shows benefices in the control of AH, and Glynn et al.[11], in a systematic review, highlighted 20 randomized and controlled trials more.

Although there is no consensus about how to perform a multi-professional approach to combat hypertension[11], our study may be a reference to a non-pharmacological model for AH control, following the Consensus and Guidelines of AH[7] and Cardiovascular Prevention[8,9]. Active patient participation may be the major control for their disease.

Limitations

This study was limited to patients from the public health system and available on the hospital, which reduce drastically the number of participating patients, and the conclusions could not to be generalized to all the hypertensive population.

Conclusion

Daily exercise guidelines and awareness about increase physical activity, integrate into a multi-professional intervention program are effective in increasing physical performance, reducing BP and improving the QoL of hypertensive patients undergoing clinical follow-up.

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Author contributions

Giachini FF participated in the study conception and design, search of research data and writing of the scientific article. Ikeda ET participated in the study conception and design, search of research data and writing of the scientific article. Albuquerque IVS participated in the formatting and interpretation of the results. Bortolotto LA participated in the study conception and design, and interpretation of results, and writing of the scientific article. Lopes HF participated in the study conception and design and interpretation of the results. Feltrim MIZ participated in the study design, statistical analysis of research data, interpretation of results and writing of the scientific article.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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