QUANTITATIVE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND ANTIHYPERTENSIVES IN ELDERLY WOMEN

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RELAÇÃO QUANTITATIVA ENTRE ATIVIDADE FÍSICA E ANTI-HIPERTENSIVOS EM IDOSAS

RELACIÓN CUANTITATIVA ENTRE ACTIVIDAD FÍSICA Y ANTIHIPERTENSIVOS EN ANCIANAS

Claudio Andre Barbosa de Lira[1]
(Biomedician)
Rafaela Gomes dos Santos[2,3]
(Physical Education Professional
Ariádny Brandão Gomes[2]
(Physical Education Professional)
Douglas de Assis Teles Santos[3]
(Physical Education Professional)
Marilia Santos Andrade[4]
(Physiotherapist)
Pantelis Theodoros Nikolaidis[5]
(Bachelor in Sports Science)
Beat Knechtle[6,7]
(Physician)
Thomas Rosemann[7]
(Physician)
Rodrigo Luiz Vancini[2]
(Physical Education Professional)

1. Universidade Federal de Goiás (UFG), Human and Exercise Physiology Division, Faculty of Physical Education and Dance (FEFD), Goiânia, GO, Brazil.
2. Universidade Federal do Espírito Santo (UFES), Physical Education and Sports Center (CEFD), Vitória, ES, Brazil.
3. Universidade Estadual da Bahia (UNEB), Physical Education Collegiate, Teixeira de Freitas, BA, Brazil.
4. Universidade Federal de São Paulo (UNIFESP), Department of Physiology, São Paulo, SP, Brazil.
5. University of West Attica, Athens, Greece.
6. Medbase St. Gallen Am Vadianplatz, St. Gallen, Switzerland.
7. University of Zurich, Institute of Primary Care, Zürich, Switzerland.

Correspondence:
Beat Knechtle
Medbase St. Gallen Am Vadianplatz. 26, Vadianstrasse, St. Gallen, Switzerland. 9001.
beat.knechtle@hispeed.ch

ABSTRACT

Introduction: Physical activity is an important tool to manage systemic arterial hypertension. However, less is known about the relationship of physical activity with the number of antihypertensive drugs used by older adults. Objective: The aim of this study was to compare the number of antihypertensive drugs used by older female adults (aged ≥ 60 years) with a low level of physical activity with the number used by those with a high level of physical activity, and to verify how many participants used more than two antihypertensive drugs. Methods: Twenty-eight physically active older women with systemic arterial hypertension who participated in a physical activity program for community-dwelling older female adults were divided into two groups: participants who presented lower habitual physical activity levels were placed in group 1 and participants that presented higher habitual physical activity levels were placed in group 2, according to the Baecke questionnaire. In addition, the number of antihypertensive drugs used by participants was collected. Results: The number of prescribed antihypertensive drugs was 2.0 (median) for both groups investigated. There was no significant difference between groups regarding the number of antihypertensive tablets prescribed ($p>0.05$). Although there was no statistical difference, a higher proportion of participants from the lower physical activity group used more than two antihypertensive drugs. Conclusion: The level of habitual physical activity did not affect the number of antihypertensive tablets used by hypertensive elderly women. ***Level of evidence II; Therapeutic studies – investigation of treatment results.***

Keywords: Exercise; Physical activity; Blood pressure; Therapeutics; Hypertension; Tablet.

RESUMO

Introdução: A atividade física é uma importante ferramenta no manejo da hipertensão arterial sistêmica. No entanto, pouco se sabe sobre a relação entre a atividade física e a quantidade de anti-hipertensivos usados por idosos. Objetivo: O objetivo deste estudo foi realizar uma comparação entre o número de anti-hipertensivos usados por idosas (≥ 60 anos) com baixo nível de atividade física com o número usado por aquelas com alto nível de atividade física, verificando quantas participantes usaram mais de dois anti-hipertensivos. Métodos: Vinte e oito idosas fisicamente ativas com hipertensão arterial sistêmica que participavam de um programa de atividade física para idosas da comunidade foram divididas em dois grupos: as participantes que apresentaram níveis mais baixos de atividade física habitual foram colocadas no grupo 1 e as participantes que apresentaram maiores níveis de atividade física foram colocados no grupo 2, de acordo com o questionário de Baecke. Ademais, coletou-se o número de medicamentos anti-hipertensivos utilizados pelas participantes. Resultados: O número de fármacos anti-hipertensivos prescritos foi de 2,0 (mediana) para ambos os grupos investigados. Não houve diferença significativa entre os grupos quanto ao número de comprimidos anti-hipertensivos prescritos ($p>0,05$). Embora não tenha havido diferença estatística, uma maior proporção de participantes entre o grupo de menor atividade física utilizava mais de dois anti-hipertensivos. Conclusão: O nível de atividade física habitual não afetou a quantidade de comprimidos anti-hipertensivos utilizados pelas idosas hipertensas. ***Nível de evidência II; Estudos terapêuticos - Investigação dos resultados do tratamento.***

Descritores: *Exercício físico; Atividade Física; Pressão Sanguínea; Terapêutica, Hipertensão; Comprimidos.*

RESUMEN

Introducción: La actividad física es una herramienta importante para el manejo de la hipertensión arterial sistémica. Sin embargo, se sabe poco sobre la relación de la actividad física con la cantidad de medicamentos antihipertensivos utilizados por las ancianas. Objetivo: El objetivo de este estudio fue hacer una comparación entre el número de medicamentos antihipertensivos utilizados por mujeres adultas mayores (≥ 60 años) y bajo nivel de actividad física con el número utilizado por aquellas con alto nivel de actividad física, y verificar cuántas de las participantes usaron más de dos medicamentos antihipertensivos. Métodos: Veintiocho ancianas físicamente activas con hipertensión arterial sistémica que participaron en un programa de actividad física para mujeres adultas mayores residentes en la comunidad fueran divididas en dos grupos: las participantes que presentaron niveles más bajos de actividad

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física habitual se ubicaron en el grupo 1 y las participantes que presentaron los mayores niveles de actividad física se ubicaron en el grupo 2, según el cuestionario de Baecke. Además, se recogió el número de medicamentos antihipertensivos utilizados por las participantes. Resultados: El número de comprimidos antihipertensivos prescritos fue de 2,0 (mediana) para ambos grupos investigados. No hubo diferencia significativa entre los grupos en cuanto al número de medicamentos antihipertensivos prescritos (p>0,05). Aunque no hubo diferencia estadística, una mayor proporción de participantes del grupo de menor actividad física usó más de dos medicamentos antihipertensivos. Conclusión: El nivel de actividad física habitual no afectó el número de comprimidos antihipertensivos utilizados por las ancianas hipertensas. ***Nivel de evidencia II; Estudios terapéuticos: investigación de los resultados del tratamiento.***

Descriptores: *Ejercicio Físico; Actividad Física; Presión Sanguínea, Terapéutica; Hipertensión; Comprimidos.*

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INTRODUCTION

Aging of the population and the increased prevalence of chronic noncommunicable diseases among older adults are major challenges facing society and the medical community.[1] Among these diseases, systemic arterial hypertension is a significant cause and consequence of disability among older adults.[2,3]

Systemic arterial hypertension is a multifactorial clinical condition characterized by elevated and sustained blood pressure levels. It is often associated with functional and/or structural changes in target organs (e.g. heart, brain, kidneys and blood vessels) and metabolic changes, with a consequent increase in the risk of cardiovascular events.[3,4]

According to the High Blood Pressure Clinical Practice Guideline, 46% of the population has systemic arterial hypertension. In addition, the prevalence increases dramatically with increasing age and is higher in black people than in Caucasians, Asians and Hispanics.[5] Furthermore, the prevalence of systemic arterial hypertension is lower in women than in men up to the fifth decade, but it is higher at the end of life in women than in men.[5] For these reasons, the study of systemic arterial hypertension in older women is an area of growing interest.

The most frequently used treatment for systemic arterial hypertension is antihypertensive medication.[6,7] However, in the last decades alternative therapies such as physical activity have been gaining notoriety for the important beneficial effects on blood pressure of patients with systemic arterial hypertension.[8-10] Indeed, a plethora of studies showed that physical activity may be a potential nonpharmacological treatment for the improvement of blood pressure in patients with hypertension.[11] Because of these effects, some authors have suggested that exercise may reduce or even replace pharmacological treatment. In this sense, Maruf et al.[12] investigated the effects of aerobic exercise combined with antihypertensive drugs on blood pressure and the number of antihypertensive drugs used by individuals with hypertension. These authors found that the combination of aerobic exercise and antihypertensive drugs reduces the number of antihypertensive drugs needed to achieve blood pressure control and enhances blood pressure control in individuals with hypertension on two antihypertensive drugs. In another study, Dimeo et al.[13] showed that exercise is able to decrease blood pressure even in participants with low responsiveness to medical treatment, and concluded that exercise should be included in the therapeutic approach to resistant hypertension. Reid, Maher, and Jennings,[14] showed that 71% of patients submitted to lifestyle management (including physical activity) who had been well controlled on antihypertensive medication were able to remain normotensive and free of drug therapy for 9 months.

From the above, the role of physical activity in the control of blood pressure in individuals with systemic arterial hypertension is indubitable. For this reason, there are many governmental initiatives that aim to encourage the participation of the population in physical activity programs.[15] These initiatives are community physical activity programs characterized by outdoor activities that take place in public spaces, such as squares, beaches and parks. In Brazil, the main concern about these community physical activity programs is the lack of individualization of exercise prescription, in some cases lack of specialized professionals (coaches and/or physical education professionals) to guide and supervise participants, and adequate exercise facilities. Thus, it is reasonable to assume that factors relating to physical training, such as intensity, weekly frequency and volume, are not strictly controlled. As a consequence, the health benefits may not be gained.[16] Specifically, in the case of patients with systemic arterial hypertension, it is expected, in addition to a decrease in blood pressure, a decrease in the amount of antihypertensive drugs used.[7,12]

Given that a myriad of studies showed beneficial effects of physical activity on the blood pressure of individuals with systemic arterial hypertension, physical activity may complement the blood pressure-lowering effects of antihypertensive drugs,[12,17] thereby reducing the number and/or dose of drugs required.[7,12] This matter is very important because a number of daily antihypertensive drugs tablets intake greater than two has been associated with no adherence to drug therapy.[18] Considering that drugs cost money and may produce negative side effects,[19] it is very important to investigate strategies that will lead to a reduction in the daily antihypertensive drugs tablets intake.

Therefore, the aim of the present study was to compare the number of antihypertensive drugs taken by women who have a low level of physical activity with the number of antihypertensive drugs taken by those with a high level of activity. We also wanted to establish how many participants in one group took more than two antihypertensive drugs compared with those participants from the other group. We hypothesized that the higher the habitual physical activity levels the lower the number of antihypertensive drugs used and that these participants would use two or less antihypertensive drugs. It is noteworthy that investigating community physical activity programs has great ecological validity because they reflect real situations and scenarios.

MATERIAL AND METHODS

Participants

A cross-sectional study was performed comprising 28 female older participants (a convenience sample out of a total of 280 people) who were recruited using advertisements placed in a physical activity program for community-dwelling older adults (located in the city of Serra, Espírito Santo, Brazil) and consisted of women using antihypertensive drugs. The inclusion criteria used were: being physically active (participated in a physical activity program for community-dwelling older adults); to present arterial hypertension; to use regularly at least one antihypertensive drug prescribed by physicians; and aged ≥ 60 years. Sedentary and male older adults were excluded from the sample.

After a clear explanation of the experimental procedures, including the risks and benefits of participation, written consent was obtained. The age and anthropometrical characteristics of the participants are presented in Table 1. Ethics approval for all experimental procedures was granted by the Federal University of Espírito Santo Human Research Ethics Committee (protocol number [CAAE]: 63228215.1.3001.5505) and conformed to the principles outlined in the Declaration of Helsinki as revised in 2013.

Study design

Participants answered a questionnaire about the use of antihypertensive drugs and habitual physical activity levels using the Baecke Habitual Physical Activity Questionnaire.[20] Because of the low educational level of the sample, an interview was used to fill out the questions. The participants were divided into two groups according to the questionnaire results. To this end, we used the median values of total score for habitual physical activity provided by the Baecke questionnaire. Thus, participants who presented lower habitual physical activity levels (values below median) were placed in group 1 and those that presented higher (values above median) were placed in group 2.

Physical activity program for community-dwelling older adults

The physical activity program for community-dwelling older adults provides health-promotion actions by encouraging physical activity and healthy eating, with a view to disease prevention. Group classes are offered, 2–3 times per week, with an orientation to aerobic exercise (running and walking), localized gymnastics and stretching, among others. Each class lasted 45–50 minutes.

Antihypertensive drugs use questionnaire

The questionnaire comprised questions intended to capture information about the number of antihypertensive drugs used. It is worth noting that the number of antihypertensive drugs was counted regardless of whether it was a full or half-dose.

Baecke Habitual Physical Activity Questionnaire

The habitual level of physical activity was evaluated by the Baecke questionnaire.[20] This questionnaire consists of 16 questions involving three habitual physical activity scores relating to the previous 12 months: occupational physical activity (eight questions); leisure time physical activity (four questions); and leisure and locomotion sport activities (four questions). As the participants were retired or housewives, we evaluated only leisure time physical activity and leisure and locomotion sport activities for the purposes of the present study. The total score for habitual physical activity was obtained by summing leisure time physical activity and leisure and locomotion sport activities. The higher the score achieved, the higher the level of habitual physical activity.

Statistical analyses

As the habitual physical activity level and number of antihypertensive drugs used by participants were not normally distributed according to the Shapiro–Wilk normality test, the data were expressed as medians (Quartile 1– Quartile 3) and the Mann–Whitney test was used to compare variables between the groups [group 1 (lower habitual physical activity) vs. group 2 (higher habitual physical activity)]. Fisher's exact test was used to check for an association between the level of habitual physical activity (group 1 and group 2) and the number of antihypertensive drugs consumed (≤2 and >2). Cramer's V was used to express effect size in these analyses in order to test the strength for any association or practical significance from the Fisher's exact test analysis. It could be interpreted as follows: effect size of 0.1 is small, effect size of 0.3 is medium, and an effect size of 0.5 is large.[21] The SPSS statistical package, version 23.0 (IBM Corp., Armonk, NY) was used for statistical analysis, and a significance level of 0.05 was set for all statistical tests.

Table 1. General participant characteristics.

	Mean±SD	Min-Max
Age (years)	69.5 ± 6.4	60.0–85.0
Height (cm)	1.60 ± 0.08	1.50–1.80
Body mass (kg)	67.4 ± 10.2	53.0–91.0
BMI (kg.m^{-2})	27.0 ± 2.8	21.9–31.3

SD: standard deviation. Min–Max: minimum and maximum values. BMI: body mass index.

RESULTS

Antihypertensive drug used by participants were diuretics (n= 13), calcium-channel blockers (n=6), β-blockers (n=11), angiotensin-converting enzyme inhibitors (n=5), angiotensin II type 1 blockers (n=11) and α-2 adrenergic agonists (n=2). The sum of the number of antihypertensive drugs does not result in the total number of participants since there were participants who used more than one drug.

Table 2 shows the habitual physical activity evaluated by the Baecke questionnaire according to the median [lower (group 1) vs. higher (group 2) habitual physical activity] of the questionnaire score. The Mann–Whitney test revealed significant differences between groups for subscales and total score.

Table 3 shows the participants' consumption of antihypertensive drugs [lower (group 1) vs. higher (group 2) habitual physical activity]. The Mann–Whitney test revealed no significant differences.

Table 4 shows the association of participants who used more than two antihypertensive drugs between groups. The Fisher's exact test revealed no significant association between variables. However, the effect size expressed by Cramer's V was 0.316, indicating that there is a medium to large effect.

DISCUSSION

The main aim of the current study was to verify whether the number of antihypertensive drugs intake is different between a sample of two groups of female older adults with different habitual physical activity levels (lower vs. higher). We found that there were no significant differences in the number of antihypertensive drugs consumed in a sample categorized according to habitual physical activity provided by the Baecke questionnaire. Despite of there was no statistical difference in proportion of participants from the lower physical activity group used more than two antihypertensive drugs, the effect size expressed by Cramer's V was medium to large, suggesting that a higher proportion of participants from the more physically active group consumed two or less antihypertensive tablets.

Table 2. Baecke questionnaire subscales and total score.

Baecke's results	Group 1 (n=14)	Group 2 (n=14)	*p*
Physical exercise in leisure time	2.8 [2.5–2.8]	3.3 [3.0–3.6]	0.0001
Leisure and locomotion activity	2.5 [2.5–3.0]	3.5 [3.3–3.6]	0.0001
Total score[a]	5.6 [5.2–5.8]	6.5 [6.2–7.1]	0.0001

Data are presented as medians [Quartile 1– Quartile 3]. [a]total score for habitual physical activity was obtained by summing physical exercise in leisure and leisure and locomotion activity scores.

Table 3. Number of anti-hypertensive drugs used by participants.

Baecke's domains	Group 1 (n=14)	Group 2 (n=14)	*p*
Total score	2.0 [1.0–3.0]	2.0 [1.0–2.3]	0.77

Data are presented as medians [Quartile 1–Quartile 3].

Table 4. Number of participants that used more than two antihypertensive drugs.

Number of antihypertensive drugs	Group 1	Group 2	*p*
≤2	57.1 (8)	85.7 (12)	0.10
>2	42.9 (6)	14.3 (2)	

Data are presented as relative (absolute) frequencies.

Previously, several studies have been conducted to assess the effectiveness of physical activity to manage systemic arterial hypertension.[22,23] Overall, these studies showed the beneficial effects of physical activity by using protocols that are controlled, standardized and structured. The existing exercise recommendations for hypertension advocate that with regards to frequency, aerobic exercise should be undertaken on most (preferably all) days of the week and resistance exercise on two to three days per week.[24] With regards to intensity, the recommendation is for moderate intensity aerobic exercise (i.e., 40 to 60% of maximal oxygen uptake or heart rate reserve; 11–13 rating of perceived exertion on the 6-20 Borg Scale and moderate intensity dynamic resistance exercise (60% to 80% of one repetition maximum).[23] In terms of time, the duration of exercise should total 150 min or more per week.[23] Finally, progression should be gradual, avoiding large increases in any exercise components (frequency, intensity and time).

From the above, the lack of difference in the number of antihypertensive drugs intake between groups (lower vs. higher habitual physical activity) found in the current study could probably be attributed to characteristics of the physical activity program for community-dwelling older adults. Briefly, this program is characterized by a lack of standardization with regards to physical activity intensity, session duration and weekly frequency. According to Dimeo et al.,[13] in daily life, physical activity in arterial hypertension is usually not monitored by a sophisticated method such as lactate concentration. Therefore, the recommendation of training intensity has to be kept more practical. Accordingly, it is reasonable to assume that physical activity performed by participants did not follow the guidelines of exercise prescription for managing systemic arterial hypertension. However, the older women that we studied were part of a public health program that seeks to promote and educate for health and quality of life and to change negative health habits, which in our view is a strong point of the program.

Another aspect that can be considered to explain the results obtained by the current study is that –in Brazil, at least – physicians are not involved with concepts related to exercise and sports science. According to the Centers for Disease Control and Prevention [CDC],[24] only 19% of physicians counsel patients about physical activity. Probably, these results can be attributed because physicians are not interested in learning about exercise science due to time pressures. As a result, it is reasonable to assume that physicians could attribute the clinical improvements of a patient to pharmacological treatment rather than physical activity/engagement, and for this reason did not decrease the prescribed number of drugs. Corroborating this assertion, it has already been demonstrated that only a few patients receive exercise counselling from physicians for managing blood pressure to improve health outcomes.[25]

A daily administration of more than two antihypertensive drugs has been associated with nonadherence to drug therapy.[18] Individuals with systemic arterial hypertension who either discontinue medication or are nonadherent to the prescribed drug therapy are at risk of developing cardiovascular complications.[19] In the current study, 28.6% (six participants in group 1 and two in group 2) used more than two antihypertensive drugs. Although there was no significant association of participants who used more than two antihypertensives drugs between groups, the number of participants in group 2 (higher levels of habitual physical activity) who ingested more than two drugs was one third of that of group 1 (lower levels of habitual physical activity), consequently the proportion of participants who used two or less antihypertensive tablets is higher in Group 2. The effect size of this analysis expressed by Cramer's V was medium to large. This result has clinical significance, because it highlights that although the physical activity program for community-dwelling older adults did not strictly follow current recommendations for exercise to reduce arterial hypertension, Group 2 showed an important effect, since the number of participants who used more than two antihypertensive drugs was lower; this is probably because the intensity and volume of exercise performed by Group 2 were higher. Furthermore, this result suggests that the need to prescribe a third antihypertensive drug would be minimized in these individuals, which suggests that exercise in conjunction with antihypertensive drug therapy improves blood pressure control and may even lead to fewer antihypertensive drugs prescribed. In practical terms, primary health-care professionals, aware of these results, could recommend that patients with systemic arterial hypertension increase the amount of physical activity in order to decrease the number of antihypertension drugs ingested.

Limitations of study

A number of limitations of the study must be mentioned. First, this study was cross-sectional and we were therefore unable to assess the responsiveness of physical exercise participation over time. Second, the cross-sectional data made it difficult to assess the direction of causality. Therefore, future longitudinal studies are warranted. Third, we did not measure blood pressure values; therefore, we did not know the severity of arterial hypertension. Fourth, we did not assess the dose of antihypertensive drugs; it is possible that the dose prescribed could have been decreased, however the amount of ingested tablets remained the same. Fifth, the current study used a relatively small, convenience sample of female older adults. Consequently, generalizations should be made with caution. Nevertheless, we believe that these limitations do not prevent conclusions being drawn from the study, for the reason that investigations into this kind of community physical activity program have considerable ecological validity because they reflect real situations and scenarios.

CONCLUSIONS

In conclusion, the findings show that the number of ingested antihypertensive tablets is not different between groups constituted by female older adults with different levels of habitual physical activity (lower vs. higher) engaged in a public health physical activity program. In addition, although there was no statistical association, participants with higher habitual physical activity presented a lower proportion of participants that ingested more than two antihypertensive drugs and this result has clinical significance.

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