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ORIGINAL ARTICLE

Does Hypertension Knowledge Influence Levels of Physical Activity in Hypertensive Patients From a Southern Brazilian Community?

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Abstract

Background: Increased level of physical activity (PA) and health education are known as non-pharmacological treatments of hypertension (HP). There is a lack of studies investigating the influence of HP knowledge on the level of PA among hypertensive patients.

Objective: To examine the influence of patient's knowledge about HP on PA level and the relationship between these variables.

Methods: A cross-sectional study was conducted in in a primary care center located in a city in the southern Brazil. A total of 199 hypertensive patients (median 61.2 [13] years; body mass index (BMI) 21.9 (7.5) kg/m2; 72.4% women) were included. The level of PA was assessed by measuring the number of steps taken daily. The knowledge about HP was assessed by a standardized questionnaire (HIPER-Q). The Kruskall-Wallis test was used to compare age, BMI and PA level between HP knowledge categories, and the Spearman test was used to assess correlations ($p < 0.05$).

Results: The median score of knowledge about HP for patients categorized as insufficient (n=6, 3%), poor (n=24; 12.1%), acceptable (n=101; 50.8%) and good (n=68; 34.2%) was 11.0 (8.0), 20.0 (4.0), 26.0 (5.0) and 38.0 (2.0), respectively. No patient has achieved an "excellent" level of knowledge. There was no significant difference in PA level ($p = 0.341$), BMI ($p = 0.510$) or age ($p = 0.073$) between these categories. Age was negatively correlated with knowledge about HP ($p < 0.05$ and rho = 0.02).

Conclusions: Patient's knowledge about HP did not influence the level of PA in hypertensive patients. Age, number of steps per day and BMI were not significantly different between the categories of knowledge. Public policies and organizational strategy should be addressed to improve health education and avoid sedentary behavior in this population.

Keywords: Hypertension; Health Programs and Plans; Health Education; Exercise; Physical Activity; Epidemiology; Quality of Life; Blood Pressure.

Introduction

Hypertension (HP) contributes significantly to the high prevalence of cardiovascular diseases (CVD), which are the main causes of mortality in the world.[1] It is believed that HP accounts for up to 7.6 million (12.8%) of total number of deaths each year.[2]

Despite recent advances in the prevention and treatment of HP, the economic and health impacts of this condition have increased, with significant repercussions on public health worldwide.[3,4] In this regard, strategies for the mitigation and control of hypertension, such as moderate to high levels of physical activity (PA), are recommended as important

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non-pharmacological approaches in the management of the disease.[4–6]

A systematic review evaluated 96,073 hypertensive patients and showed that all-causes of mortality were inversely related to PA, and that walking was the most common mode of exercise.[8] The practice of this exercise modality, complemented with the use of measurement tools, such as pedometers, has increased, as these are easy-to-handle and cheap devices.[8,9]

Some studies have shown that walking between 10,000 and 13,000 steps/day contributes to blood pressure lowering.[10–13] Thus, increases in PA are an important strategy in the prevention and treatment of HP, [7,13-15] although there is still a lack of studies investigating the effect of the use of pedometer-assessed PA in hypertensive patients.

Understanding lifestyle behaviors among individuals with HP is important to achieve hypertension control and to determine contributing factors to knowledge and treatment.[6,7] Although significant progress has been made in HP detection and control, up to 70% of diagnosed hypertensive patients do not have adequate blood pressure control.[5]

Knowledge of hypertension is associated with and considered co-responsible for treatment success. Patients participating in educational procedures can take better care of their own health.[16]

Maruf et al.[17] demonstrated that hypertensive patients had good knowledge about PA behavior, positive attitude in terms of benefits, importance and involved risk, in addition to a high level of participation. There were significant correlations between knowledge about PA, attitude towards PA and participation in PA.[17] However, to the best of our knowledge no study investigated whether hypertension knowledge influences the level of PA. Thus, the aim of this study was to examine the influence of hypertension knowledge on PA level and the relationship between these variables in hypertensive patients in a primary care center in southern Brazil.

Methods

In this cross-sectional study, 199 hypertensive individuals attending a primary care center in a city of southern Brazil were included in the study. In 2015, 921 hypertensive patients, representing 16.5% of the city's total population, were enrolled in this primary care unit. The sample size estimation was performed by proportion approximation, based on the work of Lwanga and Lemeshow.[18]

Estimates of proportions were made as follows: n= (1-α)2 (p) (1-p)/(d)X(d), where "p" indicates the prevalence of the disease in the population (16.5%); 1-p is the proportion of individuals without the disease (83.5%); 1- α is the level of confidence (95%; z=1.96), and "d" is the required accuracy (0.05). Therefore, the calculated sample was 211 hypertensive patients. A total of 302 individuals were invited to participate in the study, but 105 were excluded because of missing data (n=82) or because they did not meet the inclusion criteria (n=23). Therefore, the number of volunteers was lower than the calculated value, also because the researchers had a limited time to assess these patients.

The inclusion criteria were a) diagnosis of hypertension; b) age older than 18 years; and c) clinical follow-up lower than three months in the primary care center. The diagnosis was defined according to the VII Brazilian Guidelines on Hypertension (systolic and diastolic blood pressure levels, respectively): (1) office blood pressure ≥ 140 and/or 90 mmHg; ambulatory blood pressure ≥ 130 and/or 80 mmHg; (3) home blood pressure ≥ 135 and/or ≥ 85 mmHg.[7] Individuals with cognitive impairment to answer the questionnaire, or musculoskeletal and neurological impairments to walk were excluded.

The study was conducted for six months, and all the study procedures and patient inclusion being performed weekly. The study design followed 466/12 resolution of the Brazilian National Health Council and was approved by the Ethics Committee on research involving human beings of Santa Catarina State University, under the protocol n. 689798/2014. All patients signed an informed consent form.

Sociodemographic and personal data were collected using a specific form. Anthropometric evaluations were also performed; body mass was measured using a digital scale (Filizola PL 180) with a resolution of 0.1kg, and height was measured using a wall-mounted stadiometer (ate the nearest 1.0 cm). These measurements were performed as described by Alvarez and Pavan.[19] Body Mass index (BMI) was classified based on the World Health Organization (WHO) recommendations: normal weight (BMI < 25 kg/m^2), overweight (25 kg/m^2 ≤ BMI < 30 kg/m^2) and obesity (BMI ≥ 30 kg/m^2).[20]

To assess the level of knowledge about hypertensive disease, the HIPER-Q instrument was applied. It consists of 17 questions that encompass seven areas regarding patient education: self-care, treatment, diagnosis, PA, concept and pathophysiology, signs and symptoms and risk factors. For each item, one answer is considered the "most correct" and receives a score of 3, and another answer is considered "partially correct" and receives a score of 1. The other two options - the incorrect and the "I don't know" option – are assigned a score of 0. After completion of all questions, the sum of the scores obtained represent the average total knowledge, and the maximum score of 51 points represents the "perfect" knowledge.[21]

Finally, the level of PA was assessed using a pedometer (Power Walker TM® Model PW-610/611). The equipment was programmed to store the number of steps taken for 24 hours. The number of steps were registered for four days, and the mean was used for analysis. A number <5,000 steps per day indicated a "sedentary" lifestyle; between 5,000 and 9,999 steps per day indicated "low-active"; ≥10,000 steps per day "active", and >12,500 steps per day "very active".[22]

Statistical Analysis

Data were analyzed descriptively using Statistical Package for the Social Sciences (SPSS), version 20.0. The Kolmogorov-Smirnov test was used, which showed that the data did not follow a normal distribution. Absolute and relative frequencies were used for categorical variables and median and interquartile range for continuous variables. The Spearman's correlation was used to test the correlation of knowledge about HP with age, BMI and PA level. To compare PA level, age and BMI between different categories of HP knowledge, the Kruskall-Wallis test was used. All statistical tests adopted a significance level of 5% ($p<0.05$)."

Results

Sociodemographic data, BMI, PA level, and patient's knowledge about HP are described in Table 1. Of the 199 patients included, 144 (72.4%) were women and 55 were

Table 1 – Sociodemographic data, body mass index, physical activity level, and patient's knowledge about hypertension (n=199)

Variable	Category	f	%
Schooling	Up to 8 years	163	81.9
	More than 8 years	36	18.1
Income*	Up to 5 salaries	183	92
	More than 5 salaries	16	8
Body mass index	Normal weight	55	27.6
	Overweight	75	37.7
	Obesity	69	34.7
Level of physical activity	Sedentary	27	13.6
	Not very active	85	42.7
	Moderately active	36	18.1
	Very Active	51	25.6
Knowledge about hypertension	Excellent	-	-
	Good	68	34.2
	Acceptable	101	508
	Poor	24	12.1
	Insufficient	6	3

*f: absolute frequency; %: relative frequency; *family income based on a current minimum wage of R$ 998.00.*
The correlation tests of knowledge about HP with age, BMI and level of PA are illustrated in Table 2. Age was negatively related to HP knowledge, but the correlation found was very weak and the correlation coefficient between the variables was rho=0.02.

men (27.6%). Median knowledge about HP was 32 (10) points, which means acceptable knowledge according to HIPER-Q.[21]

The correlation tests of knowledge about HP with age, BMI and level of PA are illustrated in Table 2. Age was negatively related to HP knowledge, but the correlation found was very weak and the correlation coefficient between the variables was rho=0.02.

Comparison of PA level, BMI and age between different HP knowledge categories are presented in Table 3. No significant difference was found between KHP groups.

Discussion

The present study examined the influence of HP knowledge on PA level and the relationship between these variables in hypertensive patients. The results showed that there was no significant difference between different levels of HP knowledge and the number of steps taken per day, which means that the knowledge about the disease does not seem to be determinant to increase PA level in these individuals.

Despite the well-established literature on the importance of knowledge about the disease as a strategy to promote better blood pressure control and cardiovascular prognosis, there is still a lack of studies correlating this knowledge with other variables, such as PA. Some authors found that only 13.6% of hypertensive patients evaluated in cardiology outpatient clinics identified physical inactivity as a risk factor for HP. This could result from the perception of these patients that changes in lifestyle have no impact on high blood pressure management.[23]

Iyalomhe and Iyalomhe [24] demonstrated a low level of knowledge on HP, ineffective attitudes towards treatment and adoption of inappropriate lifestyles in a study with 108 patients undergoing antihypertensive treatment. In addition, only 10 patients (9.3%) reported practicing physical exercises regularly.[24] On the other

Table 2 – Correlation of knowledge about hypertension with age, body mass index and physical activity level (n=199)

Variables	Total n=199		Men f=55		Women f=144		Correlation	
	Md	IQ	Md	IQ	Md	IQ	rho	p
Age (years)	61.2	13	62.6	12	63	14	-0.150	0.035*
BMI (kg/m^2)	27.9	7.5	27.7	7.3	28.3	7.2	-0.075	0.290
LPA (Steps/day)	9183	6186.5	11266.7	8813	8702.5	5259.7	0.070	0.336

*n: total sample number; f: absolute frequency; Md: median; IQ: interquartile range; BMI: Body Mass Index; LPA: level of physical activity; rho: Spearman correlation coefficient; * p<0.05.*

Table 3 – Levels of patient's knowledge about hypertension by age, body mass index, and level of physical activity

	Excellent		Acceptable		Poor		Insufficient		Sig.
	MD	IQ	MD	IQ	MD	IQ	MD	IQ	p
KHP score	38.0	2.0	26.0	5.0	20.0	4.0	11.0	8.0	0.001*
BMI (kg/m^2)	27.7	8.1	28.6	5.8	27.9	10.6	25.3	7.9	0.510
Age (years)	59	14	63.5	12	64.5	14.0	65.5	10.0	0.073
LPA (Steps/day)	9287	4689.5	9014.12	7085.1	7193.2	5371.5	10864.2	7050.9	0.341

*Md: median; IQ: interquartile range; KHP: knowledge about hypertension; BMI: Body Mass Index; LPA: level of physical activity; Sig.: Statistical significance; *p<0.05.*

hand, qualitative research exploring the knowledge of hypertensive patients about cardiovascular risk factors showed that even though patients were aware of the importance of PA for their health, the majority declared to be insufficiently active.[25] A possible reason for this is a gap in the knowledge about effective strategies for modifying cardiovascular risk factors. Furthermore, resistance to the adoption of healthy lifestyles, even by patients with good knowledge on the disease, may indicate that the expectations about the results are relatively low, that is, these patients are not confident that PA actually improves health.[26]

An educational program intervention had a significant impact on both mean levels of knowledge and adherence to healthier habits by patients with coronary artery disease (CAD) .[27]

In the same manner, significant associations were found between some aspects of health literacy and increased levels of PA in patients diagnosed with acute myocardial infarction, stroke or angina pectoris.[28] Significant positive correlations were also found between the level of knowledge about risk factors for coronary disease and PA level in patients who underwent cardiovascular procedure or event.[29] On the other hand, a recent research conducted in China showed that patients with a higher level of knowledge about cardiovascular disease were more likely to not adhere to a healthy lifestyle, including the practice of PA.[30] The authors attributed these findings to the possibility that patients with a lower level of knowledge may have followed physicians' advice without questioning, which may also have been influenced by socioeconomic factors.

In our study, the median of steps/day was 9,138, without difference between men and women. Although these patients were classified as low-active,[22] these findings exceed those found in another study where, after four weeks of dietary changes and increase in PA levels, the hypertensive and diabetic patients had a median of 4,043 steps,[13] the half of the daily steps registered in the present study. Another study, in which 75% of the respondents were women, reported that diabetics and hypertensive patients submitted to a health literacy program walked 11,686 daily steps,[31] a similar quantity to that found in males in our study. Other researchers demonstrated that women performed a mean of 7,453 steps per day.[32]

Another study conducted in Hong Kong showed that physically inactive people used to walk 8,147 steps daily, and the number of steps taken was negatively associated with health complications, such as HP.[14] These results became relevant since the number of daily steps seems to be inversely correlated with the incidence of HP and, possibly, other cardiovascular outcomes.[14,15]

Hypertensive patients with low level PA are a concern, since insufficient PA represents the fourth risk factor for mortality worldwide, with more than 3.2 million deaths per year and 32.1 million quality-adjusted life years (QALYs).[33] Therefore, the benefits of regular PA are significant for individuals with cardiovascular risk factors, such as HP, as it can reduce mortality by up to 16%.[34]

Although our results indicated a weak correlation between the level of knowledge about HP and age of patients, there was no significant difference in age between different categories of knowledge. This result could be explained by the high percentage of patients in the same age group (70% were between 50 and 70 years old). Conversely, a study based on WHO data regarding global aging and adult health, examined patterns of prevalence of HP in low and middle-income countries and found that awareness of the disease was associated with older age.[35] Another study demonstrated that knowledge and awareness about HP are different between the elderly and high school students, suggesting that there might exist a generational difference in knowledge about the disease.[36] Besides, the fact that HP increases with age may contribute to the relationship between age and HP knowledge.

It is well established that obesity and a sedentary lifestyle are associated with cardiovascular risk factors, including HP.[6,37] This was confirmed by characteristics of our study population, with a high percentage of inactive individuals (42.7%) and even higher percentage of overweight or obese hypertensive patients (72.4%).

However, no significant differences were found in BMI between the categories of knowledge about HP. Corroborating our findings, Knuth et al.,[38] demonstrated an association between knowledge about the effects of PA on hypertension prevention and BMI; however, BMI was not associated with knowledge of the effects of PA on the treatment of HP and type 2 diabetes. This may have been due to the prevalence of these diseases be higher in individuals with a higher BMI.[38]

With respect to knowledge about HP, most patients (50.8%) were classified in the category of "acceptable knowledge". These results are similar to those of other studies[21,39] and reflect the importance of assessing knowledge about health and formulating hypotheses that may elucidate the determining factors for information gaps. It is also noteworthy that no patient presented an optimal level of knowledge about the disease, according to the classification of the instrument.[21]

Therefore, patient knowledge is a central component in the treatment of HP and is associated with successful self-management of the disease and behavioral changes.[16,40] Health education interventions can result in significant reductions in risk factors associated with lifestyle diseases, such as HP.[41] Thus, the WHO[33] recommends that health promotion strategies should be designed to improve knowledge about health and self-management of the disease, beyond the adoption of healthy lifestyles. Therefore, understanding the barriers to obtaining adequate knowledge on HP can contribute to the overall improvement of prevention and management of this condition, with implications for clinical practice.[41]

We did not find longitudinal studies in the literature demonstrating the effects of the higher level of knowledge about HP on outcomes, such as worse prognosis or mortality. In this context, studies on other chronic diseases have shown promising results, suggesting that disease-related education may be determinant in the control of risk factors, such as sedentary lifestyle, smoking and continuity of treatment, which can lead to reductions in comorbidities, health costs and even mortality [42,43] Thus, we expect that our findings can be used as a basis for future studies.

Caution is needed with the interpretation of the results, since this work has some limitations. First, it is notable that our research presents a cross-sectional design, thus hindering the relationships of causalities and effects between the variables. Second, in our population, there were some patients that performed physical exercises on a regular basis, which was not controlled in this research. Third, the instrument used to assess the level of PA, the pedometer, does not allow detecting activities performed with upper limbs or sedentary time and does not measure the intensity and duration of PA. Although this equipment has been widely used to evaluate PA levels, these points limit the extrapolation of the results.

Conclusion

In summary, our results showed that level of knowledge about HP did not influence the level of PA in hypertensive patients from a primary care unit in the south of Brazil. Age, number of steps per day and BMI was not significantly different between four HP knowledge categories. Health education should be emphasized as a strategy to improve knowledge and promote behavior change among hypertensive patients. Public policies and organizational strategy should be addressed to improve health education and avoid sedentary behavior among hypertensive patients.

Author Contributions

Conception and design of the research: Zulianello RS, Martins ETC, Benetti M. Acquisition of data: Zulianello RS, Martins ETC, De Lucca M. Analysis and interpretation of the data: Zulianello RS, Korbes AS. Statistical analysis: Zulianello RS, Korbes AS. Obtaining financing: Zulianello RS, Martins ETC. Writing of the manuscript: Zulianello RS, Korbes AS, De Lucca L. Critical revision of the manuscript for intellectual content: Zulianello RS, Karsten M, Benetti M.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of the *Universidade do Estado de Santa Catarina* under the protocol number 689789/2014. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

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