



## Blood Pressure, Nutritional Status and Physical Activity Level Affect the Health Related Quality of Life of Oldest Old?

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### Abstract

**Objective:** The aim of this study was to investigate the effects of blood pressure control, nutritional status and physical activity level on the health-related quality of life of the very elderly hypertensives in the Brazilian Midwest.

**Methods:** Cross-sectional study with 41 patients (age > 80 years) at a reference center for the treatment of hypertension. Anthropometric and blood pressure data were collected. The participants answered the International Physical Activity Questionnaire (IPAQ), the Medical Outcomes Study SF-36 item Short Form Health Survey (SF 36) and questions about lifestyle habits. The data were analyzed using Fisher's exact test, the t-test, the chi-square test and the Mann-Whitney-U test. The significance level was set at 5% and the confidence interval at 95%. The study was approved by the Institution's Ethics Committee.

**Results:** Nutritional status and blood pressure did not affect the SF 36 scores. The score for quality of life based on physical aspects was higher in men than in women ( $p = 0.044$ ). The very elderly who are physically active had better scores for functional capacity on the SF 36 ( $p = 0.007$ ). Social, emotional and mental health domains yielded the highest scores for quality of life.

**Conclusion:** Blood pressure control and nutritional status did not influence health-related quality of life of very elderly hypertensive. Men have a better quality of life related to the physical aspects, and physically active individuals have a better health-related quality of life related to functional capacity.

### Keywords

Quality of life, Oldest old, Nutritional status, Physical activity, Hypertension, Elderly

Aging is an independent risk factor for non communicable diseases, including systemic arterial hypertension, a leading cause of preventable death in the world [5]. Its treatment and control are key to reducing cardiovascular events, such as acute myocardial infarction and stroke [6]. In Brazil, less than 20% of all hypertensive patients have controlled blood pressure [7].

Good quality of life should be a priority goal for the population aged 80 years and over. Preserved functional capacity and the ability to maintain autonomy and independence are crucial to the quality of life of the elderly [8,9], which is also influenced by economic, social and emotional conditions; nutritional status [10]; and regular physical activity [8].

This study aimed to investigate the effects of blood pressure, nutritional status and physical activity level on the health-related quality of life of very elderly hypertensive individuals seen at a reference center for the treatment of hypertension.

### Methodology

#### Subjects

The study target population consisted of patients aged 80 and over who were under regular treatment at a public reference center for the treatment of hypertension.

#### Data collection

Data were collected between July and September 2014. A specific questionnaire was applied for the collection of sociodemographic and lifestyle data. Blood pressure measurements followed the technique presented by Brazilian Society of Cardiology [7]. The values obtained were classified according to cutoff points for the elderly aged 80 or older [11].

Two nutritionists collected weight, height, waist (WC), calf (CC) and arm (AC) circumferences and triceps skinfold thickness (TST) following the Lohman, Roche and Martorell protocol [12]. Classifications were performed according to Lipchitz [13] for body mass index (BMI); the WHO [14] for WC; the NHANES III [15] for AC, TST and mid-arm muscle circumference (MAMC); and the WHO [16] for CC.

### Introduction

Following the global trend, the Brazilian population is aging. The age group comprising very elderly individuals (those 80 years old and over) grew four times than the general population between 1997 and 2007 [1,2]. This group consists of more than 3.3 million Brazilians and is expected to triple by 2050 [3]. However, the increase in population life expectancy is not necessarily tied to better health status [4].

**Table 1:** Sociodemographic characteristics of very elderly hypertensive patients.

Variables	Total N = 41	Women N = 31	Men N = 10	p
Age (n, %)				0.673 <sup>a</sup>
80 - 84 years	28 (68.3)	21 (67.7)	7 (70.0)	
85-89 years	11 (26.8)	9 (29.1)	2 (20.0)	
> 90 years	2 (4.9)	1 (3.2)	1 (10.0)	
Marriage status (n, %)				0.049
Live with partner	13 (31.7)	7 (22.6)	6 (60.0)	
Live without partner	28 (68.3)	24 (77.4)	4 (40.0)	
Per capita income (mean ± SD)	270.6 ± 138.2	252.7 ± 107.6	315.6 ± 195.3	0.463 <sup>b</sup>
Education level (mean ± SD)	1.9 ± 2.6	1.7 ± 2.2	2.6 ± 3.5	0.565 <sup>c</sup>
Time at the LHA (mean ± SD)	14.3 ± 5.7	14.4 ± 6.1	13.8 ± 4.6	0.148 <sup>b</sup>

<sup>a</sup>p: Fisher's exact test, <sup>b</sup>p: t test, <sup>c</sup>p: Mann-Whitney U-test. Per capita income in Dollars (USD); Education in years; LHA: Arterial Hypertension League; Time at the LHA in years.

**Table 2:** Lifestyle and blood pressure control of very elderly hypertensive patients.

Variables	Total N = 41	Women N = 31	Men N = 10	p <sup>b</sup>
Smoking (n, %)				0.002
Never smoked	22 (53.7)	21 (67.7)	1 (10.0)	
Ex-smoker	19 (46.3)	10 (32.3)	9 (90.0)	
Alcohol consumption (n, %)				0
Never consumed	27 (65.9)	27 (87.1)	0	
Previous consumption	11 (26.8)	3 (9.7)	8 (80.0)	
Current consumption	3 (7.3)	1 (3.2)	2 (20.0)	
Physical activity level <sup>a</sup> (n, %)				0.469
Insufficient	22 (53.7)	18 (58.1)	4 (40.0)	
Moderate	18 (43.9)	12 (38.7)	6 (60.0)	
Intense	1 (2.4)	1 (3.2)	0	
Systolic blood pressure (n, %)				0.402
Controlled	31 (73.2)	22 (71.0)	9 (90.0)	
Uncontrolled	10 (26.8)	9 (29.0)	1 (10.0)	
Diastolic blood pressure (n, %)				0.244
Controlled	40 (97.6)	31 (100.0)	9 (90.0)	
Uncontrolled	1 (2.4)	0	1 (10.0)	

<sup>a</sup>Classification according to the IPAQ Research Committee (2005). <sup>b</sup>p: Fisher's exact test.

International Physical Activity Questionnaire (IPAQ) in Portuguese adapted and validated for the elderly [17] was applied. The physical activity level was classified in the categories insufficiently, moderately and very active [18]. To assess the health-related quality of life, the SF-36 questionnaire [19] translated and validated for Portuguese [20] was used. The scores were calculated ranging from 0 to 100 on the Raw Scale, in which 100 represents better quality of life [21].

### Statistical analysis

Descriptive analyses of the data was performed and presented as means ± standard deviations or medians. Gender differences for sociodemographic characteristics and lifestyle and clinical variables were obtained using Fisher's exact test, the t-test and the Mann-Whitney-U test. Fisher's exact and chi-square tests were performed to access the difference between anthropometric variables and level of physical activity and blood pressure control. The Mann-Whitney-U test was also applied to compare the scores of SF 36 domains, the distribution of which was not normal, with the categorical variables (blood pressure control and classification of anthropometric variables and physical activity level). The significance level was 5% and the confidence interval was 95% for all analyses. The analyses were performed using Statistical Package for Social Sciences software (version 21 for Windows, SPSS Inc., Chicago, IL, USA).

### Ethical aspects

The study was approved by the Research Ethics Committee of the Institution (Protocol No. 700.942 from 06/26/2014). The participants signed informed consent forms.

### Results

A total of 31 women (75.6%) and 10 men aged ≥ 80 years were included in the study. The mean age was 83.8 years. The mean *per*

*capita* income was USD 270.65. Men and women did not differ in terms of age, income and education level (Table 1). Marital status exhibited differences between the genders, with 77.4% of women and 40% of men living without a partner (p = 0.049).

The prevalence of overweight in the sample, using the BMI as criterion, was 46.3%. According to the AC classification, 2.4% and 17.1% of individuals were overweight and obese, respectively. According to the TST 2.4% of participants were classified as overweight and 22% as obese. The prevalence of waist circumference above recommended levels was 80.5%, resulting in increased risk of cardiovascular disease. All anthropometric methods used showed low prevalence rates for low weight and malnutrition indicators in the very elderly. The nutritional status classification did not differ between genders.

No participant reported being a smoker at the time of the study and only 7.3% reported regular consumption of alcohol. Smoking and alcohol consumption were different between genders, being higher among men (p = 0.002; p < 0.001) (Table 2). Physical activity level of 53.7% of the participants was insufficient. There was no statistically difference between the genders (p = 0.469) (Table 2).

The mean systolic blood pressure of 73.2% of the very elderly hypertensive exhibited a controlled value for the age group analyzed (< 150 mmHg). There was no difference in blood pressure control between genders (Table 2).

The scores of the elderly in the SF 36 domains indicated that role physical and functional capacity are the main limiting factors of the health-related quality of life in this population, with the lowest mean scores (39.0 and 44.7, respectively). The domains social functioning, role emotional and mental health showed the highest scores. Role physical showed best score among men (p = 0.044) (Table 3).

Moderate or vigorous physical activity was associated with better

quality of life for the functional capacity domain ( $p = 0.007$ ) (Table 4). The scores on the SF 36 domains did not differ according to the blood pressure (Table 5) or nutritional status ( $p > 0.05$ ).

## Discussion

This is the first study with Brazilian hypertensive patients aged 80 and over that analyzed the relationship between nutritional status, blood pressure, physical activity level and health-related quality of life.

The participation of women and men at a 3:1 ratio, considering the attempt to include all individuals over 80 years old, regardless of gender, is consistent with the longer life expectancy of women in Brazil [1]. Longer female life expectancy was also reflected in the marital status of the participants, with more women living without a partner. Similar results were reported in another study on the health profiles of non-institutionalized very elderly individuals [22].

The level of education and the mean *per capita* income reported by the population were very low, with a tendency to be higher among men. Other studies have reported low education and income levels among the elderly 80 years of age and older [22-28].

Regarding nutritional status, 46.3% of the study sample was overweight, according to the BMI classification, a value below that obtained in evaluations of US [29] and Polish very elderly individuals [30], in which 57.4% and 66.59% were overweight, respectively. The classification of nutritional status by BMI among the elderly should be interpreted with caution because it does not distinguish between the various components of body composition; therefore, this measure

can become inaccurate due to changes in central fat distribution and muscle depletion, which are characteristics of this age group [31]. In the present study, in addition to the proportion of overweight determined by BMI, there were also high prevalence rates of increased WC (80.5%) and preserved muscle mass as assessed by the CC (82.9% above 31 cm) and the MAMC (92.7% above the 10<sup>th</sup> percentile).

Longevity is influenced by nutritional status. A systematic review that included 2.88 million individuals from more than 10 countries found that obesity with BMI  $> 35 \text{ kg/m}^2$ , compared to normal-weight BMI, is associated with increased all-cause mortality. However, overweight is associated with lower all-cause mortality [32]. The results obtained in the present study are consistent with the literature because in the sample aged 80 or older, there was only one individual with a BMI over  $35 \text{ kg/m}^2$ , and a higher prevalence of overweight than low weight was detected.

The nutritional status of the very elderly Brazilian population has varied in studies conducted thus far. A study with 134 very elderly Brazilian individuals living in Santa Catarina, Brazil, found a significant difference between genders for the nutritional status assessed by BMI, with higher prevalence rates of malnutrition among men (27.3% vs. 12.8%) and overweight among women (53.8% vs. 25.5%) [33]. The results contrast with those obtained in the present study because, although no statistically significant difference was observed between genders, the prevalence of malnutrition was higher among women (25.8% vs. 10.0%), and that of overweight was higher among men (60.0% vs. 41.9%). A study with very elderly people in Rio de Janeiro, Brazil reported 75% obesity in the sample, which is the highest prevalence found in the literature for this age group [34].

It is known that blood pressure control is essential for reducing morbidity and mortality from cardiovascular and cerebrovascular diseases [6,7], the leading causes of death in Brazil [35] and worldwide [36]. The study sample exhibited a blood pressure control rate 373% higher than the general population of hypertensive Brazilians (73.2 vs. 19.6%) [37-39]. There is a lack of studies that evaluate the control of systemic arterial hypertension in the elderly in order to allow such a comparison for the age group analyzed here. Nevertheless, the results suggest the effectiveness of the care provided to the very elderly at this Brazilian reference center for the treatment of hypertension. The blood pressure control rate was similar to those obtained in developed countries such as the USA, Canada and England, with control rates reaching values of 71% in men and 75% in women, considering all age groups [39].

According to the scores in the SF 36 domains, the health-related quality of life of the women in the study was lower than that of men. Worse quality of life among women has also been observed in other studies [10,40-42]. Women had worse scores than men, showing significant differences for the domain limitations due to role physical. Women also had lower scores than men in the domains functional capacity and bodily pain, although with no statistical significance. These facts suggest that the physical decline over time affects women more strongly.

Although higher than in women, the score for functional capacity was also low in men. A similar result was reported by Lahariya, Khandekar, Pradhan [42] in a study with very elderly individuals in

**Table 3:** Scores for the SF 36 domains of very elderly hypertensive patients.

SF 36 domains	Total N = 41	Women N = 31	Men N = 10	p <sup>a</sup>
Functional capacity	44.7 ± 27.1	40.8 ± 25.1	56.8 ± 31.0	0.124
Role physical	39.0 ± 45.8	29.8 ± 42.0	67.5 ± 47.26	0.044
Bodily pain	53.1 ± 30.3	51.2 ± 30.7	59.8 ± 29.7	0.444
General health	49.0 ± 22.8	50.7 ± 22.1	43.3 ± 25.7	0.516
Vitality	60.0 ± 21.7	61.0 ± 21.1	56.7 ± 24.6	0.505
Social functioning	69.1 ± 32.4	68.6 ± 33.2	70.8 ± 31.2	0.787
Role emotional	74.8 ± 38.6	73.1 ± 39.8	80.0 ± 35.8	0.596
Mental health	69.7 ± 18.1	67.0 ± 18.1	79.1 ± 15.6	0.118

<sup>a</sup>p: Mann-Whitney U-test.

**Table 4:** Mean quality of life scores on the SF 36 domains according to the physical activity level.

SF 36 domains	Insufficient PAL	Moderate or vigorous PAL	p <sup>a</sup>
Functional capacity	33.8 ± 24.6	57.2 ± 24.9	0.007
Role physical	27.3 ± 42.2	52.6 ± 47.0	0.086
Bodily pain	47.9 ± 31.2	59.5 ± 28.8	0.194
General health	51.2 ± 21.9	46.4 ± 24.4	0.513
Vitality	60.0 ± 22.9	60.0 ± 20.7	0.827
Social functioning	66.5 ± 31.7	72.2 ± 33.9	0.523
Role emotional	69.7 ± 44.7	80.7 ± 30.1	0.692
Mental health	69.8 ± 18.3	69.6 ± 18.4	0.978

PAL: physical activity level; ap: Mann-Whitney U-test.

**Table 5:** Mean quality of life scores on the SF 36 domains according to blood pressure control.

SF 36 domains	Systolic blood pressure			Diastolic blood pressure		
	Controlled	High	p-value	Controlled	High	p-value
Functional capacity	44.3 ± 27.9	43.5 ± 26.4	0.976	45.2 ± 26.6	0	0.098
Role physical	42.7 ± 46.2	27.5 ± 44.8	0.238	35.9 ± 44.7	100.0 ± 0	0.182
Bodily pain	52.2 ± 29.9	55.9 ± 33.0	0.843	54.2 ± 29.9	10.0 ± 0	0.128
General health	46.2 ± 24.0	57.6 ± 17.4	0.254	49.8 ± 22.7	20.0 ± 0	0.208
Vitality	58.2 ± 22.9	65.5 ± 17.4	0.428	60.5 ± 21.7	40.0 ± 0	0.258
Social functioning	70.4 ± 32.7	65.0 ± 32.7	0.429	70.2 ± 32.0	25.0 ± 0	0.190
Role emotional	73.3 ± 38.6	76.7 ± 41.7	0.711	73.5 ± 39.1	100.0 ± 0	0.453
Mental health	71.5 ± 017.4	64.4 ± 20.3	0.307	68.9 ± 17.7	100.0 ± 0	0.098

Systolic blood pressure: Controlled  $< 150 \text{ mmHg}$ ; High  $> 150 \text{ mmHg}$ . Diastolic blood pressure: Controlled  $< 90 \text{ mmHg}$ ; High  $\geq 90 \text{ mmHg}$ . <sup>a</sup>p: Mann-Whitney U-test.



India, and by Nogueira, et al. [43] with 129 very elderly Brazilians. These results confirm that health impairment and reduced physical capacity of the elderly affect work and limit physical activities and those of daily life [44,45], thus reducing the health-related quality of life.

The decreases in physiological functions and functional capacity are characteristics of aging that, among other things, can reduce the capacity to perform exercises. Although the aging process is common to all, the rate of decline varies among individuals with similar chronological age, often influenced by disuse. A controlled study with elderly individuals observed that those who are physically active tend to have better quality of life due to smaller losses of functional capacity compared to sedentary elderly individuals [45].

In the present study, the score on the domain functional capacity differed according to the physical activity level of the participants, with better quality of life being observed for individuals who are more active. Therefore, elderly individuals with moderate and vigorous levels of physical activity were more physically independent and reported less difficulty in performing household chores, climbing stairs, walking, bending, kneeling, showering, and getting dressed on their own. Metha, et al. also demonstrated that regular exercise is effective in controlling blood pressure in individuals over 80 years of age, reducing low-density lipoprotein (LDL) cholesterol and improving functional capacity and quality of life [46].

Although physical inactivity ranks fourth among the main risk factors for overall mortality [47] and regular exercise contributes to improved quality of life, 46% of adults and 62.7% of elderly Brazilians do not exercise regularly at sufficient levels [48]. The present study observed that 46.3% of the sample was sufficiently active. This result, although not entirely satisfactory, is superior to that of the National Health Survey, a Brazilian population-based survey, which found that only 37.3% of the elderly perform commuting and leisure-time physical activity [48]. The physical limitations associated with aging are responsible for the high prevalence of inactivity in the elderly [49].

A study with elderly individuals over 90 years of age demonstrated that the quality of life is influenced more by the mental health and the presence of depression than by physical and cognitive declines [50]. In the present study, unlike the role physical, the effects of social and psychological problems on the participants' activities were low. Thus, the high scores obtained in the social functioning, role emotional and mental health domains suggest that the study sample has a good health-related quality of life.

The scores on the SF 36 did not differ for older adults with controlled or high blood pressure values. Sample size may have influenced this result as well as high blood pressure control rate. Anyway, the same result was found by Carvalho, et al. [51] in study with 246 hypertensive patients and 87 healthy individuals from the community. Normotensive individuals (control group) have had better HRQOL compared to hypertensive patients but inside the hypertension group the blood pressure control did not affect significantly the HRQOL.

A limitation of this study was the small number of participants (n = 41) because more than 20% of eligible individuals did not have the preserved mental and physical faculties necessary for participation. In addition, 10% of the individuals contacted refused to participate, often due to the dependence on family members for transportation and decision-making.

## Conclusion

HRQOL was higher in men and improved by moderate or vigorous levels of physical activity among very elderly Brazilian people. Blood pressure control and nutritional status did not influence HRQOL of the very elderly hypertensive.

These findings should encourage the development of more studies to clarify promoting factors of longevity with better quality of life, which may direct the development of public policies directed to the elderly.

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## Ethical Statement

The study was approved by the Research Ethics Committee of the Federal University of Goiás with Protocol number 700.942 from 06/26/2014.

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