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ANTHROPOMETRICAL INDICATORS AND SOCIAL VARIABLES AMONG ENDERLY WITH HYPERTENSION AND DIABETES

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ABSTRACT

This study aimed at assessing the anthropometrical indicators and social variables among elderly with hypertension and diabetes. It is a transversal, descriptive research with a quantitative approach, carried out in two municipalities in Southwestern Bahia, Brazil, provided with a sample of 180 interviewees. The statistical analysis was carried out by means of the Chi-Squared test. One identified that 65% of the sample hat hypertension diagnosis and 18.3% of diabetes diagnosis. One evidenced significant statistical difference among illiterate hypertensive elderly with the anthropometrical variables body fat, body mass index, waist circumference and abdominal circumference ($p \leq 0.05$). Hypertensive elderly who do not work and do not practice any physical activity with the anthropometrical variables body fat, body mass index, waist circumference and abdominal circumference ($p \leq 0.05$). Married hypertensive elderly with the variables body fat, waist circumference and abdominal circumference ($p \leq 0.05$). Among diabetic elderly, there was only significant statistical difference among the elderly who do not work and do not practice any physical activity with the variable body fat ($p \leq 0.05$). However, one evidenced that social-demographic factors may interfere in the anthropometrical variables, and such factors, when associated with the aging phenomenon, may trigger the increase of morbi-mortality of this population by Non-Communicable Chronic Diseases.

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INTRODUCTION

Aging, or senescence, is understood as a natural process, reflected by genetic heritages, social-environmental factors, with significant changes in the biological, physiological, behavioral and functional levels (WHO, 2015). In most cases, this process involves a series of body changes, in which the decrease of height, body-weight and muscle mass is included, besides the redistribution of body mass (Freitas and Py, 2016). This, in turn, accumulates itself mainly in the abdominal region, which results in a relevant risk to the elderly's health, since the abdominal fat accumulation is directly associated with the development of Non-Communicable Chronic Diseases (NCCDs), such as cardiovascular diseases, hypertension and diabetes (Menezes *et al*., 2013). The Health Ministry (Brazil, 2013b) defines Systemic Arterial Hypertension (SAH) as a multifactorial condition, characterized by high and sustained pressoric levels, with values equal or higher than 140 x 90 mmHg, and may affect target-organs, trigger metabolic changes and increase the risk of cardiovascular events. Mellitus Diabetes (MD) is a disease caused by the deficiency in the secretion and/or action of

insulin in the organism, characterized by hyperglycemia and disorders in the metabolism of carbohydrates, proteins and fat, with which one normally associates dyslipidemia and arterial hypertension (Brazil, 2013c). According to the Brazilian Institute of Geography and Statistics (IBGE, 2015), the elderly are the population segment which most increases in Brazil. In 2010, the elderly population represented 19.6 million and one estimates that the number of the elderly in 2030 and in 2060 will reach 45.5 and 73.5 million, respectively, due to the fast and continuous decrease of fecundity in the country, as well as the decrease of mortality. The studies conducted by Ortolani and Goulart (2015) confirm these data and reaffirm that the aging phenomenon of the Brazilian population– caused by the decrease of mortality and birth-rate as well as significant improvement of the health services – contributed with the epidemiological transition of the country, given the decline of the infectious and parasite diseases and the consequent rise of non-communicable chronic diseases.

Besides, the elderly's health has been suffering the impact of social determinants of health, thus generating situations of inequality in the exposure and vulnerability, which interferes in the well-being and considerably in the elderly's life quality and health (Geib, 2012). Several social factors interfere in the health of such individuals, such as income, education level, age, gender, color/race, living conditions, access to goods and services, among others (Pereira *et al*., 2016). Amounting to this is the fact that living and working conditions influence insidiously in the health of the elderly population, as well as the deficient education, behavioral changes, food pattern transition and lifestyle factors (Geib, 2012). All these factors affect negatively the health of the elderly population, thus determining the high prevalence of non-communicable chronic diseases (Brazil, 2013a).

The high level of overweight, obesity and abdominal fat accumulation represent some of the risk factors for the development of NCCDs, which, in turn, may be easily identified by means of the anthropometrical assessment (Scherer *et al*., 2013). Several anthropometrical indicators may be used in order to analyze the assessment of the nutritional state among the elderly, such as the body mass index (BMI), waist circumference (WC), abdominal circumference (AC) among others (Menezes *et al*., 2013; Santos *et al*., 2014; Oliveira *et al*., 2016). From among these anthropometrical indicators, the BMI is the widest knownand used one for the assessment of the nutritional state of the elderly; however, the isolated use of such indicator does not enable a satisfactory assessment of the nutritional state (Cortez and Martins, 2012). Goh *et al*. (2014) state that the BMI calculation is an important measurement of risk punctuation for cardiovascular diseases (CVD). However, Rezende *et al*. (2015) point out the importance of using other anthropometrical indicators, which determine more precise results for nutritional assessment such as WC.

A study conducted with European medium-age and elderly men has showed that the WC assessment seems to be one of the best evaluators of the adiposity index, thus being an instrument of high importance for the anthropometrical assessment (Han *et al*., 2015). The analysis of the anthropometrical indicators and the social variables may provide indicators of the profile of NCCDs among the elderly, thus significantly contributing for the improvement of the knowledge and analysis of the association existent among these factors in the elderly population (Scherer *et al*., 2013). Before the aforementioned information, this article aims to assess the anthropometrical indicators and social variables among the elderly with hypertension and diabetes.

METHODOLOGY

This is a descriptive, transversal study, of quantitative approach, carried out in a city in the backland of Bahia, with 180 elderly people, aged 60 or older, of both genders, with hypertension and/or diabetes, belonging to the E class, with mental conditions to participate in the research (evaluated by MMSE) and who accepted to take part in the study. The data were collected in companionship groups, schools and health facilities, in the period from July to December 2016, by means of a research by the Area of Extension, Research and Study on Chronic Diseases, whose general objective of the project is to identify the epidemiological profile of obesity in a municipality in Bahia. For the cognition assessment (criterion for including the elderly in the study), one used the Mini Mental State Examination (MMSE) (Folstein *et al*., 1975). The MMSE is composed of several questions, which aim to assess the specific cognitive functions, such as short-term and long-term memory, orientation, day-by-day information and calculation capacity – so that its score may vary from 0 to 30 points, and given that a score between 26 and 30 points is classified as preserved cognitive functions; between 24 and 26, as a non-suggestive deficit change; and equal or below 23, suggesting a cognitive deficit (Folstein *et al*., 1975).

The collected anthropometrical variables were weight, height, BMI, WC, AC, WHR and the Body Fat Percentage. The establishment of the measurements was carried out at the headquarters of NEPEdc, by examiners previously trained and at a closed place. In order to measure the weight, an OMRON Body Control Digital Scale – Whole Body, model HBF-514C, which offers measurement of the body parameters, such as body weight, body fat, BMI, skeletal muscle, visceral fat, basal metabolism and body age. The elderly were weighed at the center of the scale, barefoot, wearing the minimum of clothes. The measurement of the height was carried out by means of a WCS portable stadiometer, with graduation of 0.2 mm, 220 cm long. The elderly were positioned standing up, barefoot, with the body aligned and erected to the maximum extension.

The measurement of the WC and AC was conducted by means of a Circulo flexible inextensible measuring tape, with graduation of 1 mm, 152 cm long, the elderly wearing the minimum of clothes, relaxed abdomen and loosearmsnext the body. In order to measure the WC, the measuring tape was laid out at the medium point between the last rib and the iliac crest and for the AC, one measured at the place with maximum extension from the abdomen region according to the description by Callaway *et al*. (1988). The BMI was calculated by an OMRON Body Control Digital Scale – Whole Body, model HBF-514C, based on the data of weight and height, by dividing the weight by the squared height. The elderly were classified according to the establishments by WHO (1995), by classifying low weight individuals with BMI <18.5 kg/m²; eutrophic, BMI between 18.5 kg/m² and 24.9 kg/m²; overweight, BMI between 25 kg/m² and 29.9 kg/m²; degree I obesity, BMI between 30 kg/m² and 34.9 kg/m²; degree II obesity, BMI between 35 kg/m² and 39.9 kg/m²; and degree III obesity, BMI above 40 kg/m².

The variables gender, age, work, income, marital status and education were obtained by means of a social-economic and cultural questionnaire UEL (Finatti and Alves, 2006), properly adapted. The information about pre-existent diseases were collected by means of a list aimed at this, by using the ABCDE criterion, where one collected the information on medical examinations, medicine use and conducted treatments (Delgado, 2004). The sampling of the study occurred randomly and the statistical analysis was conducted with the aid of the program Statistical Package for Social Science for Windows (SPSS®), Version 22.0, by applying the chi-squared test, taking into account the significance level of the results of $p \leq 0.05$. This study was approved by the Ethics and Research Committee of the Faculdade Independente do Nordeste/BA, approval report nº 1.670.007. The participation was voluntary and all the individuals read and signed the Written Informed Consent Form (WICF).

RESULTS

Table 1 characterizes the study sample according to the social-demographic and health conditions, most of them belonging to the feminine gender (71.7%), married ones (51.7%), unconcluded Elementary School (47%) and those who do not work (89.4%). As far as physical activity is concerned, 37.2% reported practicing it and according to health conditions 65% suffer from SAH and 18.3% present MD.

Table 2 shows the characteristics of the population taking part in the study as far as anthropometrical indicators are concerned, in which one calculated the average and the standard deviation. The population with SAH presented the highest age average (71.6 years old). The body weight of those suffering from MD presented the highest average (69.7 kg). The population with SAH presented the percentage of body fat (37.4%), with the highest relevance, and the population with DM presented the lowest average (35.7%). The Control Population presented the lowest BMI average (29.9 kg /m²). The highest and the lowest waist circumference was, respectively, 91.9 cm for the population with MD and 88.0 for the Control Population. The elderly with an MD diagnosis presented the highest abdomen circumference average (100.1 cm), given that the Control Population represented the lowest average (95.1 cm).

Table 3 shows the statistical analysis of the control population of the study, carried out by means of the chi-squared test, by confronting the social, demographic, economic and health variables with the anthropometrical variables. One evidenced that the individuals with the lowest education levels presented significant statistical difference in the anthropometrical variables BMI (p= 0.047), WC (p= 0.001) and AC (p= 0.001). The elderly with concluded Elementary School did not present any significant statistical difference with the anthropometrical variables.

Table 1. Social, economic, demographic and health data of the elderly population from two municipalities of Southwestern Bahia

		Control Population		Population with MD			Population with SAH		
Variables	Categories	N	%	N	% MD	PG	N	% SAH	PG
Gender	Female	129	71,7	24	72,7	18,6	90	76,9	69,8
	Male	51	28,3	9	27,3	17,6	27	23,1	52,9
Marital Status	Single	22	12,2	3	9,1	13,6	13	11,1	59,1
	Married	93	51,7	20	60,6	21,5	57	48,7	61,3
	Divorced	14	7,8	0	0	0	9	7,7	64,3
	Widow	51	28,3	10	30,3	19,6	38	32,5	74,5
Education	None	66	36,7	9	27,3	13,6	45	38,5	68,2
	Unconcluded E. School	86	47,8	18	54,5	20,9	57	48,7	66,3
	Concluded E. School	6	3,3	2	6,1	33,3	4	3,4	66,7
	Unconcluded S. School	4	2,2	0	0	0	2	1,7	50,0
	Concluded S. School	13	7,2	3	9,1	23,1	6	5,1	46,2
	Concluded Higher Education	5	2,8	1	3	20,0	3	2,6	60,0
Work	Works	19	10,6	9	27,3	47,4	9	7,7	47,4
	Does not work	161	89,4	24	72,7	14,9	108	92,3	67,1
Social Class	Class E	180	100	33	100,0	18,3	117	100	65,0
Physical	Practices	67	37,2	17	51,5	25,4	45	38,5	67,2
Activity	Does not practice	113	62,8	16	48,5	14,2	72	61,5	63,7
MD Diagnosis	No	147	81,7	0	0	0	93	79,5	63,3
	Yes	33	18,3	33	100,0	100,0	24	20,5	72,7
SAH Diagnosis	No	63	35	4	12,1	6,3	0	0	0
	Yes	117	65	29	87,9	24,8	117	100	100,0

Source: Author's research, 2017.

Table 2. Analysis of the anthropometrical variables of the elderly taking part in the research, from two municipalities of Southwestern Bahia

	Control Population			Population with MD			Population with SAH		
Variables	*N*	*Average*	*Standard Deviation*	*N*	*Média*	*Standard Deviation*	*N*	*Average*	*Standard Deviation*
Age	180	71,0	8,6	33	68,9	5,8	117	71,6	8,8
Body Weight	180	65,6	12,3	33	69,7	13,7	117	66,8	11,4
Height	180	150,2	31,1	33	142,2	45,9	117	152,2	25,9
Body Fat Percentage	180	36,2	10,7	33	35,7	10,0	117	37,4	9,9
BMI	180	29,9	7,1	33	30,4	6,3	117	30,5	6,7
Waist Circumference	180	88,0	11,1	33	91,9	10,1	117	89,2	10,1
Abdominal Circumference	180	95,1	11,7	33	100,1	12,2	117	95,9	10,9

Source: Author's research, 2017.

Table 3. Statistical analysis of the control population of the study from two municipalities of Southwestern Bahia

Variables			Body Fat			BMI			Waist Circumference			Abdominal Circumference		
		Gender	No Change	Change	x²/p	No Change	Change	x²/p	No Change	Change	x²/p	No Change	Change	x²/p
Education	None	Female	8	32	1,760/0,185	10	30	10,631/0,001	7	33	28,815/0,001	4	36	17,483/0,001
		Male	9	17		17	9		22	4		15	11	
		Total	17	49		27	39		29	37		19	47	
	Unconcluded E. School	Female	9	58	10,300/0,001	16	51	3,960/0,047	17	50	12,076/0,001	5	62	24,861/0,001
		Male	9	10		9	10		13	6		11	8	
		Total	18	68		25	61		30	56		16	70	
	Concluded E. School	Female	1	4	2,400/0,121	2	3	0,600/0,439	2	3	1,200/0,273	1	4	0,240/0,624
		Male	1	0		0	1		1	0		0	1	
		Total	2	4		2	4		3	3		1	5	
	Unconcluded S. School	Female	0	2	1,333/0,248	0	2	1,333/0,248	0	2	4,000/0,046	0	2	4,000/0,046
		Male	1	1		1	1		2	0		2	0	
		Total	1	3		1	3		2	2		2	2	
	Concluded S. School	Female	0	10	7,879/0,005	2	8	2,359/0,125	4	6	0,660/0,416	1	9	4,174/0,041
		Male	2	1		2	1		2	1		2	1	
		Total	2	11		4	9		6	7		3	10	
	Concluded Higher Education	Female	0	5		0	5		0	5		0	5	
		Male	0	0		0	0		0	0		0	0	
		Total	0	5		0	5		0	5		0	5	
	Total	Female	18	111	18,011/0,001	30	99	18,735/0,001	30	99	46,820/0,001	11	118	52,566/0,001
		Male	22	29		29	22		40	11		30	21	
		Total	40	140		59	121		70	110		41	139	
Work	Works	Female	0	11	6,967/0,008	0	11	4,898/0,027	1	10	6,115/0,013	0	11	6,967/0,008
		Male	4	4		3	5		5	3		4	4	
		Total	4	15		3	16		6	13		4	15	
	Does not work	Female	18	100	12,851/0,001	30	88	17,059/0,001	29	89	42,483/0,001	11	107	46,572/0,001
		Male	18	25		26	17		35	8		26	17	
		Total	36	125		56	105		64	97		37	124	
	Total	Female	18	111	18,011/0,001	30	99	18,735/0,001	30	99	46,820/0,001	11	118	52/566/0,001
		Male	22	29		29	22		40	11		30	21	
		Total	40	140		59	121		70	110		41	139	
Marital Status	Single	Female	1	14	10,092/0,001	6	9	4,023/0,045	5	10	8,556/0,003	2	13	10,805/0,001
		Male	5	2		6	1		7	0		6	1	
		Total	6	16		12	10		12	10		8	14	
	Married	Female	12	46	6,496/0,011	15	43	3,871/0,049	17	41	15,635/0,001	8	50	15,351/0,001
		Male	16	19		16	19		25	10		18	17	
		Total	28	65		31	62		42	51		26	67	
	Divorced	Female	0	11	3,949/0,047	2	9	6,873/0,009	2	9	6,873/0,009	1	10	4,641/0,031
		Male	1	2		3	0		3	0		2	1	
		Total	1	13		5	9		5	9		3	11	
	Widow	Female	5	40	0,739/0,390	7	38	8,175/0,004	6	39	15,335/0,001	0	45	32,553/0,001
		Male	0	6		4	2		5	1		4	2	
		Total	5	46		11	40		11	40		4	47	
	Total	Female	18	111	18,011/0,001	30	99	18,735/0,001	30	99	46,820/0,001	11	118	52,566/0,001
		Male	22	29		29	22		40	11		30	21	
		Total	40	140		59	121		70	110		41	139	

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Physical Activity	Practices	Female	5	45	3,765/0,052	11	39	0,145/0,703	13	37	6,063/0,014	5	45	11,141/0,001
		Male	5	12		3	14		10	7		8	9	
		Total	10	57		14	53		23	44		13	54	
	Does not practice	Female	13	66	13,716/0,001	19	60	27,256/0,001	17	62	43,552/0,001	6	73	41,595/0,001
		Male	17	17		26	8		30	4		22	12	
		Total	30	83		45	68		47	66		28	85	
	Total	Female	18	111	18,011/0,001	30	99	18,735/0,001	30	99	46,820/0,001	11	118	52,566/0,001
		Male	22	29		29	22		40	11		30	21	
		Total	40	140		59	121		70	110		41	139	
Social Class	Social Class E	Female	18	111	18,011/0,001	30	99	18,735/0,001	30	99	46,820/0,001	11	118	52,566/0,001
		Male	22	29		29	22		40	11		30	21	
		Total	40	140		59	121		70	110		41	139	
	Total	Female	18	111	18,011/0,001	30	99	18,735/0,001	30	99	46,820/0,001	11	118	52,566/0,001
		Male	22	29		29	22		40	11		30	21	
		Total	40	140		29	121		70	110		41	139	

Source: Author's research, 2017

Table 4. Statistical analysis of the elderly population with SAH from two municipalities in Southwestern Bahia

Variables			Body Fat			BMI			Waist Circumference			Abdominal Circumference		
	Education	Gender	No Change	Change	x^2/p	No Change	Change	x^2/p	No Change	Change	x^2/p	No Change	Change	x^2/p
Education	None	Female	3	25	7,565/0,006	4	24	12,101/0,001	2	26	29,592/0,001	1	27	20,216/0,001
		Male	8	9		11	6		15	2		11	6	
		Total	11	34		15	30		17	28		12	33	
	Unconcluded E. School	Female	6	44	1,398/0,237	12	38	0,329/0,566	12	38	1,126/0,289	4	46	2,759/0,097
		Male	2	5		1	6		3	4		2	5	
		Total	8	49		13	44		15	42		6	51	
	Concluded E. School	Female	0	3	4,000/0,046	1	2	0,444/0,505	1	2	1,333/0,248	1	2	0,444/0,505
		Male	1	0		0	1		1	0		0	1	
		Total	1	3		1	3		2	2		1	3	
	Unconcluded S. School	Female	0	1	2,000/0,157	0	1	2,000/0,157	0	1	2,000/0,157	0	1	2,000/0,157
		Male	1	0		1	0		1	0		1	0	
		Total	1	1		1	1		1	1		1	1	
	Concluded S. School	Female	0	5	6,000/0,014	0	5	6,000/0,014	2	3	1,200/0,273	0	5	6,000/0,014
		Male	1	0		1	0		1	0		1	0	
		Total	1	5		1	5		3	3		1	5	
	Concluded Higher Education	Female	0	3		0	3		0	3		0	3	
		Male	0	0		0	0		0	0		0	0	
		Total	0	3		0	3		0	3		0	3	
	Total	Female	9	81	19,797/0,001	17	73	11,587/0,001	17	73	32,843/0,001	6	84	33,707/0,001
		Male	13	14		14	13		21	6		15	12	
		Total	22	95		31	86		38	79		21	96	
Work	Yes	Female	0	6	2,250/0,134	0	6	2,250/0,134	1	5	2,250/0,134	0	6	2,250/0,134
		Male	1	2		1	2		2	1		1	2	
		Total	1	8		1	8		3	6		1	8	
	No	Female	9	75	18,393/0,001	17	67	10,711/0,001	16	68	30,800/0,001	6	78	32,418/0,001
		Male	12	12		13	11		19	5		14	10	
		Total	21	87		30	78		35	73		20	88	
	Total	Female	9	81	19,797/0,001	17	73	11,587/0,001	17	73	32,843/0,001	6	84	33,707/0,001
		Male	13	14		14	13		21	6		15	12	
		Total	22	95		31	86		38	79		21	96	

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Marital Status	Single	Female	1	10	2,176/0,140	5	6	2,026/0,155	5	6	2,026/0,155	2	9	0,965/0,326
		Male	1	1		2	0		2	0		1	1	
		Total	2	11		7	6		7	6		3	10	
	Married	Female	6	32	10,729/0,001	8	30	1,629/0,202	8	30	12,214/0,001	4	34	12,120/0,001
		Male	11	8		7	12		13	6		10	9	
		Total	17	40		15	42		21	36		14	43	
	Divorced	Female	0	6	2,250/0,134	0	6	9,000/0,003	0	6	9,000/0,003	0	6	5,143/0,023
		Male	1	2		3	0		3	0		2	1	
		Total	1	8		3	6		3	6		2	7	
	Widow	Female	2	33	0,181/0,671	4	31	6,341/0,012	4	31	14,424/0,001	0	35	24,630/0,001
		Male	0	3		2	1		3	0		2	1	
		Total	2	36		6	32		7	31		2	36	
	Total	Female	9	81	19,797/0,001	17	73	11,587/0,001	17	73	32,843/0,001	6	84	33,707/0,001
		Male	13	14		14	13		21	6		15	12	
		Total	22	95		31	86		38	79		21	96	
Physical Activity	Practices	Female	4	32	5,473/0,019	8	28	0,000/1,000	9	27	5,625/0,018	4	32	5,473/0,019
		Male	4	5		2	7		6	3		4	5	
		Total	8	37		10	35		15	30		8	37	
	Does not practice	Female	5	49	14,305/0,001	9	45	16,336/0,001	8	46	29,154/0,001	2	52	30,070/0,001
		Male	9	9		12	6		15	3		11	7	
		Total	14	58		21	51		23	49		13	59	
	Total	Female	9	81	19,797/0,001	17	73	11,587/0,001	17	73	32,843/0,001	6	84	33,707/0,001
		Male	13	14		14	13		21	6		15	12	
		Total	22	95		31	86		38	79		21	96	
Social Class	Social Class E	Female	9	81	19,797/0,001	17	73	11,587/0,001	17	73	32,843/0,001	6	84	33,707/0,001
		Male	13	14		14	13		21	6		15	12	
		Total	22	95		31	86		38	79		21	96	
	Total	Female	9	81	19,797/0,001	17	73	11,587/0,001	17	73	32,843/0,001	6	84	33,707/0,001
		Male	13	14		14	13		21	6		15	12	
		Total	22	95		31	86		38	79		21	96	

Source: Author's research, 2017

Table 5. Statistical analysis of the elderly population with MD from two municipalities of Southwestern Bahia

	Escolaridade	Gender	No Change	Change	x²/p	No Change	Change	x²/p	No Change	Change	x²/p	No Change	Change	x²/p
Education	None	Female	0	6	2,250/0,134	0	6	2,250/0,134	0	6	2,250/0,134	0	6	2,250/0,134
		Male	1	2		1	2		1	2		1	2	
		Total	1	8		1	8		1	8		1	8	
	Unconcluded E. School	Female	1	12	2,714/0,099	1	12	0,554/0,457	3	10	2,215/0,137	1	12	0,554/0,457
		Male	2	3		1	4		3	2		1	4	
		Total	3	15		2	16		6	12		2	16	
	Concluded E. School	Female	1	0		1	0	2,000/0,157	1	0		0	1	
		Male	1	0		0	1		1	0		0	1	
		Total	2	0		1	1		2	0		0	2	
	Unconcluded S. School	Female	0	0		0	0		0	0		0	0	
		Male	0	0		0	0		0	0		0	0	
		Total	0	0		0	0		0	0		0	0	
	Concluded S. School	Female	0	3		0	3		0	3		0	3	
		Male	0	0		0	0		0	0		0	0	
		Total	0	3		0	3		0	3		0	3	
	Concluded Higher Education	Female	0	1		0	1		0	1		0	1	
		Male	0	0		0	0		0	0		0	0	
		Total	0	1		0	1		0	1		0	1	
	Total	Female	2	22	5,738/0,017	2	22	1,185/0,276	4	20	4,991/0,025	1	23	2,582/0,108

Continue……..

Work	Works	Female	0	5	1,406/0,236	0	5		0	5	3,214/0,073	0	5	1,406/0,236
		Male	1	3		0	4		2	2		1	3	
		Total	1	8		0	9		2	7		1	8	
	Does not work	Female	2	17	5,847/0,015	2	17	2,476/0,116	4	15	2,906/0,088	1	18	1,125/0,289
		Male	3	2		2	3		3	2		1	4	
		Total	5	19		4	20		7	17		2	22	
	Total	Female	2	22	5,738/0,017	2	22	1,185/0,276	4	20	4,991/0,025	1	23	2,582/0,108
		Male	4	5		2	7		5	4		2	7	
		Total	6	27		4	29		9	24		3	30	
Marital Status	Single	Female	1	1	0,750/0,386	0	2		0	2	3,000/0,083	0	2	3,000/0,083
		Male	1	0		0	1		1	0		1	0	
		Total	2	1		0	3		1	2		1	2	
	Married	Female	1	12	3,516/0,061	2	11	0,495/0,482	3	10	2,321/0,128	1	12	0,220/0,639
		Male	3	4		2	5		4	3		1	6	
		Total	4	16		4	16		7	13		2	18	
	Divorced	Female	0	0		0	0		0	0		0	0	
		Male	0	0		0	0		0	0		0	0	
		Total	0	0		0	0		0	0		0	0	
	Widow	Female	0	9		0	9		1	8	0,123/0,725	0	9	
		Male	0	1		0	1		0	1		0	1	
		Total	0	10		0	10		1	9		0	10	
	Total	Female	2	22	5,738/0,017	2	22	1,185/0,276	4	20	4,991/0,025	1	23	2,582/0,108
		Male	4	5		2	7		5	4		2	7	
		Total	6	27		4	29		9	24		3	30	
Physical Activity	Practices	Female	1	11	0,463/0,496	1	11	0,443/0,506	1	11	2,435/0,119	1	11	0,463/0,496
		Male	1	4		0	5		2	3		1	4	
		Total	2	15		1	16		3	14		2	15	
	Does not practice	Female	1	11	7,111/0,008	1	11	3,149/0,064	3	9	3,200/0,074	0	12	3,200/0,074
		Male	3	1		2	2		3	1		1	3	
		Total	4	12		3	13		6	10		1	15	
	Total	Female	2	22	5,738/0,017	2	22	1,185/0,276	4	20	4,991/0,025	1	23	2,582/0,108
		Male	4	5		2	7		5	4		2	7	
		Total	6	27		4	29		9	24		3	30	
Social Class	Social Class E	Female	2	22	5,738/0,017	2	22	1,185/0,276	4	20	4,991/0,025	1	23	2,582/0,108
		Male	4	5		2	7		5	4		2	7	
		Total	6	27		4	29		9	24		3	30	
	Total	Female	2	22	5,738/0,017	2	22	1,185/0,276	4	20	4,991/0,025	1	23	2,582/0,108
		Male	4	5		4	7		5	4		2	7	
		Total	6	27		4	29		9	24		3	30	

Among the elderly with unconcluded Secondary School, one noticed significant statistical difference only in AC (p= 0.046) and WC (p= 0.046). For the elderly with concluded Secondary School one found significant statistical difference between Body Fat (p= 0.005) and AC (p= 0.041). It was not possible to analyze individuals with Higher Education, due to their quantity. In the variable Work, both individuals who work and those who do not presented significant statistical difference in all anthropometrical variables: Body Fat (p= 0.008), BMI (p= 0.027), WC (p= 0.013) and AC (p= 0.008) for working elderly, and Body Fat (p= 0.001), BMI (p= 0.001), WC (p= 0.001) and AC (p= 0.001) for the elderly who do not work. In the variable marital status there was no significant statistical difference except among the categories widow and Body Fat (p = 0.390). The elderly who practice physical activity obtained significant statistical difference in all variables.

Table 4 presents the statistical analyses for the population with SAH. In the variable education, the illiterate elderly presented significance in all anthropometrical variables Body Fat (p= 0.006), BMI (p= 0.001), WC (p= 0.001) and AC (p= 0.001)

and individuals with unconcluded Elementary School and unconcluded Secondary School did not present any significance in their results (p > 0.050). It was not possible to analyze individuals with Higher Education, due to their quantity. The elderly who work did not present any significant statistical difference in their results (p > 0.050) and those who do not work presented significant statistical difference in all variables, Body Fat (p= 0.001), BMI (p= 0.001), WC (p= 0.001) and AC (p= 0.001). As for marital status, single individuals did not present any significance in the results (p > 0.050). The married ones presented significance in the variables Body Fat (p= 0.001), WC (p= 0.001) and AC (p= 0.001), the divorced and widow ones did not present significance only in the variable Body Fat, p=0.134 and p=0.671, respectively. As for the practice of physical activity, the elderly who do it presented statistical significance in the anthropometrical variables Body Fat (p= 0.019), WC (p= 0.018) and AC (p= 0.019). On the other hand, those who do not practice any physical activity presented significant statistical difference in all variables, Body Fat (p= 0.001), BMI (p= 0.001), WC (p= 0.001) and AC (p= 0.001). Table 5 shows the statistical analysis of the elderly population with MD. In the education variable, the illiterate elderly and those with unconcluded Elementary School did not present any significance in their results (p> 0.050). In relation to the concluded Elementary School, it was only possible to perform the statistical analysis of the variable BMI (p = 0.157), due to the reduced number of individuals in the other variables. It was not possible to perform the statistical analysis of the population with unconcluded Secondary School, concluded Secondary School and concluded Higher Education, because of the minimum number of individuals. As far as work is concerned, the elderly who work did not present any significance in their results, Body Fat (p= 0.236), WC (p= 0.073) and AC (p= 0.236) and those who do not work obtained significance only in the variable Body Fat (p=0.015). As for the marital status, single individuals and married ones did not present any significance in their results (p>0.050). It was not possible to perform the statistical analysis among divorced individuals due to the number of the elderly, and among widow individuals, only in the variable WC was it possible to perform the analysis, with no significance in its result (p=0.725). As for the practice of physical activity, only the variable Body Fat presented positive correlation with the elderly who do not practice any physical activity, with significance of p=0.008.

DISCUSSION

The study conducted by Martins and Tavares (2015) evidenced higher prevalence of female elderly (54%), married (65%), with lower education levels and who do not practice any physical activity (76.2%), corroborating the results found in the present study. As far as work is concerned, only a few elderly informed still having some working activity, restating the report in the study by Vicente and Santos (2013), in which only 20% of the elderly still worked. National and international studies (Vicente and Santos, 2013; Acosta *et al*., 2015; Akamo *et al*., 2015; Focchesatto *et al*., 2015) point out that SAH more generally affects the elderly population in relation to MD. One found similar data in the present study, in which one noticed that most of them have SAH. The average age and weight found in the present study was also evidenced in research carried out among elderly aged 60or older in Argentine and Chile (Acosta *et al*., 2015; Sass and Marcon, 2015). In the study by Machado *et al*. (2010), conducted among 395 elderly, the average percentage of body fat was 24.7% (DP±10.4), presenting itself below the result obtained in the present study, with an average of 36.2% for the control population. In the study by Ruiz *et al*. (2014),one noticed the high percentage of body fat in 96.5% of the elderly with hypertension and diabetes, featuring itself as a risk factor for the development of the referred diseases.

As for the highest body weight of those suffering from MD, one evidenced in the studies by Badrick *et al*. (2017) that diabetic individuals presented higher rates of body weight and BMI, in which one observed that overweight and obesity were prevailing in such population with 33.6% and 53.5%, respectively, thus evidencing direct association between MD and obesity. However, unexpectedly, overweight individuals and with degree I obesity presented decreased mortality for all the causes as compared to normal weight individuals, namely "obesity paradox" as described by Gruberg *et al*. (2002).

The association between SAH and high levels of BMI was also observed in the studies conducted by Mártires *et al*. (2013), where 43.6%, 39.6% and 6% of the elderly presented, respectively, overweight, obesity and degree III obesity, restating what is reported in the present study. These data prove that elderly individuals with MD and SAH presented higher levels of BMI, with an average of 30.4 and 30.5 kg/m², respectively. However, Chang *et al*. (2012) point out that BMI is not an appropriate anthropometrical indicator to assess the elderly because it does not detect the morphological changes occurred during the aging process, such as the redistribution of body fat, which may lead to overestimated and underestimated results. Because of this, other indicators were chosen in this study, such as WC and AC. Studies by Akamo *et al*. (2015) in Nigeria point out that elderly individuals of both genders, with SAH and MD presented higher WC averages as compared to healthy elderly, as evidenced in our study, in which the highest averages were 91.9 cm for the population with MD and 89.2 cm for the population with SAH. Akamo *et al*. (2015) also state that WC is an anthropometrical predictor helpful in order to assess cardiovascular risk factors and comorbidities.

The WC average of the control population of the present study (88.0 cm) corroborates the average of the elderly population studied by Pereira *et al*. (2014). The average AC of the control population of the present study agrees with the studies by Souza *et al*. (2013), which presented the average of 95.2 cm.
As far as education is concerned, Brazilian studies (Scherer *et al*., 2013; Pereira *et al*., 2016; Souza *et al*., 2016) were consistent with the results found in the present study, in which they point out that the elderly with the lowest education levels are susceptible to the development of overweight and obesity, differently from the result found in the studies by Han *et al*. (2015), carried out in Europe among medium-age men and elderly, where individuals with Secondary School presented BMI higher than that of individuals with lower education levels. Luz *et al*. (2014) point out in their research carried out in Rio Grande do Sul, Brazil, that 95% of the elderly are out of the economically active population; a similar data found in the present study. There was no association observed among

anthropometrical indicators and the variable work, because both the elderly who work and those who do not presented change in all the analyzed anthropometrical variables. Han *et al*. (2015), in turn, point out in their results that European individuals who do not work had the highest proportions only in the variable WC, and this divergence of results may relate to cultural and social-demographic questions. The results for marital status are similar to others found in the literature, where most elderly are married (Luz *et al*., 2014; Souza *et al*., 2016). There was no association between anthropometrical indicators and marital status among the elderly in the present study, as observed in the studies by Scherer *et al*. (2013), among the male elderly population.

According to the studies by Rezende *et al*. (2015), the older they are the practice of physical activity by the elderly tends to decrease, thus characterizing such population as sedentary. Data from the present study, in which one verified that most elderly do not practice any physical activity, are corroborated by others in the gerontological literature which shows that the practice of physical activity among elderly is still incipient (Luz *et al*., 2014; Oliveira *et al*., 2016). In the studies by Espinosa *et al*. (2015), the variables WC, AC and WHR presented the lowest values. In the present study, one noticed a positive correlation with the practice of physical activity with the variables WC and AC.

The studies by Souza *et al*. (2016) verified that most of the assessed population –represented by hypertensive elderly who did not practice any physical activity, with low education and income levels – presented the highest BMI and AC levels, data similar to those of the present study, in which hypertensive individuals, illiterate and provided with low income, presented positive correlation between these variables and the anthropometrical indicators. Mártires *et al*. (2013), in their research carried out in Portugal with 250 hypertensive elderly who live with their spouses, evidenced a positive association with the variables SAH, overweight, obesity and BMI. In the present study, BMI was the only anthropometrical indicator which did not present any significance (p= 0.202).

One believes that the elderly with SAH who do not work present changes in the anthropometrical variables, because of the decrease in the routine that a working occupation requires, associated with no physical activities, resulting in a sedentary lifestyle, associated with the body and metabolic changes resulting from the aging process. In the anthropometrical assessment of the elderly with an MD diagnosis, international studies point to a direct correlation between MD, overweight and obesity, associated with the changes in the variables BMI and Body Fat (Akamo *et al*., 2015, Badrick *et al*., 2017), which is partially similar to the present study, in which most individuals were classified with overweight and obesity and presented positive association between MD, Body Fat and the elderly who do not practice any physical activity and do not work. As evidenced in the present study, Souza *et al*. (2016) did not find any correlation between anthropometrical variables, diabetic elderly, education level and marital status; they only evidenced the presence of overweight in these individuals. This study had the limitations of the reduced quantity of the elderly, which, although representative, interfered in the analysis of some sampling variables, but does not invalidate the found data. The widening of the sampling number may increase the findings and deepen the understanding of the approached questions.

Consideration

In the analysis/assessment of the anthropometrical indicators and social variables among elderly with SAH and MD, one evidenced that social-demographic factors may interfere in the anthropometrical variables, and these are factors that may trigger the increase of morbi-mortality of this population by NCCDs when associated with the aging phenomenon. The study showed a direct relation between obesity and abdominal fat accumulation with the chronic diseases hypertension and diabetes. The research results are relevant because they contribute to identifying individual and collective characteristics of a group that, although heterogeneous, presented similarities in which concerns the problem of obesity, especially the abdominal one, with the development of chronic pathology.

The information contained in this study shows the impact caused by obesity, evaluated by means of anthropometrical indicators, and serve as a subsidy for the design of intervention strategies. Besides, it guides the assistance practice of health professionals who deal directly with the elderly with MD and SAH. One points out that the understanding of the obesity phenomenon, especially the abdominal one among the elderly, may sensitize health professionals about which variables are relevant during the approach of these individuals, thus showing an assistance based on evidences, which subsidies the care in different scenes, both in the primary health care, in homecare and in hospital care. Likewise, this research calls the attention to the need of appropriate use of anthropometrical variables, which measure obesity in the elderly in a criterial and specific way, in order to foresee the efficiency of the recommendations and the prescribed treatment, as well as for the management of the appropriate care. In face of the aforementioned information, one evidences the need of studies more related to such theme, since research involving the assessment/analysis of the existent correlation between social-demographic factors and anthropometrical indicators are still scarce in the literature.

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