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DESCRIPTION OF SARCOPENIA FREQUENCY AND ANALYSIS OF AGREEMENT BETWEEN THE CALF CIRCUMFERENCE AND THE EUROPEAN CONSENSUS FOR SARCOPENIA SCREENING IN ELDERLY

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Abstract
This study aimed to describe the frequency of sarcopenia and verify the agreement between instruments for diagnosis. This a cross-sectional study, where we used the algorithm proposed by the European Consensus Sarcopenia in Older People (EWGSOP), calf circumference (CC), muscle mass and body mass index. 167 elderly were evaluated with a mean age of 68.03 ± 6.12 years. The elderly frequency screened by EWGSOP sarcopenia and CC was as follows: 40 (24.0%) 27(16.2%) and 15 (9.0%). A low degree of agreement between CC and the EWGSOP (κ = 0.192) was found. However, these instruments due to the low financial cost and easy applicability are important auxiliary tools for the screening of sarcopenia in elderly.
Key words: Sarcopenia. Diagnosis. Anthropometry. Elderly.

Introduction

The aging process is individual and highly variable and is only moderately correlated with chronological age (DANTAS, 2003; TRIBESS; VIRTUOSO, 2005). It is also relates to several organic alterations, from the molecular level to the morphophysiological. One of the most common changes, linked to the aging process is the modification of body composition.

The changes in body composition, especially those related to the loss of muscle skeletal and the increase of fat mass increased are inherent to the aging process. In general it is expected that loss of muscle mass and increased fat mass will occur in the elderly. When the muscle mass loss is severe, causes functional dependency and interferes negatively on the quality of life of older people, it may be classified as sarcopenia (FERRO-LUZZI et al., 2000). Sarcopenia is characterized by loss of strength and mass (CRUZ-JENTOFT et al., 2010). Loss of muscle mass is considered to be a major determinant of the strength loss in aging (GOODPASTER et al., 2006).

Sarcopenia has a multifactorial etiology, which includes physical inactivity, loss of motorneurone, decrease in testosterone secretion, dehidroepiandrosterona (DHEA) and protein syntheses, poor nutrition and genetic factors (ROSENBERG, 1997; RAN et al., 2014).

Moreover, during the aging process, the skeletal muscle tissue suffers several modifications, among them we can mention the decrease in the area relating to the type II fibers in about 20 to 50% with advancing age (FRONTERA et al, 1991).–The type II fibers also known as fast-twitch fibers, are subdivided into type IIA or fast-oxidative glicolitic (FOG) fibers or IIB or fast glicolitic (FG) (MINAMOTO, 2005; SILVERTHORN, 2010). These structural modifications generate impairment of muscle mass and modulate the degree of muscle power generation that also concomitant decrease the number of fibers, which defines the process of sarcopenia (MATTIELLO-SVERZUT, 2003).

According Silva et al. (2006), sarcopenia is one component of frailty syndrome leaving older people more susceptive the risk of falls, fractures, incapacity, dependence, recurrent hospitalization and mortality.

Sarcopenia affects about 30% of individuals over 60 years of age, and more of 50% of individuals over 80 years old (BAUMGARTNER et al., 1998). The prevalence of sarcopenia in men is 26.8% and 22.6% for women (IANNUZZI-SUCICH; PRESTWOOD; KENNY, 2002). In addition, sarcopenia has considerable economic impact. In the United States in 2000 the estimated cost of health attributable to sarcopenia was US$ 18.5 billion, representing about 1.5% of total expenditure on health for that year (JANSSEN et al., 2004). However, it has not yet conducted a survey of the costs attributed to sarcopenia in Brazil.

Many methods have been developed for assessment of muscle mass in older people; anthropometric measures (ROLLAND et al., 2003), bio impedance (BIA), ultrasonography, computed tomography (CT scan), magnetic resonance imaging (MRI) and dual energy X-ray absorptiometry (DXA). Recently the European Working Group on Sarcopenia in Older People (EWGSOP) developed an assessment which includes; decrease of gait speed, functional independence, muscle mass and strength (CRUZ-JENTOFT et al., 2010).

Some researchers suggest the imaging assessment such as those using MRI, CT scan DXA are the gold standard to diagnosis sarcopenia. However these methods only measure the musculoskeletal architecture and do not include functional variables as recommended by EWGSOP.

Additionally, it is important to consider that these imaging methods are extremely expensive for developing countries, such as Brazil, limiting their use in research. Therefore, the use of anthropometric measurements and functionality (strength and gait speed), may be more feasible from an economic perspective. In addition, anthropometry, and the evaluation of strength and gait speed, has been widely used in epidemiological studies, because of low cost and ease of application in the elderly (CRUZ-JENTOFT et al., 2010).

This study aims to describe the frequency of sarcopenia by different diagnostic criteria CC and EWGSOP and analyze the agreement between CC (ROLLAND et al., 2003), and EWGSOP (CRUZ-JENTOFT et al., 2010).

Materials and Methods

Design: a cross sectional study

Population and sample

The study populations were elderly people from the city of Uruguaiana, RS, Brazil. The municipality of Uruguaiana is located in the extreme west of the Rio Grande do Sul state, on the border with Argentina (IBGE, 2010). According to the last Census Uruguaiana has approximately 125.435 inhabitants, of which approximately 13.605 thousand are aged 60 years or more (IBGE, 2010).

The study was approved by Ethics committee of Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS). Protocol nº 312.127, Resolution number 466/12 of Ministry of Health on research with human beings. All subjects were informed about the importance of research through the informed consent form (ICF), which explained the whole procedure and the project objectives. At the end of the explanation, and after clarification of concerns subjects signed the ICF voluntarily in duplicate. The sample size calculation was performed in the G Power 3.1.7 ® program, by providing a power of 80%, and 4 degrees of freedom, with 5% significance level resulting in a sample size of 132 people.

The following inclusion criteria were used for this study: age equal or more 60 years old, capacity for prolonged standing and able to walk independently.

Exclusion criteria were: need of a wheelchair, bilateral amputation, rheumatoid arthritis or cachexia.

Variables and instruments

1) Socio demographics: sex, race, age, salary, marital status and level of education. The subjects were also asked about the regular practice of physical activity, modality, frequency and duration.

2) Anthropometrics: body mass was measured using a calibrated anthropometric balance Filizola® with capacity of 150 kilos and minimum increments of 100g. The result was recorded in kilograms (Kg). Height was measured with a stadiometer Filizola®. The result was recorded in meters (m).

The body mass index (BMI) was calculated on the basis of height and weight measures, using the equation mass (Kg) divided by height in meters squared. The classification of nutritional status used the World Health Organization (WHO) classification: underweight ≤ 18.5Kg/m2, normal weight = 18.5 – 24.9 Kg/m^2, overweight = 25.0 – 29.9Kg/m^2 and obese ≥30.0Kg/m^2 (HEALTH, 2000).

The circumferences were measured with a non-elastic tape measure and skinfolds thickness were measured with a Top Tec Cescorf® caliper, with sensitivity of 0.1 mm, 85mm reading range and pressure ±10g/mm^2.

Waist circumference was performed with the subject in the supine position, measured immediately below the last rib, at the narrowest place in the trunk (natural waist), as recommended by the Anthropometric Standardization Reference Manual.

The brachial circumference (BC) was measured at the midpoint of arm, and recorded in centimetres. The midpoint is halfway between acromial surface of scapula and the olecranon process of elbow (LOHMAN; ROCHE; MARTORELL, 1988).

Thigh circumference (TC) was measured on the right thigh in the orthostatic position with the feet's slightly apart. The tape was placed perpendicular to the longitudinal axis of the femur, 1 cm from the gluteal fold (LOHMAN; ROCHE; MARTORELL, 1988).

The calf circumference was measured in the sitting position with the knee flexed to 90 degrees, a tape measure was placed around the largest point of the calf (ROLLAND et al, 2003).

Triceps skinfold thickness (TST) was collected in millimeters on the back of the right arm, parallel to the longitudinal axis, at the midpoint between the superolateral edge of the acromion and the olecranon, with the person in the standing position, with weight equally distributed on both feet and shoulders and arms relaxed by the side (LOHMAN; ROCHE; MARTORELL, 1988).

Skinfold thickness of the thigh, (STT) in millimeters, was measured on the rectus femoral muscle, at the midpoint between the inguinal ligament and the upper border of the patella with the foot parallel to the longitudinal axis of the thigh (LOHMAN; ROCHE; MARTORELL, 1988).

And the calf skinfold thickness (CST) in millimeters, was measured at the largest circumference of the calf with the person sitting with the knee in 90 ° of flexion, ankle in anatomical position, the height of the larger circumference of the leg (MARFELL-JONES; STEWART; CARTER, 2006).

3) Function

Gait speed: A distance of 6 meters was marked on the ground with a tape. Participants were instructed to stand still with their feet behind a starting line, then, following a verbal command were instructed to walk at their normal pace for 6 meters and stop just past the finish line.

The time was started at the moment the person moved from the stance phase of the first leg and the clock was stopped when the first foot completely crossed the finish line. The rate was calculated by dividing the distance in meters by the number of seconds (CESARI et al., 2009).

Hand grip strength: This was measured with a Jamar ® dynamometer. The people were seated in a chair 45 cm high, feet on the floor, shoulders in neutral position, elbow at 90 degree and the wrist in neutral position (intermediate between pronation and supination). The examiner held the dynamometer (FIGUEIREDO et al., 2007).

4) Sarcopenia: this health condition was determined by two screening criteria.

a) The calf circumference (CC) was measured in the sitting position with the knee flexed to 90 degrees, a tape measure was placed around the largest point of the calf. The cutoff point adopted was 31 cm according to Rolland et al (2003).

b) The other method used for the screening of sarcopenia was the algorithm proposed by the European Working Group on Sarcopenia in Older People (EWGSOP). The algorithm proposes that use measures of handgrip strength, gait speed and the calculation of muscle mass (MM) according Lee et al (2000) equation:

MM= heigth^2 x (0.00744 x arm circumference^2 + 0.00088 x thigh circumference^2 + 0.00441 x calf circumference^2) + 2.4 x sex – 0.048 x age + race + 7.8).

Sex (male) weight = 1 and (female) weight = 0, and for races Asiatic = -2.0, Black = 1.1 and Caucasian = 0. In the present study we adopted in the race Mestizo and Dun the 1.1value.

In addition, the following formula was used for subtraction of subcutaneous fat: $C_m = C_{limb} - \pi S$,

C_m is the circumference including bone; C_{limb} is the circumference of the limb to be corrected by subcutaneous adipose tissue (S), as measured with a caliper.

Muscle Mass Index (MMI) was obtained with a simple calculation: MM (kg) / height (m)^2.

Thus, the cutoff points adopted in the present study for the classification of sarcopenia was obtained with the MMI and, categorized as proposed by Lee; for men, normal MMI ≥ 10.75 kg / m^2, sarcopenia grade I - 10.75> MMI ≥ 8 51 kg/m^2 and sarcopenia grade II - MMI <8.51 kg/m^2; for women is normal MMI ≥ 6.75 kg/m^2, sarcopenia grade I - 6.75> MMI ≥ 5.76 kg/m^2 and sarcopenia grade II - MMI <5.76 kg/m^2.

Logistic of the study

Data were collected in the Basic Health Units (BHU) in the city of Uruguaiana - RS Brazil, during the months of July 2013 to July 2014, and carried out in the following stages:

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1º Stage: The subjects were informed about the importance of research through the informed consent form (ICF), which explained the whole procedure and the project objectives. At the end of the explanation, and after clarification of concerns subjects signed the ICF voluntarily in duplicate.

2º Stage: Subjects were assessed and socio demographic and anthropometric data collected, including: height, weight, measurements of arm circumference (AC), thigh circumference (TC) and calf circumference (CC) addition to the brachial triceps skinfold, medial thigh and calf. To standardize the acquisition of anthropometric measurements of circumference and skinfold measure was adopted the protocol a single measurement of these in the right hemisphere.

3º Stage: The evaluation of hand grip strength test. Three attempts of grip strength test were performed in each subject. Then the gait speed test was performed.

Statistical Analysis

The data were initially input into a Microsoft Excel version 2007 spreadsheet and then transferred to SPSS version 17.0 for analysis. The quantitative anthropometric variables were described by frequencies, means and standard deviations and was used the Student t test for comparison of means. Categorical variables as general characteristics of the sample were evaluated by chi-square test. To assess agreement between the instruments we used the Kappa test (κ). Thresholds for interpretation were taken from Landis and Koch, cited/apud Wright (2005), in which a kappa coefficient of 0.00 would be poor, from 0.01 to 0.20 slight, 0.21 to 0.40 fair, 0.41 to 0.60 moderate, 0.61 to 0.80 substantial, and 0.81- 1.00 almost perfect. The minimum level of significance for all statistical tests was set at $p < 0.05$.

Results

The sample was composed of 167 older people, 60 (35,9%) male and 107 (64,1%) female, with mean of age 68,03± 6,12 years. The sample was mostly composed of elderly white 83 (49,7%), with an income of a minimum wage 103 (61,7%)and with incomplete primary education 116 (69,5%). In table 1 the general characteristics of the sample are presented.

The elderly frequency diagnosed with sarcopenia by EWGSOP and CC was as follows: 27 (16.2%, 4 women and 23 men), and 15 (9%, 12 women and 3 men) respectively. Also was observed statistically significant differences between the sexes ($p < 0.001$) by the EWGSOP. Was not find statistically significant differences between the sexes by the CC criteria diagnosis ($p = 0.261$). However, the agreement between calf circumference and EWGSOP was slight, ($\kappa = 0.192$; $p = 0.009$).

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Table 1. General characteristics of the sample.

Variabel	**Total of Sample N(%)**	**Men**	**Women**	***p* ***
Race				
Caucasian	83 (49.7%)	32	51	
Mestizo	55 (32.9%)	21	34	0.658
Black	19 (11.4%)	5	14	
Dun	10 (6.0%)	2	8	
Retired				
Yes	121 (72.5%)	51	70	
No	42 (25.1%)	9	33	0.017
Pensioner	4 (2.4%)	0	4	
Salary per month				
Without a m.w	20 (12%)	3	17	
1 m.w	103 (61.7%)	36	67	
2 m.w	36 (21.6%)	17	19	0.051
≥ 3 m.w	6 (3.6%)	2	4	
Not answer	2 (1.2%)	2	0	
Level of education				
Illiterate	21 (12.6%)	9	12	
Incomplete primary education	116 (69.5%)	34	82	
Complete primary education	12 (7.2%)	10	2	
Incomplete middle school	5 (3.0%)	4	1	0.002
Complete middle school	9 (5.4%)	2	7	
Higher Education	2 (1.2%)	1	1	
Technical education	2 (1.2%)	0	2	
Marital status				
Single	19 (11.4%)	6	13	
Married	76 (45.5%)	39	37	0.001
Separated	13 (7.8%)	6	7	
Widower	59 (35.3%)	9	50	
Tabagism				
Never smoked	44 (26.3%)	7	37	
Current smoked	32 (19.2%)	9	23	0.001
Former smoked	91 (54.5%)	44	47	
Physical activity				
Active	57 (34.2%)	27	30	0.041
Sedentary	110 (65.8%)	33	77	

P: x^2 Pearson square. m.w: minimal wage.

When asked about the practice of physical activity only 57 individuals reported being adherents of regular physical exercise. Among the most cited there is the practice of walking (n = 25), followed by cycling (n = 8), gymnastics (n = 8), more than one type of physical activity (n = 13) and another types (n=3). The weekly frequency reported by the 29 individuals was more than 4 times a week, followed by 16 subjects who reported some 3 to 4 times a week and 12 subjects who reported performing only 1 to 2 times per week. The mean duration of physical activity ranged from 15 to 120 minutes.

When analyzing the screening of sarcopenia by EWGSOP and the regular practice of activity was not observed statistically significant differences between them (p = 0.381), however when analyzing the screening of sarcopenia by CC and the regular practice of activity was observed significant difference between them (p = 0.021). Of these only 7 were sarcopenic according to the criterion of EWGSOP and only one measure of the calf circumference.

The anthropometric and functional variables of the sample studied are described in the table 2. Were found statistically significant differences between the averages of several anthropometric measurements evaluated (p<0.05), with the exception of the arm circumference (p=0.066), the corrected thigh (p=0.691), calf (p=0.425) and their respective skinfolds thickness.

Table 2. Anthropometric profile and functions of sample.

Variable	**Total of sample**	**Men**	**Women**	p *****
Weight (Kg)	71.52±15.52	75.3±12.08	69.3±15.37	0.010
Height (m)	1.58±0.09	1.66±0.06	1.53±0.06	0.001
BMI (Kg/m^2)	28.68±5.51	27.17±4.23	29.52±5.97	0.008
Circunferences (cm)				
Bracquial	30.94±4.21	30.14±3.30	31.39±4.60	0.066
Bracquial corrected	25.56±2.97	26.60±2.60	24.98±3.02	0.001
Thigh	54.19±7.41	51.57±7.30	55.65±7.09	0.001
Thigh corrected	46.99±5.67	46.75±6.53	47.12±5.15	0.691
Calf	35.96±3.93	35.64±3.37	36.15±2.72	0.425
Calf corrected	30.48±3.09	32.28±2.91	29.47±2.72	0.001
Skinfolds Thickness				
Triciptal	17.13±7.42	11.31±4.02	20.39±6.88	0.001
Triciptal corrected	1.71±0.74	0.40±0.05	0.68±0.06	0.001
Thigh	22.83±10.55	10.75±1.38	10.46±1.01	0.491
Thigh corrected	2.27±1.05	1.08±0.14	1.04±0.10	0.543
Calf	17.53±9.81	10.60±1.37	9.33±0.90	0.281
Calf corrected	1.74±0.97	0.58±0.07	0.93±0.09	0.001
MMI (Kg/m^2)	9.35±1.33	9.84 ±1.31	9.08±1.37	0.001
MM (Kg)	23.44±4.44	27.2±3.70	21.28±5.97	0.001
Hand grip strength (Kgf)				
Right	24.5±9.21	32.5±9.28	20.0±5.33	0.001
Left	24.3±9.15	32.3±9.19	19.8±5.22	0.001
Gait speed (m/s)	0.82±0.23	0.91±0.22	0.77±0.21	0.001

T-test for independent samples (p≤ 0.05).

Discussion

This study showed, based on a sample of 167 elderly residents of the city of Uruguaiana, the frequency of sarcopenia was 16.2% by EWGSOP and 9% by CP. Moreover, it showed a low degree of correlation between the assessed instruments (κ = 0.192) these data are similar to previous studies realized in other populations.

Pagotto and Silveira (2014) also found a slight agreement of the calf circumference with other instruments that assess the MMI, such as DXA, BIA and anthropometric measurements. Moreover, also found a wide range of prevalence of sarcopenia according to the diagnostic criteria used, 8.3% (CC) and 60.6% (DXA) in 132 elderly investigated. The use of the calf circumference is not widely used for the diagnosis of sarcopenia. Rolland et al (2003), showed in a study of 1458 French elderly obtained a prevalence of 9.5% of sarcopenia the criterion diagnosis of CC and that CC was correlated with appendicular skeletal muscle mass (r = 0.63). Calf circumference under 31 cm was the best clinical indicator of sarcopenia (sensitivity = 44.3% and the specificity = 91.4%). However, the authors suggest that this measure not be used for diagnosis of sarcopenia in the elderly, only for screening (ROLLAND et al., 2003).

In these sense, body imaging assessment techniques such as computed tomography, magnetic resonance and the DXA are considered the gold standard for the diagnosis of muscle loss. Several studies show a good level of agreement between imaging with BIA and anthropometric measurements not only for the diagnosis of muscle loss but for mainly sarcopenia (PROCTOR et al., 1999; ROSS, 1996; ROUBENOFF et al., 1997). However, for population-based studies these techniques become unviable due to high costs, equipment, specialized professionals and health risks due to exposure to radiation. So, ever more has used non-invasive techniques and with low cost for the assessment of body composition in epidemiological studies. And studies to assess the agreement between instruments that use only anthropometric variables in the elderly are scarce in the literature. Some anthropometric measurements and equations were developed to estimate muscle mass in the elderly and are widely used in epidemiological studies. An example was developed by Landi, Liperoti and Onder (2013), these authors describe the use of the arm circumference corrected by skinfold thickness, as a practical, inexpensive and easily accessible tool for the screening of sarcopenia in people who live in long term care facilities or receiving home care.

Some equations have been validated in South elderly in Brazil (RECH et al., 2012) and only equation Lee et al. (2000) is valid for estimate the muscle mass in the elderly. RECH et al.(2012), compared the Lee et al (2000) equation with dual energy X-ray absorptiometry (DXA), and these found a substantial agreement between instruments (κ =0.74). Additionally, another study conducted by Lee, et al (2013) found a moderate agreement (κ =0.448) between the protocols defined by the International Working Group on Sarcopenia (IWGS) and the EWGSOP.

Studies have reported prevalence 3-30% of community-dwelling elderly who have some degree of sarcopenia (BAUMGARTNER et al., 1998; TICHET et al., 2008; MASANES et al., 2012). In a study performed in Brazil, was identified that 36.1% of patients included had reduced muscle mass (RECH et al., 2012). And this occurrence tends to accentuate with increasing age, there are reports of a higher frequency than 50% in people over 80 years (BAUMGARTNER et al., 1998). However, it is necessary to consider these estimates of prevalence of sarcopenia because differ widely. This finding may be due to the methods employed and diagnostic criteria and the characteristics of the target population to assess muscle mass.

The EWGSOP defined sarcopenia as a syndrome characterized the generalized and progressive loss of muscle mass and function, with risk of adverse outcomes such as disability, low quality life and death. This group recommends that assess muscle mass and strength (handgrip strength) and physical performance (gait speed) for the diagnosis of sarcopenia. For the evaluation of muscle mass in research the EWGSOP recommending imaging techniques or BIA. However, for clinical practice may be used the anthropometry (CRUZ-JENTOFT et al., 2010). Corroborating the approach of the European consensus for the diagnosis of sarcopenia studies has showed the decrease of 0.1 m/s gait speed increases the risk of mortality by 12% (KRISTEN et al., 2013). Some authors suggest that loss of muscle mass and adipose tissue infiltration, especially in the quadriceps muscle (CONNELLY et al, 1998), can be functional damaging in the elderly, especially in relation to gait speed (KRISTEN et al, 2013).

A major cause muscle strength reduction in the elderly is reduction of the cross-sectional area, which indicates muscle fiber atrophy, reduction in percentage of contractile muscle tissue and a deficit in muscle innervation, including recruitment and firing of motor units (CONNELLY et al., 1998; FRONTERA et al., 2000). However, it is important to consider that the force produced by a muscle is not directly proportional to the amount of muscle fibers present.

In order to prevent or minimize the loss of muscle mass, several studies have been conducted, and these showed the efficacy of resistance training to maintain and / or increase muscle mass (FRONTERA et al.; 1990; KLITGAARD et al., 1990). In a systematic review with meta-analysis about resistance training and the effect on lean body mass in people aged 50 years or more, Peterson and colleagues, found a positive association between resistance training and the increase of lean body mass. According the authors the weighted pooled estimate of mean lean body mass change was 1.1 kg, and the results of meta-regression revealed that higher volume interventions were associated ($\beta = 0.05$, $p < 0.01$) with significantly greater increases in lean body mass, whereas older individuals experienced less increase ($\beta = -0.03$, $p = 0.01$).

In addition, regular physical activity, especially strength training causes several biochemical and morphological changes in muscle structure, improving biomechanical performance (CARVALHO and SOARES, 2004). A study conducted by Frontera and colleagues (1990), they observed; the effects of strength training on maximal aerobic power (VO_2max) and some of its determinants in 12 healthy older men. The volunteers underwent a 12 weeks of strength conditioning of extensors and flexors of each knee with eight repetitions per set, three sets per session, and three sessions per week at 80% of the one repetition maximum (1 RM).The authors found a 107% increase in 1 RM on knee extensors. In addition, the authors carried out biopsies of the muscle vastus lateralis which was observed a 28% increase in mean fiber area, a 15% increase in capillaries per fiber and a 38% increase in citrate synthase activity. The data suggest that the small increase in leg cycle VO_2max in older men may be due to adaptations in oxidative capacity and increased mass of the strength-trained muscles. In another study conducted by Trappe and colleagues (2000) with the elderly who underwent a 12-week of progressive resistance training (PRT), the results of these indicated that PRT in the elderly increases the muscle cell size, strength, contractile velocity, and power in both slow- and fast-twitch muscle fibers.

However, when we investigated the practice regularity of physical activity in this study, only 57 reported practice of regularity form, only being observed association between CC and physical activity in the investigated elderly. Of these only 7 were sarcopenic according to the criterion of EWGSOP and only one by the measure of calf circumference, which may justify a weak agreement between the EWGSOP and calf circumference, because even if both instruments do not take into account the practical physical activity is evident that it is directly related to muscle mass and strength, and also the gait speed.

In 2008, Clark and Manini postulated that there is dissociation between loss of strength and muscle mass, since this particular loss of strength (dinapenia) can be associated with the aging process itself. The aging process causes changes at all levels (from the molecular to the morphological) and disrupts organic homeostasis (cellular, neural and metabolic) (GOTTLIEB et al., 2007). This process results in a progressive decrease in physiological capacity and reduction in ability to respond to environmental stress. This leads to increased susceptibility and vulnerability to physical and functional diseases. In this sense, reduction of gait speed appears to be a risk factor for disability, cognitive impairment, institutionalization, falls and death.

Some studies (CUOCO et al., 2004; TIETJEN-SMITH et al., 2006) have shown that the slow gait speed and reduced grip strength can identify elderly with decreased muscle strength and power of the lower limbs, limitations and functional decline. Grip strength has also been shown to be a predictor of survival and sarcopenia in prospective population studies, including the elderly (KILGOUR et al., 2013). In addition, there is a growing body of

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evidence (METTER et al., 2002; NEWMAN et al., 2006; GALE et al., 2007; SASAKI et al., 2007) from longitudinal studies suggesting that low grip strength predicts mortality from all causes, regardless of age. These findings highlight the importance of assessing handgrip strength, gait speed, and MMI in elderly populations, because of the impact that aging imposes these physiological parameters and their relationship to functional capacity, morbidity and quality of life. These three parameters are part of the algorithm for the screening of sarcopenia in elderly proposed by EWGSOP (CRUZ-JENTOFT et al., 2010). They are cheap, simple and easily applicable in any environment. Such measures may help to predict health outcomes of the elderly, including functional capacity, healthiness and nutritional status that are widely affected by aging. However, caution is needed when using the equation of Lee et al (2000), or other anthropometric measures, such as the circumference of the calf or arm. This is because with the aging process, infiltration of adipose tissue occurs along with loss of muscle mass (SONG et al., 2004; RECH et al., 2012; BUFORD et al., 2012).

The present study has limitations, including the absence de body imaging techniques and the use of anthropometry and the formula created by Lee et al (2000) to measure the MMI used in the European consensus algorithm. The age-related changes in fat deposits and loss of skin elasticity can contribute to measurement errors in the elderly. There are relatively few validation studies of anthropometric measures in the elderly overweight and obese, in our sample 35.3% were overweight and 38.9% were obese. This and other confounding factors mean that anthropometric measures are susceptible to error, thus they are not recommended for routine use in the diagnosis of sarcopenia (ROLLAND et al., 2008; CRUZ-JENTOFT et al., 2010). This fact can cause distortions in calculating an accurate MMI despite correction for subcutaneous fat (LEE et al., 2000).

However, despite the study's limitations the use of muscle mass obtained by the Lee et al (2000) equation, rather than a body imaging technique recommended in the European consensus algorithm and MMI own are instruments that can be widely used, not only in research but also in clinical practice for the elderly to screening sarcopenia.

Conclusion

The results of this study showed poor agreement between the EWGSOP and calf circumference. The elderly frequency diagnosed with sarcopenia by EWGSOP was 27 (16.2%, 4 women and 23 men), and by CC was 15 (9%, 12 women and 3 men). Both results on both the low degree of correlation between the investigated instruments as the frequency of sarcopenia by CC findings are similar to those reported in previous studies with other populations of elderly. However, the low degree of agreement found between the instruments evaluated in this study was due to the set of variables that EWGSOP takes into account for the screening of sarcopenia in the elderly, which may have generated points of disagreement. However, these instruments may be set as important auxiliaries tools for the screening of sarcopenia in the elderly population due to their low cost, and easy application in populations studies. However, it is important to consider that the most sensitive and accurate methods to measure muscle mass, especially in the elderly are the image technique's. And, especially with regard to sarcopenia is essential to evaluate not only muscle mass, but also the strength and functional performance, recommended by consensus.

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DESCRIÇÃO DA FREQUÊNCIA DE SARCOPENIA E ANÁLISE DA CONCORDÂNCIA ENTRE A CIRCUNFERÊNCIA DA PANTURRILHA E O CONSENSO EUROPEU PARA O RASTREIO DE SARCOPENIA EM IDOSOS

RESUMO
Este estudo teve o objetivo descrever a frequência de sarcopenia e verificar a concordância entre instrumentos para o seu diagnóstico. Trata-se de estudo transversal onde foram utilizados o algoritmo proposto pelo Consenso Europeu de Sarcopenia em idosos (EWGSOP), circunferência da panturrilha (CP), massa muscular e índice de massa muscular. 167 idosos foram avaliados com idade média de 68.03±6.12 anos. A frequência de idosos rastreados com sarcopenia pelo EWGSOP e CP foi a seguinte: 27(16.2%) e 15 (9.0%). Foi verificado um fraco grau de concordância entre a CP e o EWGSOP (κ = 0.192). Contudo, esses instrumentos, devido ao baixo custo financeiro e fácil aplicabilidade são ferramentas auxiliares importantes para o rastreio de sarcopenia em idosos.
Palavras-chave: sarcopenia. diagnóstico. antropometria. idoso.

DESCRIPCIÓN SARCOPENIA FRECUENCIA Y ANÁLISIS DEL ACUERDO ENTRE EL BECERRO CIRCUNFERENCIA NIVEL Y EL CONSENSO EUROPEO PARA LA SARCOPENIA CRIBADO EN EL ANCIANO

RESUMEN
Este estudio tuvo como objetivo describir la frecuencia de la sarcopenia y verifique el acuerdo entre los instrumentos para el diagnóstico. Este estudio transversal donde se utilizó el algoritmo propuesto por el Consenso Europeo Sarcopenia en Anciano (EWGSOP), circunferencia de la pantorrilla (CP), la masa muscular y el índice de masa corporal. 167 ancianos fueron evaluados con una edad media de 68,03 ± 6,12 años. Las personas mayores a menudo diagnosticada por EWGSOP sarcopenia y CP fue el siguiente: 27 (16.2%) y 15 (9.0%). Se encontró un bajo grado de correlación entre la CP y el EWGSOP (κ = 0.192). Sin embargo, estos instrumentos debido al bajo costo financiero y de fácil aplicabilidad son ayudas importantes para la detección y el diagnóstico de la sarcopenia en los ancianos.
Palabras-clave: sarcopenia. cribado. antropometria. ancianos.

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