AGREEMENT BETWEEN SELF-REPORTED AND MEASURED WEIGHT AMONG OLDER ADULTS IN SOUTHERN BRAZIL

Concordância entre peso referido e medido entre idosos do sul do Brasil

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ABSTRACT

OBJECTIVE: To evaluate the agreement between self-reported and measured weight among older adults living in the city of Pelotas, southern Brazil. METHODS: Cross-sectional analyses using data from the second follow-up of “COMO VAI?”, a longitudinal population-based study that included community-dwelling older adults from the urban region of Pelotas. Weight was self-reported and measured at the same visit. Standing height was estimated based on knee height, which was measured at the first follow-up (2014). Body mass index was categorized as normal (< 24.9 kg/m²), overweight (between 25.0 and 29.9 kg/m²) or obese (≥ 30 kg/m²). Agreement between self-reported and measured weight and between body mass index based on self-reported and measured weight was evaluated using Lin’s concordance correlation coefficient and a Bland-Altman plot. The kappa coefficient was used to evaluate the agreement between body mass index according to self-reported and measured weight. RESULTS: Ninety-nine participants were visited at home, where their weight was self-reported and directly measured. The mean difference between measured and self-reported weight was 1.8 kg (95%CI 0.5; 3.1) in men and -0.1 kg (95%CI -1.1; 0.8) in women. Nutritional status according to self-reported and measured weight showed good agreement (81% of the elderly correctly classified themselves) with a kappa of 0.71 in men and 0.68 in women, and a weighted kappa of 0.75 in men and 0.72 in women. CONCLUSIONS: There was good agreement between self-reported and measured weight in women, but strong agreement for nutritional status according to self-reported and measured weight in both sexes, thus self-reported weight can be used to monitor nutritional status in older adults. KEYWORDS: self report; body weight; nutritional status; aged.

RESUMO

OBJETIVO: Avaliar a concordância entre peso autorreferido e medido em idosos de Pelotas, no Sul do Brasil. MÉTODOS: Análise transversal usando dados do segundo acompanhamento do “COMO VAI?”, um estudo longitudinal de base populacional que inclui idosos residentes na área urbana de Pelotas, sul do Brasil. Peso autorreferido e medido foram coletados no mesmo momento. Altura em pé foi estimada com base na altura do joelho medida no primeiro seguimento (2014). O Índice de massa corporal (IMC) foi classificado como normal (< 24.9 kg/m²), sobrepeso (25.0–29.9 kg/m²) e obesidade (≥ 30 kg/m²). A concordância entre peso autorreferido e medido e entre o IMC usando peso autorreferido e medido foi avaliada pelo coeficiente de correlação de concordância de Lin e pelo gráfico de Bland-Altman. O coeficiente Kappa foi utilizado para avaliar a concordância entre o estado nutricional do IMC usando peso autorreferido e medido. RESULTADOS: Noventa e nove participantes visitaram domicílios com peso autorreferido e medido. A diferença média entre peso medido e referido foi de 1,8 kg (IC95% 0,5; 3,1) e -0,1 kg (IC95% -1,1; 0,8) para homens e mulheres, respectivamente. O estado nutricional utilizando peso autorreferido e medido foi avaliado pelo coeficiente de correlação de concordância de Lin e pelo gráfico de Bland-Altman. O coeficiente Kappa foi utilizado para avaliar a concordância entre o estado nutricional do IMC usando peso autorreferido e medido. RESULTADOS: Noventa e nove participantes visitaram domicílios com peso autorreferido e medido. A diferença média entre peso medido e referido foi de 1,8 kg (IC95% 0,5; 3,1) e -0,1 kg (IC95% -1,1; 0,8) para homens e mulheres, respectivamente. O estado nutricional utilizando peso autorreferido e medido foi avaliado pelo coeficiente de correlação de concordância de Lin e pelo gráfico de Bland-Altman. O coeficiente Kappa foi utilizado para avaliar a concordância entre o estado nutricional do IMC usando peso autorreferido e medido. CONCLUSÕES: Os achados apresentaram boa concordância entre peso autorreferido e medido no sexo feminino, mas forte concordância quanto ao estado nutricional, usando peso autorreferido e medido para ambos os sexos, possibilitando o uso do peso autorreferido para monitorar o estado nutricional em idosos. PALAVRAS-CHAVE: autorrelato, peso corporal; estado nutricional; idoso.
INTRODUCTION

Monitoring nutritional status in older adults is highly important, since it can reduce and control the occurrence of chronic diseases, as well as neurological disorders, fracture risk and disabilities.1

Self-reported weight and height are commonly used in epidemiological studies for nutritional status screening and monitoring in an effort to reduce logistical difficulties, especially in nationwide surveys.2 This strategy simplifies fieldwork and reduces costs related to transportation, the duration of data collection, anthropometrics training and equipment acquisition.3

Previous research has shown a strong correlation and agreement between self-reported and measured weight among adults.2 However, Gorber et al. emphasized that caution should be used with self-reported measurements, since certain demographical and economic factors can influence the occurrence of bias,4 e.g., women commonly underestimate weight and men commonly overestimate height.5

Older adults tend to underestimate self-reported weight, and age is related to this inaccuracy.1 Imprecision leads to biased estimates in the prevalence of overweight and obesity, especially in populations of older adults. However, comparability between self-reported and measured weight and height has also been observed.5

Thus, the current study aimed to evaluate the agreement between self-reported weight (BWR) and measured weight (BWM), as well as nutritional status based on body mass index (BMI), calculated according to BWR and BWM, in community-dwelling older adults in the urban region of Pelotas in southern Brazil.

METHODS

The study was conducted using data collected in the second follow-up of the “COMO VAI?” study, a population-based cohort study of community-dwelling older adults in Pelotas, a mid-sized city in southern Brazil. The sample was enrolled through a two-stage sampling procedure applied in the urban region. Non-institutionalized individuals aged 60 years or older were eligible for inclusion.

From January to August 2014, older adults were interviewed and measured in their residence. Several health aspects were investigated at baseline. The interviewers observed sex (male; female) and race (white; other). The participants answered questions about their age (60–64; 65–69; 70–74; 75–79; ≥ 80 years of age), education (None; < 8 years completed; ≥ 8 years completed) and self-perceived health (Very good; Good; Normal; Poor/very poor). The participants’ economic level was classified according to categories from A (richest) to E (poorest) according to Brazilian Association of Research Companies (ABEP) criteria, which are based on household assets, domestic employees, and the head of the family’s education level.7 Nutritional status was classified according to BMI, which was obtained from weight, measured with a digital scale (Tanita UM-080, Tanita, Tokyo, Japan), and height, estimated from knee height (measured with portable pediatric wooden stadiometers) using Chumlea’s equations.8

Between November 2016 and April 2017, the second follow-up was conducted, primarily through phone calls. In cases of phone number changes or unanswered calls, visits were attempted at the participant’s residence a minimum of four times on different days and at different hours during the data collection period.

The second phase of the study investigated the participants’ health, including self-reported weight. Participants who were visited at home were also invited to have their body weight measured (while barefoot and wearing light clothing) with the same scale used at baseline. Thus, BMI was calculated according to self-reported weight (BMI_r) and measured weight (BMI_m) using the baseline height data. The participants’ nutritional status was classified based on their BMI as normal-weight (< 24.9 kg/m²), overweight (between 25.0 and 29.9 kg/m²) or obese (≥ 30 kg/m²).

Questionnaire data were recorded using the Research Electronic Data Capture application (https://projectredcap.org/), whereas measured weight data was double entered in EpiData 3.1. Statistical analyses were performed in Stata 13.0. Participant characteristics were described according to sex in absolute and relative frequencies and in means and standard deviation. Agreement between BW_r and BW_m, as well as between BW_r and BW_m-based BMI, were evaluated with Lin’s concordance correlation coefficient and a Bland-Altman plot, including the mean differences, 95% confidence intervals and the 95% limits of agreement. Pearson’s correlation coefficients are also shown. Kappa and weighted kappa were used to evaluate the agreement beyond chance between nutritional status according to BW_r- and BW_m-based BMI.

Both phases of the study were approved by the Research Ethics Committee of the Federal University of Pelotas School of Medicine (1.472.959). Informed consent was obtained from all participants prior the baseline and follow-up interviews.

RESULTS

Of the 1,451 older adults interviewed in 2014, 1,161 (80.0%) were interviewed in the second follow-up. At the residence of 99 participants, direct weight measurements were obtained in addition to self-reported weight. There were no significant differences in baseline age, race, self-perceived health or nutritional status between participants who were...
only interviewed and those who were directly weighed, in both men and women. Among women, the proportion of those with no or <8 years of education were higher in the directly weighed group than in participants who were only interviewed. Regarding economic level, there was a higher proportion of men in the A/B class and women in the C class among those directly weighed than among those who were only interviewed. The mean baseline and follow-up BMI according to self-reported weight were similar between the two groups.

Mean difference between measured and self-reported weight was 1.8 kg (95%CI 0.5; 3.1) in men and -0.1 kg (95%CI -1.1; 0.8) in women. The 95% limits of agreement varied from -5.8 to 9.4 kg in men and from -7.6 to 7.3 kg in women. Lin's concordance correlation coefficient was 0.94 and 0.95 for men and women, respectively (Figure 1).

A Bland-Altman plot was performed for BMI_M and BMI_R. In men, the mean difference in BMI_M (0.5 kg/m², 95%CI: 0.1; 1.0) was higher than BMI_R, whereas there was no difference between mean BMI_R (95%CI: -0.5; 0.4 kg/m²) and BMI_M in women. No systematic bias was observed, considering the 95% limits of agreement of -2.1 to 3.2 kg/m² in men and -3.3 to 3.2 kg/m² in women. Lin's concordance correlation coefficient was 0.93 for both men and women (Figure 1).

Evaluation of nutritional status (normal-weight, overweight or obese) based on BW_M and BW_R in the whole sample showed a good agreement (81% of the participants were correctly classified: 83% in men and 80% in women) with a kappa of 0.70 (0.71 in men and 0.68 in women) and the weighted kappa was 0.74 (0.75 in men and 0.72 in women).

**DISCUSSION**

According to the results of this study, nutritional status based on self-reported weight showed good agreement with nutritional status based on measured weight in both sexes, although self-reported weight showed good agreement with measured weight only in women. The loss of muscle mass is one of the most evident changes in body composition with aging. Another
important change is decreased basal metabolic rate and body fat gain, even if the dietary intake or activity remains unchanged. For this reason, a stable weight or BMI in older adults does not necessarily indicate that body composition has been maintained. Nevertheless, nutritional status based on BMI is an important proxy for health, and its monitoring is necessary to detect obesity. Obesity is strongly associated with non-communicable chronic diseases, as well as the malnutrition, which are associated with an increased risk of physical disabilities, infections and hospitalizations, in addition to lower quality of life.

A number of population-based studies use self-reported measurements to classify nutritional status. The Brazilian Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone (Vigitel) is one example. This study is conducted annually in the Federal District and all state capitals and includes individuals over 18 years of age. Self-reported weight and height data have been collected in all state capitals and includes individuals over 18 years of age.

Previous publications have described different results from those found in the present study. Carvalho et al. found a correlation coefficient of 0.94 between self-reported and measured weight, almost the same found in the current study (r = 0.95). Another study found a Kappa of 0.64 for self-reported weight and height in older adults. Good agreement between self-reported and measured weight in older adults could be a result of weight monitoring during visits to the doctor or other health professionals, considering that more than 90% of the sample had been diagnosed with two or more chronic diseases (data not shown). However, self-reported weight should be used carefully, because several factors are associated with bias in self-reported anthropometric information.

This study was limited by the low number of participants whose weight was directly measured, which was due to logistics difficulties. Although we included subjects from different economic and demographic characteristics, the good agreement for nutritional status may have been due to having weighed a higher proportion of participants with lower education and economic status than was present in the whole sample. People in poor socio-economic conditions are generally followed-up only periodically in basic health units to receive their medications, which are provided through public health programs, unlike individuals in higher social classes, who more often have health insurance.

CONCLUSION

It can be concluded that self-reported weight had good agreement with measured weight in community-dwelling older women. In addition, most older adults from both sexes correctly classified their nutritional status. Our findings showed that it is possible to use self-reported weight to monitor nutritional status in similar populations of older adults.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

REFERENCES