Letter to the editor

External validity of a muscle mass formula derived from simple demographic and anthropometric measurements in a group of Mexican older adults

1. Introduction

There is an increasing need of accurate data on measuring muscle mass due to the continuously growing interest in sarcopenia [1,2], however current methods used in this purpose are still not entirely available neither in clinical nor in epidemiological studies [3]. A recent study approached this problem by validating a formula using simple demographic and anthropometric measurements in comparison to magnetic resonance imaging (MRI) in a wide population with valid results [4]. The aim of this research letter is to test external validity of this formula in a group of Mexican older adults when compared to appendicular muscle mass derived from dual-energy X-ray absorptiometry (DEXA).

2. Materials and methods

A cross-sectional analysis of a group of Mexican older adults that were assessed for a study to compare the effect on body composition of a folk dance was used in this report. In this study adults 50-year or older were chosen from folk dancing and social clubs, only those subjects with complete anthropometry and DEXA measurement were included (those with missing data compared to those with complete data were not significantly different in age, sex and anthropometric measurements). Anthropometry was performed by certified personnel (the average of three measurements was used) and DEXA with the Hologic W® densitometer – containing software to estimate appendicular muscle mass in Hispanic subjects. Anthropometric measurements included: weight, height, hip circumference and waist circumference. The formulas used from the previous report was (first number represents the constant, last number is the coefficient for Hispanic):(a) Men skeletal muscle = 39.5 + 0.665 × weight [kg] − 0.185 × waist circumference [cm] − 0.418 × hip circumference [cm] − 0.0805 × age [years] + 0.21902(b) Women

skeletal muscle = 2.89 + 0.255 × weight [kg] − 0.175 × waist circumference [cm] − 0.0384 × age [years] − 0.50311

The study was conducted according to the guidelines of the Declaration of Helsinky. All participants signed informed consent, and the Ethics Committee of the Geriatrics Institute reviewed the protocol.

Descriptive analysis with frequencies for categorical variables and mean with standard deviations (SD) for continuous ones was performed. A correlation was performed stratified by sex between appendicular muscle mass from DEXA and skeletal muscle derived from the formula. In addition linear regressions were performed between the DEXA assessment and that derived from the formula. All analyses were performed with STATA® 13 statistical software.

3. Results

From a total of 100 subjects, 64% were women. The overall age mean was of 67.7 years [SD ± 7.4]. The mean for weight was of 65.2 kg [SD ± 12.2] and for height of 158 cm [SD ± 9.2]. Regarding circumferences, waist circumference mean was of 92.2 cm [SD ± 13.3] and hip circumference of 98.7 cm [SD ± 12.3]. Skeletal muscle from the formula and appendicular muscle mass derived from DEXA was significantly different between men and women [$P < 0.001$].

A significant correlation between both measurements was found $r = 0.653$ ($P < 0.001$) for women and $r = 0.359$ ($P = 0.031$) for men (Fig. 1 and Table 1). Linear regression resulted in a R^2 of 0.13 ($P = 0.031$) in men and 0.42 ($P < 0.001$) in women.
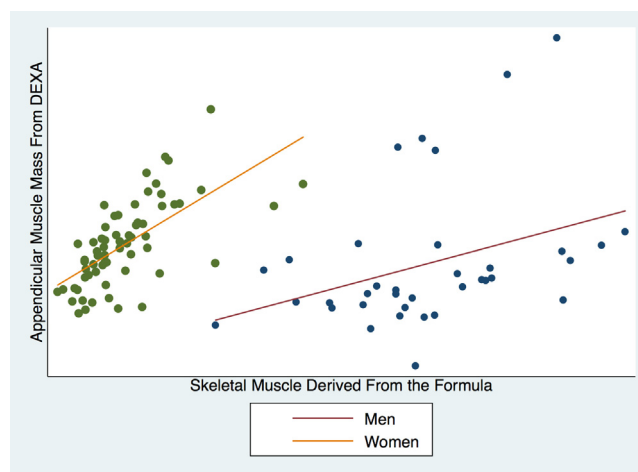

Fig. 1. Correlation of appendicular muscle mass from DEXA with formula derived skeletal muscle.

Table 1
Correlation and linear regression parameters between appendicular muscle mass by DEXA and formula derived skeletal muscle.

Parameters	Correlation		Linear regression		
	r	P-value	Beta coefficient	R2	P-value
Men	0.359	0.031	251.9	0.13	0.031
Women	0.653	<0.001	569.9	0.42	<0.001

4. Discussion

In a group of Mexican older adults the formula of Al-Gindan et al. is valid when compared to appendicular muscle mass derived from DEXA. However, the estimates where lower than expected. This could have a number of explanations, first of all, comparison in our study was done with DEXA not with MRI as in the original work [4]. In addition, the sample was small something that could have impacted power. Therefore, further research on how this formula behaves in larger samples are needed. Moreover, cut-off values in different populations and its association with adverse outcomes would enhance robustness of this formula.

In a context were scarce human and financial resources are scarce, the use of simple measurements to detect older adult conditions that could increase their risk of a worsening health status is of great importance [5].

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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