Skeletal Muscle Index and Body Fat Percentage Determined by Bioelectrical Impedance Analysis as an Indicator of Impaired Mobility and Sarcopenic Obesity in Elderly

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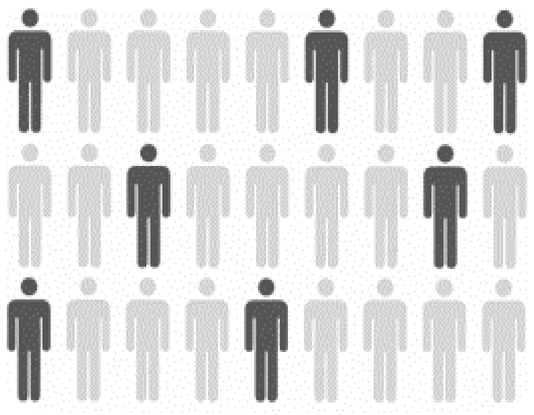
INTRODUCTION

Skeletal muscle loss in elderly can cause sarcopenia and result in mobility impairment. Skeletal muscle index (SMI) presents ratio of muscle mass (kg) and body height^2 (m²). Values below 6.75 kg/m² in females and 8.50 kg/m² in males indicate elevated risk for impaired mobility.
Recent research suggests that eggshell membrane (ESM) slows down the muscle loss and as such slow down the aging and lowers don the risk of mobility decline.

The aim of this study was to assess nutritional status and estimate risk for sarcopenic obesity (SO) in elderly based on bioelectric impedance measurements.

METHODS



Cross-sectional study involving elderly individuals
- 97 subjects, 22% males and 78% females
- 51 to 95 years of age; 44% below 75 years and 56% above 75 years
- 48% living in residential home for elderly, 52 % living in their own home

Data collection protocol
- **body height** measurement by anthropometer (Seca-213) in standing position on a flat surface, without footwear (values expressed in cm with precision of 0.1 cm),
- **body weight** measurement using Omron BF500 (values expressed in kg with precision of 0.1 kg),
-**body composition** measurement by Omron BF500 following the protocol as recommended by manufacturer.

RESULTS

Participants of both genders overestimated height and underestimated weight.

BMI values resulting from the measurements averaged in obesity while self reported values averaged in overweight.

Table 1 *Body composition of study participants*

		Average	SD	Median	Min	Max
Fat tissue (%)	M	31.1	6.3	31.	20.2	44.1
	F	43.4	7.2	44.7	20.3	56.4
	All	40.8	8.7	41.3	20.2	56.4
Muscle mass (%)	M	29.5	2.8	28.9	25.4	35.2
	F	23.9	3.3	23.7	10.9	31.2
	All	25.1	3.9	25.1	10.9	35.2
Visceral fat index	M	17.8	5.8	19	7	28
	F	12.4	3.8	13	3	20
	All	13.5	4.8	13	3	28

Table 2 *Body composition by age subgroups*

		Average ± SD	
		< 75 years	≥ 75 years
Fat tissue (%)	M	30.0 ± 6.1	32.1 ± 6.7
	F	40.8 ± 7.4	45.5 ± 6.5
	All	38.2 ± 8.4	42.8 ± 8.4
Muscle mass (%)	M	30.4 ± 6.1	28.7 ± 2.7
	F	24.6 ± 3.6	23.3 ± 3.0
	All	25.9 ± 4.2	24.4 ± 3.6
SMI (kg/m^2)	M	8.91 ± 0.83	9.14 ± 0.78
	F	6.48 ± 1.05	7.57 ± 1.00

Body composition values (**Table 1**) indicated very high proportion of fat tissue in 67% of male subjects and low muscle mass in 81% of them.

Results (**Table 2**) indicated raise in body fat proportion accompanied by loss of muscle mass with age, and this trend was more pronounced in females than in males. As a result, skeletal muscle index (SMI) was lower in females than in males of the same age group (6.48±1.05 kg/m² vs 8.91±0.83 kg/m²) and declined with age (7.57±1.00 kg/m² in age group <75 years vs 9.14±0.78 kg/m² in age group >75 years).
Using the cut points by Janssen et al. (2004), obtained SMI values indicate moderate physical disability risk in study population of both genders with higher presence in males than in females.

CONCLUSION

Findings of this study indicate very high proportion of body fat and low muscle mass in elderly individuals of both genders. Resulting SMI values indicated elevated risk for impaired mobility in males in comparison to females. Individuals with low SMI had significantly higher fat tissue. These findings highlight elevated risk of SO and emphasize the need for targeted nutritional and lifestyle interventions to improve overall health and quality of life in elderly.

REFERENCES:
1. Janssen I, *et. al.* Skeletal muscle cutpoints associated with elevated physical disability risk in older men and women. American Journal of Epidemiology, 2004, 159:413-421.

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