Associations of Walking with Sarcopenic Obesity and Cardiovascular Disease Risk Factors in Older Adults

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OBJECTIVES

To investigate the associations of walking (steps/day) with sarcopenic obesity (SO) and cardiovascular disease (CVD) risk factors in older adults.

METHODS

Study Design:

- Cross-sectional study

Participants:

- 297 older adults aged ≥65 years (mean age 72 years, ranged 65-95).

Walking:

- Walking was assessed using an accelerometer (Omron HJ-321), and categorized into thirds (tertile) based on the average daily steps.

Sarcopenic Obesity (SO):

- **Sarcopenia** was defined as low appendicular lean mass index (<0.789 in men, <0.512 in women) and slow gait speed (≤0.8 m/s) and weak handgrip strength (<26 kg in men, <16 kg in women), according to the Foundation for the US National Institutes of Health Sarcopenia Project diagnostic criteria.
- Appendicular lean mass (ALM) was derived as the sum of the lean mass of the four limbs, and ALM was then normalized by dividing by body mass index (kg/m^2) to yield appendicular lean mass index (ALMI) using Dual Energy X-Ray absorptiometry.
- **Obesity** was defined as high % body fat (≥25% in men and ≥30% in women) using Dual Energy X-Ray absorptiometry.
- **Sarcopenic obesity** was defined as the coexistence of sarcopenia and obesity.

Statistical Analysis:

- Multivariable linear regression.
- Multivariable logistic regression.

RESULTS

Table 1. Baseline Participant Characteristics

	All (n=297)	Tertile of Walking Steps/Day		
		Low (n=100)	Middle (n=100)	High (n=97)
Age, years	71.62 (5.89)	73.37 (6.08)	71.67 (6.03)	69.76 (4.97)
Female, % (n)	57.9 (172)	58.0 (58)	58.0 (58)	57.7 (56)
Slow Gait Speed, % (n)	2.7 (8)	6.0 (6)	1.0 (1)	1.0 (1)
Gait Speed, m/s	1.14 (0.19)	1.08 (0.18)	1.17 (0.21)	1.16 (0.15)
Weak Handgrip Strength, % (n)	6.7 (20)	12.0 (12)	5.0 (5)	3.0 (3)
Handgrip Strength, kg	30.09 (10.23)	28.75 (10.49)	30.56 (10.55)	30.98 (9.56)
Low Muscle Mass, % (n)	23.9 (71)	35.0 (35)	19.0 (19)	17.5 (17)
Appendicular Lean Mass/BMI	0.70 (0.19)	0.67 (0.17)	0.72 (0.22)	0.72 (0.16)
Sarcopenia, % (n)	4.0 (12)	7.0 (7)	4.0 (4)	1.0 (1)
Obesity, % (n)	95.3 (283)	97.0 (97)	95.0 (95)	93.8 (91)
% Body Fat, %	39.76 (7.64)	41.52 (7.84)	39.47 (7.61)	38.24 (7.15)
Sarcopenic Obesity, % (n)	4.0 (12)	7.0 (7)	4.0 (4)	1.0 (1)
Hypertension, % (n)	46.1 (137)	54.0 (54)	44.0 (44)	40.2 (39)
Peripheral SBP, mmHg	124 (18)	127 (19)	123 (17)	122 (18)
Peripheral DBP, mmHg	73 (7)	73 (8)	73 (7)	72 (7)
Central SBP, mmHg	118 (17)	120 (17)	116 (16)	116 (17)
Central DBP, mmHg	74 (8)	75 (8)	74 (8)	74 (7)
Hypercholesterolemia, % (n)	50.8 (151)	49.0 (49)	48.0 (48)	55.7 (54)
Total cholesterol, mg/dl	186.58 (36.22)	185.95 (37.64)	188.55 (34.68)	185.20 (36.57)
Diabetes, % (n)	10.1 (30)	15.0 (15)	9.0 (9)	6.2 (6)
Fasting glucose, mg/dl	99.47 (16.10)	101.57 (16.92)	98.41 (16.38)	98.39 (14.84)

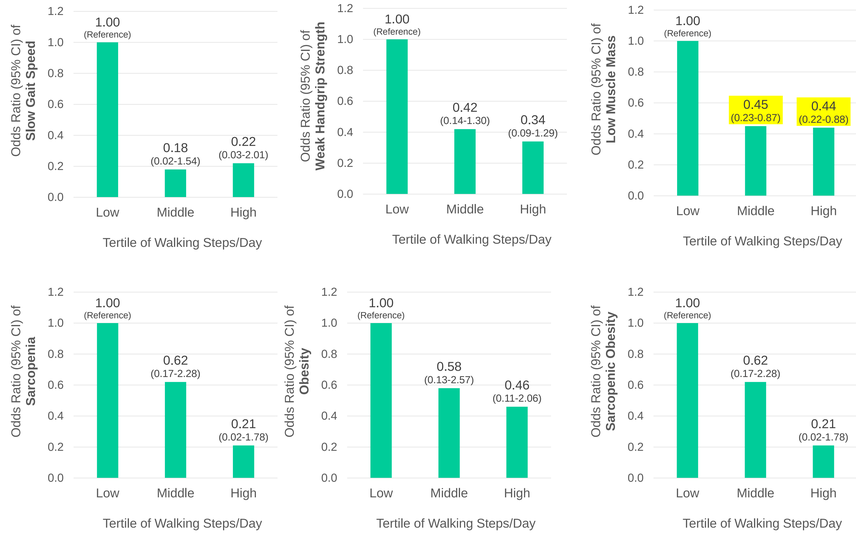
Values are means (SD) for continuous variables or % (number of participants) for categorical variables.
*BMI: body mass index, DBP: diastolic blood pressure, SBP: systolic blood pressure

Table 2. Sacropenic Obesity Indices and CVD Risk Factors per 1,000 Steps/Day of Walking*

	Coefficient	SE	P
Gait speed, m/s	0.008	0.004	0.030
Handgrip strength, kg	0.088	0.139	0.528
ALM BMI index, ALM/BMI	0.006	0.003	0.028
% Body fat, %	-0.592	0.123	<0.001
Peripheral SBP, mmHg	-0.500	0.379	0.188
Peripheral DBP, mmHg	-0.249	0.159	0.118
Central SBP, mmHg	-0.442	0.352	0.210
Central DBP, mmHg	-0.270	0.165	0.102
Total cholesterol, mg/dl	-0.115	0.721	0.873
Fasting glucose, mg/dl	-0.679	0.340	0.047

*Adjusted for age (years), sex, smoking status (ever smoking, yes or no), and heavy alcohol drinking (yes or no) using multivariable linear regression. ALM: appendicular lean mass, BMI: body mass index, DBP: diastolic blood pressure, SBP: systolic blood pressure

Figure 1. Associations of Walking Steps/Day with Sarcopenic Obesity Criteria*



*Adjusted for age (years), sex, smoking status (ever smoking, yes or no), and heavy alcohol drinking (yes or no) using multivariable logistic regression.

Table 3. Associations of Sacropenic Obesity with CVD Risk Factors*

	Odds Ratios (95% Confidence Intervals)		
Sarcopenic Obesity	Hypertension	Hypercholesterolemia	Diabetes
No	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Yes	2.04 (0.58-7.18)	1.27 (0.39-4.22)	1.87 (0.37-9.45)

*Adjusted for age (years), sex, smoking status (ever smoking, yes or no), and heavy alcohol drinking (yes or no) using multivariable logistic regression.

CONCLUSIONS

1. This study suggests that **more walking (steps/day) is associated with faster gait speed, increased muscle mass, decreased % body fat, and decreased fasting glucose** levels in older adults.
2. **More walking (steps/day) is associated with a lower prevalence of low muscle mass**, and other sarcopenic obesity diagnostic criteria, although not significant.
3. **Older adults with sarcopenic obesity appear to have higher prevalence of hypertension, hypercholesterolemia, and diabetes**, compared to older adults without sarcopenic obesity.

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