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Dynapenic abdominal obesity in older adults in Colombia: Results from the SABE survey

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ABSTRACT

Objectives: To describe the prevalence of Dynapenic Abdominal Obesity (DAO) in older Colombian adults and analyze its associations with health, functional performance, and falls.
Methods: A cross-sectional study from the SABE Colombia Survey, including 4956 individuals (58.0 % women). Abdominal obesity (AO) was defined as waist circumference ≥88 cm in women and ≥102 cm in men. Dynapenia (D) was defined by handgrip strength <27 kg in men and <16 kg in women.
Results: DAO prevalence was 17.7 %, being higher in women than men (23.8 % vs. 8.2 %, $p < 0.00$), and increasing with age. Adults aged ≥80 years had 4.9 higher DAO odds. Multimorbidity and polypharmacy increased DAO odds by 3.5 and 1.6, respectively. DAO was associated with lower gait speed and limitations in the Short Physical Performance Battery, but not with falls.
Conclusions: DAO is prevalent in older Colombian adults, and it is linked to lower functional performance.

Introduction

Dynapenic abdominal obesity (DAO) is described as the combined presence of dynapenia (age-related loss of muscle strength) and abdominal obesity (excessive accumulation of fat in the abdominal region) in people.[1] Recent studies suggest that DAO is more associated with functional impairment,[2] risk of falling,[3] metabolic alterations,[1] and cardiovascular disease mortality[4] than the presence of dynapenia (D) or abdominal obesity (AO) alone. However, not all studies support these findings[5,6] and more research is necessary to evaluate the utility of this promising indicator (DAO) compared to D and AO in identifying and prioritizing adults who require intervention.

Several mechanisms may explain DAO associations with functional impairment and poor metabolic health. The functional impairment is probably due to muscle weakness and the extra weight owed to OA; both conditions reduce the ability to do daily living activities.[7] In a cross-sectional study on 20,198 older adults from low- and middle-income countries, Smith et al. (2024)[8] found that DAO was associated with a 2.08 higher odds for activities of daily living (ADL) disability, in agreement with studies from high-income countries. DAO has also been associated with disturbances on balance and gait speed. In a sample of older adults from China, Lv et al. (2022)[3] found that those with DAO showed a 3.39 higher odds ratio for alterations in the Tinetti performance-oriented mobility assessment test, which is widely used to assess risk fall. Falls in older adults are the main cause of accidental injuries and injury-related deaths. Through different mechanisms DAO may alter metabolic health. The excessive fat accumulation with AO probably triggers alterations such as insulin resistance, hyperglycemia, dyslipidemia, and elevated blood pressure, conditions that contribute to DAO associations with cardiovascular diseases.[1,9]

The Colombian population is aging acceleratedly, like most developing countries worldwide. In 2021, 13.9 % of Colombians were 60 years or older, totaling about 7.1 million people,[10] this figure is estimated to reach 10 million by 2030. In two major cities of Colombia, Medellin and Bogota, the proportions of older people with abdominal obesity are high (51,8 % and 40.5 %, respectively).[11,12] Although these prevalences are lower than reported in Mexico (74.0 %)[13] similar values are found in other Latin populations such as Chile (55,6 %)[14] and Sao Pablo, Brazil (48.0 %).[15] Also, there is a high percentage of D in older adults from Medellin (18,4 %)[16] and Bogota (52,3 %),[17] which is similar to the values found in Chileans (35.6 %)[14] and people from Sao Pablo, Brazil (27.2 %).[15] Moreover, older

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Colombians had an elevated occurrence of falls in the last year (32.4 %) and high prevalence of dependence in ADL and instrumental activities of daily living (IADL) (21.2 % and 38.2 %, respectively).[18]

Given the rapid growth of older population in Colombia, and the high proportions of D and OA in the major cities of the country, it is necessary to characterize DAO prevalence in this population, since this condition increases the risk of morbidity and functional impairment. Furthermore, it is attractive to analyze DAO differences by sex in this population, given that women had higher prevalences of OA (60.0 vs. 28.5)[12] and D (57.5 vs. 42.8)[19] than men. This analysis may identify people requiring priority intervention, design targeted public-health strategies, and promote healthy aging. Therefore, the first objective of this study is to describe DAO prevalence in older people in Colombia, and the second objective is to analyze DAO associations with health variables, functional performance, and fall risk. We hypothesized that older adults with DAO will have more functional impairment, worse health variables and higher fall risk.

Material and methods

Design and participants

This is a secondary data study from SABE Colombia Survey (Encuesta de Salud, Bienestar y Envejecimiento, in Spanish), Colombia 2015. This cross-sectional analysis evaluated people 60 years and older, who were living non-institutionalized in urban and rural areas in Colombia. The SABE sample size of 23,694 older adults was obtained by applying a cluster, multistage, probabilistic, and stratified sampling method. A national representative subsample of 5196 subjects was obtained for functionality evaluation; more information about this study was previously described.[20] Older adults with missing or implausible values in waist circumference (n = 236) were excluded. A final subsample of 4956 individuals was included in this analysis. This study followed the Helsinki Declaration guidelines and was approved by the Bioethics Committees of the Universidad de Caldas (Approval reference number: CBCS-021−14) and the Universidad del Valle (Approval reference numbers: 09−014 and O11−015). All participants signed the informed consent.

Data collection

The sociodemographic variables were collected through face-to-face interviews. Anthropometric and functional variables were collected by health staff personal, trained and standardized by the major researchers at the coordinating centers (Universities of Caldas and Valle).[20] Waist circumference was measured using non-stretch, fiberglass, anthropometric measuring tape midway between the lowest rib and the iliac crest. Older adults with a waist circumference ≥102 cm in men and ≥88 cm in women were classified with AO, using the cutoff points of the United States National Institute of Health.[21] Handgrip strength was measured twice in each hand using a digital dynamometer (Takei 5401; Tokyo, Japan). The highest reading obtained among the measurements was used to classify older adults with D, when this value was <27 kg in men and <16 kg in women, following the cutoffs of the European Working Group on Sarcopenia in Older People (2019).[22] Older adults with a combined presence of D and AO were classified with DAO, and those free of D and AO were classified as ND/NAO.

The Short Physical Performance Battery (SPPB) was used to evaluate physical performance. SPPB comprises three examinations, namely usual walking speed test, timed standing balance test, and five-repetition chair stand test.[23] Every test was scored from zero (worst) to four (best performing). The total sum of the three scores (0−12) was used as a measure of the level of physical performance. For binary logistic regression analyses, older people with <10 points in SPPB were classified with limited physical performance.[24] Likewise, older adults with a usual walking speed of <0.8 m/s were classified as having low gait speed.

The ADL were evaluated with the Barthel Index,[25] which has a score from 0 to 100, with higher scores indicating a better functional condition. For binary logistic regression analysis, older adults were classified as independent (Barthel index = 100 points) or dependent (Barthel index < 100 points). The IADL were assessed with the modified Lawton and Brody scale[26]; this scale ranges from 0 to 6 points. Older adults were classified as independent (score = 6 points) or dependent (score <6 points). The Reuben scale was used to evaluate the advanced activities of daily living (AADL).[27] Using the Reuben scale, older adults were classified into four categories: (1) frequent vigorous exercisers (vigorous), (2) frequent long walkers (moderate), (3) frequent short walkers (light), and (4) no regular exercisers (inactive).

The variables analyzed were sex (men and women), age (divided into three groups: 60−69 years, 70−79 years, ≥80 years), socioeconomic stratum (from 1 to 6 according to dwelling location; higher numbers indicate more expensive neighborhoods), education level (none, primary, secondary or technical, technological or higher education level), marital status (single, separated/widowed, married/common-law union). The variables number of medications consumed (older adults using ≥5 medications daily were classified with polypharmacy), and number of diseases diagnosed by physician (older adults having ≥2 diseases were classified with multimorbidity) were categorized using widely accepted cutoff points from the literature.[28] Based on self-report information, participants were classified as fallers (≥1 in the last year) or not.[29]

Statistical analysis

Categorical variables are shown in absolute numbers and percentages; numerical variables are presented as means and standard deviations. DAO associations with sociodemographic and health variables were tested using Chi-square test. Differences and interactions in SPPB, ADL, and IADL scores, among D and AO groups (D, AO, DOA and ND/NAO) by sex and age groups (60−69, 70−79, ≥ 80), were tested with generalized lineal models (GLM) and adjusted with the Bonferroni test. Physical function variables were transformed using Box-Cox before the GLM models were applied. Likewise, this analysis was adjusted by the number of diseases and medications reported.

The associations of DAO as an independent variable with low gait speed (<0.8 m/s), a low SPPB score (<10 points), ADL, IADL, and AADL categories, were tested with binary or multinominal logistic regression analysis. These regressions were adjusted by age, number of diseases and medications, given that they are associated with handgrip strength, abdominal obesity and functionality.[30,31] Binary models were evaluated with Hosmer and Lemeshow tests and multinominal models were evaluated with Deviance test. Binary and multinomial models were run for each sex. The level of statistical significance was set at an alpha of 5 %. Sample weights were used in all analyses, and the statistics were done using SPSS version 25 (SPSS Inc., Chicago, IL, USA).

Results

Sociodemographic and health characteristics

A total of 4956 participants were included in the study, with a mean age of 70.3 ± 7.7 years. About educational level, 13.5 % (n = 881) had no formal education, 59.9 % (n = 2933) had a primary education level, and 26.6 % (n = 1126) had a secondary or superior education level. Nearly 70 % (n = 3778) of older adults dwell in stratum one or two, which represent the lowest socioeconomic levels in

Table 1
Sociodemographic and health characteristics according to sex.

Variable	Total (n = 4956)			Men (n = 2077)			Women (n = 2879)			p*
	n	%	95 % CI	n	%	95 % CI	n	%	95 % CI	
Age										
60 – 69	2614	53.5	51.6 % – 55.4 %	1050	50.9	47.8 % – 54.0 %	1564	55.2	52.7 % – 57.7 %	0.096
70 – 79	1636	32.5	30.7 % – 34.4 %	702	33.9	31.0 % – 36.9 %	934	31.6	29.3 % – 34.0 %	
≥ 80	706	14.0	12.7 % – 15.4 %	325	15.2	13.1 % – 17.5 %	381	13.2	11.6 % – 15.0 %	
Socioeconomic stratum										
1	1713	23.5	22.0 % – 25.1 %	774	25.1	22.7 % – 27.8 %	939	22.5	20.5 % – 24.5 %	0.210
2	2065	45.7	43.8 % – 47.7 %	860	45.5	42.5 % – 48.6 %	1205	45.8	43.3 % – 48.4 %	
3	1022	26.4	24.7 % – 28.2 %	396	25.8	23.1 % – 28.6 %	626	26.8	24.6 % – 29.1 %	
4–6	156	4.4	3.6 % – 5.3 %	47	3.6	2.6 % – 5.0 %	109	4.9	3.9 % – 6.1 %	
Education level										
Secondary school or others	1126	26.6	24.9 % – 28.4 %	506	29.8	27.0 % – 32.8 %	620	24.6	22.5 % – 26.8 %	0.006
Primary school	2933	59.9	58.0 % – 61.8 %	1214	58.3	55.2 % – 61.3 %	1719	60.9	58.4 % – 63.3 %	
No education	881	13.5	10.1 % – 13.9 %	351	11.9	10.1 % – 13.9 %	530	14.5	12.9 % – 16.3 %	
Marital status										
Married / common-law union	2715	52.8	50.8 % – 54.7 %	1481	72.9	70.1 % – 75.5 %	1234	39.9	37.4 % – 42.3 %	<0.001
Separated / widowed	1695	35.7	33.8 % – 37.5 %	425	20.2	17.8 % – 22.8 %	1270	45.6	43.1 % – 48.1 %	
Single	546	11.6	10.4 – 12.9 %	171	6.9	5.6 % – 8.6 %	375	14.6	12.9 % – 16.4 %	
Multimorbidity										
No	2658	51.0	49.1 % – 53.0 %	1382	64.0	61.0 % – 67.0 %	1276	42.6	40.2 % – 45.1 %	<0.001
Yes	2298	49.0	47.0 % – 50.9 %	695	36.0	33.0 % – 39.0 %	1603	57.4	54.9 % – 59.8 %	
Polypharmacy										
No	3952	77.3	75.6 % – 78.9 %	1759	82.6	80.1 % – 84.8 %	2193	74.0	71.7 % – 76.1 %	<0.001
Yes	1004	22.7	21.1 % – 24.4 %	318	17.4	15.2 % – 19.9 %	686	26.0	23.9 % – 28.3 %	

95 % CI: 95 % Confidence Interval. * Maximum verisimilitude test.

Colombia. Regarding health conditions, 49.0 % (n = 2298) had two or more diseases (multimorbidity) and 22.7 % (n = 1004) took five or more medications daily (polypharmacy) (Table 1). Similar trends were found in excluded participants, except these ones were older (73.8 ± 9.4); there was a lower proportion of married people or common-law union (39.8 %), and a higher proportion of separated/widowed people (45.4 %) (Supplementary Table S1). There were no significant differences between men and women by age group or socioeconomic strata (p = 0.096; p = 0.210 respectively). Compared to men, women showed a higher proportion of no formal- or primary-education level, higher multimorbidity, polypharmacy, and separated/widowed conditions (Table 1).

Functional characteristics

The functional characteristics of the participants are shown in Table 2. Limitations on physical performance (SPPB), dependence in ADL, low gait speed and falls, increased with age. Notably, these conditions were more prevalent in women than men. Dependence in IADL also increased with the advance in age; this behavior was similar between men and women (Table 2). There was a decrease in the percentage of older adults practicing vigorous or moderate AADL with the advance in age; this decrease was more accentuated in women 80 years or older. Men practiced more vigorous or moderate AADL while women did lighter AADL or were inactive (Table 2).

Dynapenic abdominal obesity according to sociodemographic and health characteristics

The prevalence of DAO in older adults was 17.7 % (n = 877); this condition was associated with sociodemographic and health variables. Women showed an almost three times higher DAO prevalence than men (23.8 % (n = 1753) vs 8.2 % (n = 812) respectively; $p < 0.001$), and DAO prevalence increased with age ($p < 0.001$) (Table 3). Analyzing by sex and age, the DAO proportion increased from 4.9 % to 16.6 % in men, and from 17.8 % to 36.6 % in women (Fig. 1). Older adults with multimorbidity and polypharmacy had 3.5 and 1.6 higher DAO odds ratio, respectively (Table 3). Associations of

Table 2
Functional characteristics according to sex and age (n = 4956).

Variable	Men (n = 2077) §					Women (n = 2879) §				
	60–69	70–79	≥ 80	Total	p*	60–69	70–79	≥ 80	Total	p*
Low gait speed (<0.8 m/s)	55.6	70.3	88.2	65.2	<0.001	70.2	87.7	94.3	78.7	<0.001
SPPB (score <10)	43.4	65.4	83.7	55.4	<0.001	64.5	83.9	92.3	73.5	<0.001
Falls (≥ 1 in the last year)	23.8	23.5	36.8	25.7	0.003	34.3	37.6	43.5	36.6	0.032
Dependence in ADL	7.6	11.0	35.4	13.0	<0.001	12.3	23.5	50.5	21.3	<0.001
Dependence in IADL	22.5	38.4	69.3	35.1	<0.001	15.8	38.4	70.2	30.7	<0.001
AADL										
Vigorous	27.8	22.7	14.6	24.0	<0.001	19.0	11.5	4.9	14.6	<0.001
Moderate	41.4	41.7	29.0	39.6		33.4	26.6	9.5	27.8	
Light	15.8	18.4	13.9	16.4		19.8	21.7	20.6	20.5	
Inactive	15.1	17.3	42.6	20.0		27.9	40.2	65.0	37.0	

§ Values presented as percentages.
SPPB: Short Physical Performance Battery; ADL: Activities of daily living; IADL: Instrumental activities of daily living; AADL: Advanced activities of daily living. Values presented as percentages. * Likelihood-ratio test.

Table 3
Relative frequency of dynapenic abdominal obesity and odds ratio according to sociodemographic characteristics (n = 4956).

Variable	Dynapenic abdominal obesity classification (%)				p*	Multinomial logistic model (Odds Ratio - CI 95 %)		
	ND/NAO	AO	D	DAO		AO	D	DAO
Total	28.6	29.9	23.8	17.7				
Sex								
Men	43.2	14.8	33.7	8.2	<0.001	1.0	1.0	1.0
Women	19.3	39.5	17.4	23.8		5.4 (4.17–6.91)	0.99 (0.77–1.27)	5.5 (4.0–7.47)
Age								
60 – 69	34.5	36.8	15.7	13.0	<0.001	1.0	1.0	1.0
70 – 79	25.5	26.2	27.3	21.0		0.9 (0.7–1.16)	2.1 (1.65–2.74)	1.9 (1.44–2.58)
≥ 80	13.4	11.8	46.6	28.1		0.8 (0.47–1.24)	6.5 (4.50–9.51)	4.9 (3.12–7.55)
Socioeconomic stratum								
4–6	32.2	28.0	22.2	17.6	0.583	1.0	1.0	1.0
3	29.8	27.2	24.3	18.7		1.0 (0.56–1.81)	1.1 (0.61–1.96)	1.2 (0.60–2.27)
2	26.8	32.2	23.5	17.5		1.3 (0.73–2.34)	1.2 (0.69–2.16)	1.3 (0.68–2.55)
1	30.2	28.7	24.1	17.0		1.09 (0.59–1.98)	1.1 (0.61–1.99)	1.3 (0.64–2.49)
Education level								
Secondary school or others	36.5	29.9	20.4	13.3	<0.001	1.0	1.0	1.0
Primary school	26.8	30.4	23.9	18.9		1.3 (0.95–1.64)	1.3 (0.96–1.67)	1.4 (0.99–1.95)
No education	21.1	28.0	30.0	21.0		1.4 (0.97–2.14)	1.6 (1.09–2.39)	1.6 (0.98–2.5)
Marital status								
Married / common-law union	34.4	29.5	21.7	14.5	<0.001	1.0	1.0	1.0
Separated / widowed	21.1	31.3	25.5	22.1		1.02 (0.78–1.32)	1.4 (1.09–1.88)	1.05 (0.77–1.42)
Single	25.8	27.0	28.1	19.1		0.8 (0.54–1.09)	1.8 (1.22–2.53)	1.03 (0.68–1.55)
Multimorbidity								
No	38.0	25.2	26.9	9.9	<0.001	1.0	1.0	1.0
Yes	18.9	34.7	20.6	25.8		2.0 (1.54–2.49)	1.3 (1.05–1.72)	3.5 (2.63–4.67)
Polypharmacy								
No	32.0	28.1	24.6	15.3	<0.001	1.0	1.0	1.0
Yes	17.1	35.9	21.0	26.0		1.7 (1.25–2.29)	1.2 (0.84–1.62)	1.6 (1.15–2.22)

ND/NAO: No dynapenia/No abdominal obesity; AO: abdominal obesity only; D: Dynapenia only; DAO: Dynapenic abdominal obesity.
* Chi-square test of independence (bivariate analysis). Multivariate multinomial logistic regression model. Reference category: ND/NAO; dependent variable: DAO; independent variables: sex, age, socioeconomic stratum, education level, marital status, multimorbidity and polypharmacy.

D and AO with sociodemographic and health variables are shown in Table 3. Notably, men showed a higher DAO odds ratio with advance in age than women, and this difference was particularly high at the age of 80 or more (OR=9.6 for men; OR=3.2 for women; p-value interaction <0.05) (Fig. 2).

Dynapenic abdominal obesity according to functional variables and falls

DAO associations with functional variables and falls are shown in Table 4. Older adults with DAO or D showed a higher odds ratio for low gait speed, and limitations on physical performance (SPPB). Men

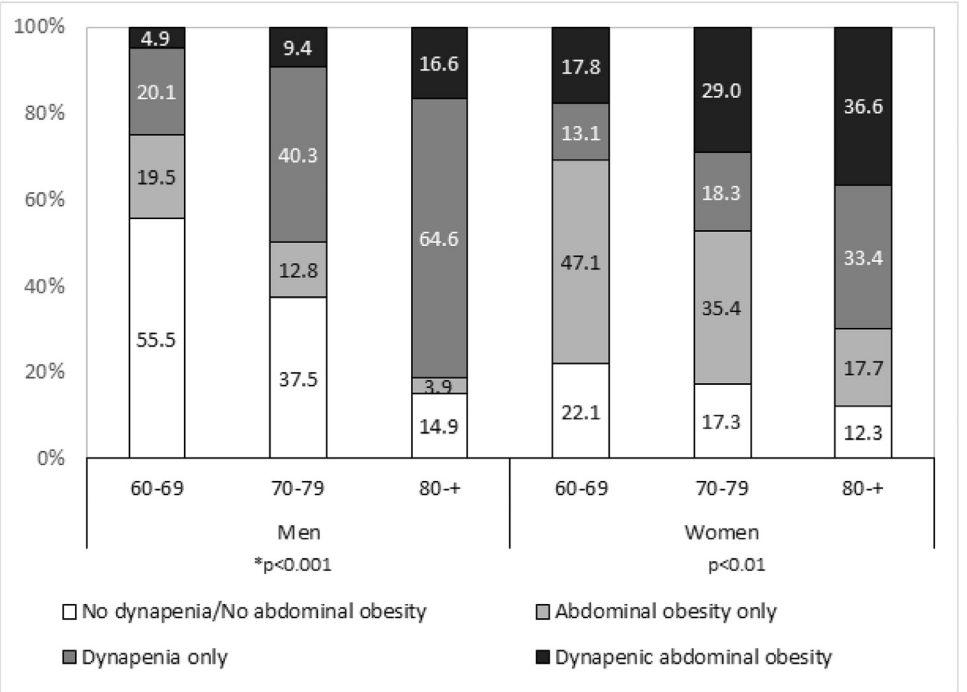

Fig. 1. Prevalence of dynapenic abdominal obesity by sex and age.
* Likelihood-ratio test between dynapenic abdominal obesity classification and age.

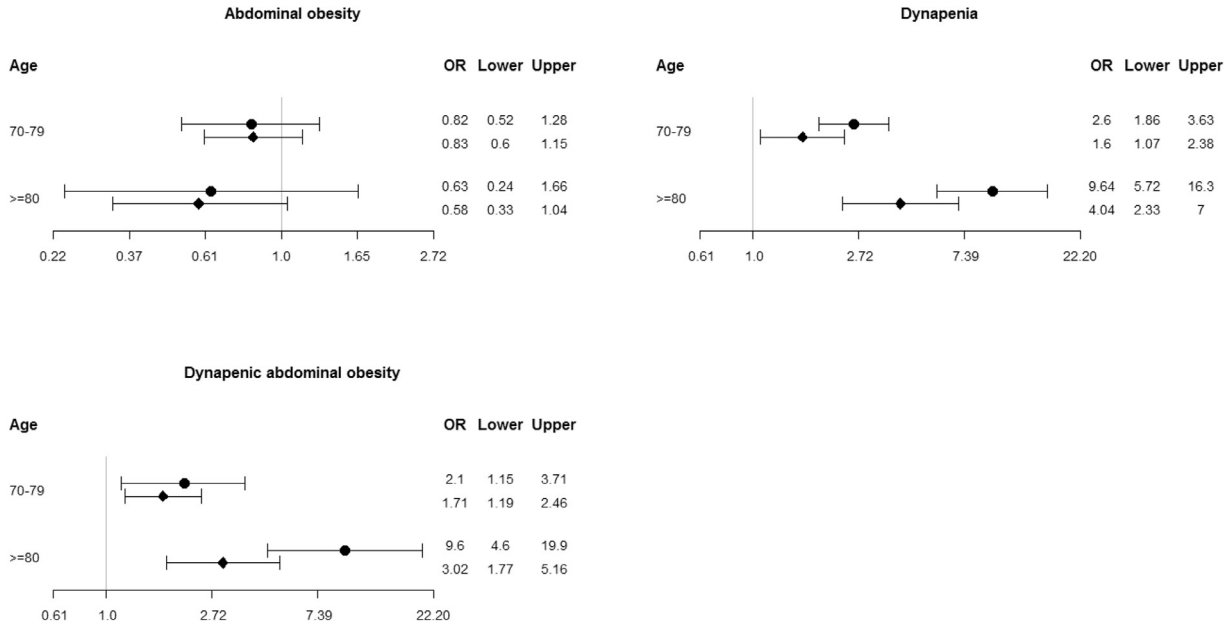

Fig. 2. Odds ratio for the association between dynapenic abdominal obesity by sex and age*.

The X-axis displays the odds ratio (OR) and 95 % Confidence Interval. (• Male; ◆ Female). Reference category 60−69 years.

* ORs were calculated adjusting for the variables of socioeconomic status, education level, marital status, multimorbidity and polypharmacy.p-value for sex*age interaction = 0.030.

with D had a higher odds ratio for falls, dependence in ADL and IADL, and higher chances of being moderately active or inactive in AADL (Table 4). Women with DAO had a higher odds ratio for dependence in ADL, IADL and physical inactivity on AADL, while D women showed only higher chances for dependence in IADL. A generalized linear analysis of the DAO associations with ADL, IADL, and SPPB scores, by age and sex, is shown in Supplementary Table S2.

Discussion

This study aimed to describe DAO prevalence in older Colombian adults and its associations with health variables, functional performance and falls. In Colombia, almost one in five older adults had DAO, and its prevalence increased with age, polypharmacy, multimorbidity, and being a woman. There was interaction between sex and age, increasing DAO odds in men 80 years or older. Older adults with DAO showed higher odds for slow gait speed and physical performance impairment. Women with DAO had higher odds for impairment on ADL, IADL and AADL. Noteworthy, DAO was not associated with falls; only D showed association with falls in men.

DAO prevalence in older adults in Colombia (17.7 % − n = 877) was higher than in England (4.0 %),[7] Brazil (9.3 %),[5] and China (3.8 %).[32] The high DAO prevalence in this population may be due to the elevated occurrence of dynapenia in Colombians, since the older adults from the studies of England, Brazil and China showed higher values of AO than Colombians, even with similar sex proportions and age means. DAO prevalence was higher in Colombian women than men, with results similar to those found in England, where DAO prevalence was 3.7 % in women and 2.0 % in men.[33] In line with previous studies,[33,34] it was found that DAO frequency augments with the increase of age or in adults over 80 years of age. Interestingly, in those 80 years or older, the odds of having DAO were higher in men than

Table 4
Odds ratio of low gait speed, limitations in physical performance, falls, and daily living activities according to dynapenic abdominal obesity (n = 4956).

Dynapenic/ abdominal obesity status	Low gait speed (<0.8 m/s)	SPPB (score <10)	Falls (≥1 in the last year)	Dependence in ADL	Dependence in IADL	AADL §		
						Moderate	Light	Inactive
Men								
DAO	2.4 (1.24−4.74)*	3.5 (1.77−6.89)*	1.3 (0.71−2.21)	1.6 (0.75−3.23)	1.3 (0.76−2.33)	1.04 (0.52−2.06)	1.6 (0.74−3.57)	1.7 (0.80−3.79)
D	1.8 (1.25−2.47)*	2.2 (1.58−3.11)*	1.7 (1.18−2.36)*	1.9 (1.17−3.25)*	1.5 (1.06−2.03)*	1.8 (1.16−2.67)*	1.7 (0.98−2.82)	2.9 (1.79−4.72)*
AO	1.3 (0.83−1.92)*	1.4 (0.93−2.13)	1.2 (0.78−1.95)	1.2 (0.58−2.62)	0.7 (0.41−1.09)	1.3 (0.83−2.20)	1.6 (0.90−2.97)	1.5 (0.81−2.95)
ND/NAO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Women								
DAO	3.3 (2.08−5.35)*	2.5 (1.65−3.89)*	1.1 (0.82−1.58)	2.9 (1.8−4.56)*	2.8 (1.87−4.09)*	0.8 (0.47−1.36)	0.97 (0.55−1.71)	1.7 (1.02−2.9)*
D	1.7 (1.07−2.58)*	2.1 (1.37−3.32)*	1.1 (0.77−1.57)	1.6 (0.96−2.68)	2.5 (1.63−3.78)*	0.9 (0.52−1.56)	1.2 (0.68−2.22)	1.2 (0.69−2.12)
AO	1.3 (0.90−1.75)	1.6 (1.14−2.16)*	0.98 (0.73−1.31)	1.5 (0.93−2.36)	1.4 (0.97−2.05)	0.7 (0.47−1.10)	0.9 (0.57−1.48)	1.2 (0.74−1.82)
ND/NAO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Values presented as Odds ratio (95 % Confidence Interval). ND/NAO: No dynapenia/No abdominal obesity; AO: Abdominal obesity only; D: Dynapenia only; DAO: Dynapenic abdominal obesity. SPPB: Short Physical Performance Battery; ADL: Activities of daily living; IADL: Instrumental activities of daily living; AADL: Advanced activities of daily living. * § Reference category: vigorous. * $p < 0.05$ Significant association.

Models adjusted by age, number of diagnostic diseases and consumed medications.

Hosmer and Lemeshow test (men): Low gait speed (p = 0.0640); SPPB (p = 0.2809); falls (p = 0.7945); ADL (p = 0.4720); IADL (p = 0.2610).

Hosmer and Lemeshow test (women): Low gait speed (p = 0.0840); SPPB (p = 0.6042); falls (p = 0.6967); ADL (p = 0.6346); IADL (p = 0.3018).

women. This may be due to the decline in strength, which is more accelerated in men as age increases,[35] and may also be related to fat mass gain, especially in the central region, which begins at an early age in men.[33]

DAO prevalence increased with multimorbidity and polypharmacy in Colombian older adults (Table 3), results in agreement with previous studies.[3,36] In a sample of 3302 English older adults, Veronese et al. (2023)[36] reported a significant association of DAO with multimorbidity (OR = 1.67; 95 %CI: 1.20−2.32; p = 0.002). Meanwhile, Lv et al. (2022)[3] found association between DAO and polypharmacy (p = 0.001) in a sample of 551 Chinese older adults. DAO associations with multimorbidity and polypharmacy may be driven, at least in part, by a chronic inflammation state, as both central adiposity and dynapenia, may present with an increase in inflammatory molecule concentrations that alter muscle metabolism and immune function.[37,38] Likewise, multimorbidity and polypharmacy may lead to muscle weakness, fat increase and the presence of syndromes, such as frailty and sarcopenia.[39] On the other hand, this study did not find association of DAO with education level or socioeconomic strata (Table 3). This is probably due to the use of a bi-variated statistical analysis that was not adjusted by variables of interest. Similar results have been reported by Araujo et al. (2022)[40] in a sample of 382 older adults from Brazil.

DAO showed associations with slow gait speed and physical performance impairment (Table 4). Similar to the results in Colombians, DAO associations with slow gait speed have been reported in English people over 50 years of age.[2] The decrease in gait speed may be due to the mixed effects of muscle weakness, especially in the legs, and the extra weight owed to OA, leading to a decreased ability to propel off the ground and reduce stride length.[41] In agreement with previous studies, older adults with DAO showed lower SPPB scores.[33] This is noteworthy since physical performance impairment is linked with multiple adverse health outcomes.[42]

Women with DAO had higher odds for impairment on ADL, IADL and AADL (Table 4). This could be because women showed a higher AO prevalence than men. It is possible that AO in women may have affected trunk and hip flexion movements, which are crucial for many ADLs.[43] Contrary to our findings, a study conducted in Ireland showed that only in men was DAO associated with impairment in ADL.[34] These conflicting results may be related to differences in the demography characteristics of studies, since the Irish study included younger people in a longitudinal analysis.[34] Regarding IADL, it is unknown why they are associated with DAO only in women; we found no similar analyses in the literature, since sex is generally used as an adjustment variable.[44] Contrary to our findings on AADL, Araujo et al. (2022)[40] did not report association between physical inactivity and DAO; nevertheless, they analyzed the whole group without exploring gender differences.

Recently, it has been suggested that DAO is more associated with falls than the presence of D or AO alone.[5] Given that low muscle strength may difficult rapid postural corrections when meeting imbalance challenges[45] and the accumulation of abdominal fat decreases postural stability,[46] it was rationalized that both conditions synergize increasing the risk for falls in older adults with DAO.[47] However, in this study only D was associated with falls in men (Table 4). These results may be related to different trends in muscle strength loss and abdominal fat accumulation that this population showed with advancing age. Adults aged 70, 80 or more had greater D and less AO than those aged 60 (Table 3). So, the observed increase in DAO prevalence with age was primarily due to a D augment. This trend was more pronounced in men than women (Fig. 2), showing that men lose muscle strength and function faster at this age, probably increasing the fall risk. A similar result was found by Máximo et al. (2019)[5] in a community-dwelling of 1046 older adults residing in Sao Paulo, Brazil. They did not find DAO associations with falls, but D was associated with recurrent falls. Given that falls affect a high proportion of older adults in Colombia (Table 2), and these have been associated with a higher risk of fractures, hospitalization, mobility and mortality,[48] strategies for decreasing dynapenia in this population are greatly appreciated.

This study has several strengths. It is a national study based on a representative sample of older adults in Colombia, which enhances the generalizability of the findings. The sample included a wide age range, allowing for a more comprehensive understanding of aging-related outcomes. Standardized and validated measurements were used to assess anthropometric, handgrip and functional performance variables, which increases the reliability and clinical relevance of the findings. Furthermore, sex-stratified analyses were conducted, providing important insights into potential differences between men and women that may inform targeted interventions. Nonetheless, the study has some limitations, such as the use of self-reported data on falls may introduce recall bias, and the cross-sectional design, which restricts causal inferences and limits the ability to determine temporal relationships between variables. Additionally, it is worth keeping in mind that comparing cross-sectional results with findings from longitudinal studies conducted in other countries should be done with caution, as differences in study design, follow-up duration, and sociocultural contexts may affect the comparability of results.

Conclusions

DAO prevalence in older adults in Colombia is high and increases with age, polypharmacy, multimorbidity, and being a woman. Only in women DAO is associated with impairment in ADL, IADL, and AADL. In general, DAO is associated with physical performance impairment but not with falls. These results highlight the relevance of DAO evaluation since its early identification and treatment may help to prevent further impairment in physical function and improve quality of life. Thus, it is recommended that DAO routine screening for older adults be incorporated in clinical and community settings, with particular attention to women of all ages and men aged 80 years or older. These strategies could be especially relevant for other low- and middle-income countries, including those in Latin America, where healthcare cost represents public health challenges and resources are limited. Future research in Colombia should consider longitudinal studies to capture important changes over time and strengthen causal interpretations.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Alejandro Estrada-Restrepo: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Fredy Alonso Patiño-Villada:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Juan Carlos Aristizabal:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization.

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Data statement

The datasets used and/or analyzed during the current study are from the SABE Colombia survey 2015; they are available on reasonable request to the Ministry of Health and Social Protection of Colombia.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.gerinurse.2025.103476.

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