

The Prevalence of Sarcopenia in Adults Aged 20 to 59 Attending a Primary Care Clinic at a University Hospital

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Abstract

Objective: Identify the prevalence of sarcopenia in adults aged 20 to 59 years in the Primary Care clinic at a hospital in Mexico.

Methods: An observational, cross-sectional, and descriptive study was carried out, which included 174 participants distributed according to the gender and age groups. Detailed analyses were performed, such as place of residence, schooling level, socioeconomic level, body mass index, and level of sarcopenia.

This analysis was based on the diagnostic criteria established by the European Working Group on Sarcopenia in Older People (EWGSOP2).

Result: In evaluating 174 participants, a gender distribution was identified with 56 men and 118 women. The majority of participants came from urban environments (172). By dividing these by age group (20 to 30 years, 31 to 40 years, 41 to 50 years, and 51 to 59 years), a total of 81, 32, 32, and 39 participants were obtained, respectively. Regarding body mass index, the study was divided into underweight (4), average weight (60), overweight (58), and obesity (52). In this study, probable sarcopenia was identified in 7 participants, while no cases of confirmatory sarcopenia or severe sarcopenia were found. When analyzing the presence of probably sarcopenia according to the body mass index, it was observed that this condition manifested itself in patients with average weight (4 patients), overweight (2 patients), and obesity (1 patient).

Conclusion: The results of this study reveal the absence of sarcopenia in the population between 20 and 59 years of age. Although the findings in this study differ from other studies, it is suggested that longitudinal and specific research aimed at adults in the age range of 20 to 59 years of age be carried out.

Keywords: Sarcopenia; Age groups; EWGSOP2; Body mass index.

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Introduction

According to the European consensus, sarcopenia is defined as a musculoskeletal disorder characterized by a gradual and generalized loss of muscle mass and strength; however, it can be found in sedentary people, inadequate nutrition, or with cancer. Sarcopenia is characterized by weakness, lack of energy, difficulty walking and balance, and increased falls [1].

Sarcopenia is defined by low levels of three measures: muscle strength, muscle quantity/quality, and physical performance as an indicator of severity [1].

It can be classified as primary sarcopenia, where increasing age is the leading cause. Secondary sarcopenia is one where muscle loss is due to some disease and inadequate diet. Regarding its duration, it can be classified as acute (<6 months) or chronic (>six months), the latter being the one that represents a greater risk of mortality [2].

The European Working Group on Sarcopenia in Older People (EWGSOP2) establishes that sarcopenia is probable when lower muscle strength is detected (Criterion 1). A diagnosis of sarcopenia is confirmed by low muscle quantity or quality (Criterion 2); when low muscle strength, low muscle quantity/quality, and low physical performance are detected, it is considered very important (Criterion I, II, and III, respectively) [1]. Worldwide, the World Health Organization (WHO) estimates that more than 50 million people suffer from sarcopenia, a figure that could increase to 200 million in 40 years. The worldwide prevalence

of sarcopenia has been estimated between 5-13% in people between 60-70 years of age and 11-50% in people over 80 years of age [3]. In Latin America, a prevalence of sarcopenia in older adults has been reported at 11.5% in Colombia, 6-15% in the United States, 16% in Brazil, and up to 19.1% in Chile [4].

According to data from the National Health and Nutrition Survey (ENSANUT) 20185, in Mexico, there are more than 82.7 million people over 20 years of age (65.4% of the population), of which 14% correspond to older adults. 6 It is in this age group where a large number of studies have been carried out to detect sarcopenia; however, in the group of young adults (20-59 years), there are few studies that investigate its prevalence [5,6].

In Mexico, a cross-sectional study was carried out on participants over 60 years of age from the ENSANUT 2012 to detect the presence of sarcopenia by Espinel et al. A prevalence of sarcopenia of 13.30% was detected, being higher in women and increasing with age [7,8].

In a cross-sectional study carried out in Mexico by Godínez-escobar and collaborators with 293 patients, a prevalence of 14.28% was found in patients aged 18-39 years and 11.5% for patients between 40-59 years old, using the IMM as a diagnostic method through a bioimpedance scale [9].

In Chile, in 2016, an observational and cross-sectional study was carried out on 25 overweight or obese adults, where muscle mass, muscle strength, and physical resistance were measured through bioimpedance and the Ruffier-Dickson test. A

prevalence of 12% sarcopenia was found in adults between 20-40 years old who are overweight and obese [10].

Sarcopenic obesity is influenced by age and physical activity, as well as diet, and is more common in males. Within sarcopenic obesity, pro-inflammatory hormones that are associated with muscle atrophy through protein degradation are secreted [11].

A study was conducted in Turkey in 2018, with 515 volunteers divided into groups based on ages 18 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79, and 80 and older. The authors evaluated skeletal muscle mass index (SMMI), physical performance, and muscle strength. The authors were using the diagnostic criteria of the European Working Group on Sarcopenia in Older People (EWGSOP). Finding a prevalence from 40 years of age of 7%, 10.6%, 15.4%, 21.2%, and 36.5%, respectively. No prevalence was reported in the age group 18 to 39 years so that the prevalence may vary in different demographic situations in each country [12].

Degenerative changes associated with age corresponding to the presence of sarcopenia have been found, such as anatomical and histochemical changes in muscle fibers, more frequent in type II, in addition to other changes such as ring arrangement of fibers or muscle fibers, broken, destructuring of myofilaments and Z lines and accumulation of lipofuscin [13,14]. Among the factors that intervene in sarcopenia are neuromuscular ones, such as, for example, a decrease in alpha motor neurons. Endocrine factors have also been described, such as the decrease in certain hormones such as testosterone, GH,

IGF-1, or estrogens, to name a few, in addition to immune factors (elevation of pro-inflammatory cytokines) and cellular factors (mitochondrial alterations). Alcohol intake, smoking, a sedentary lifestyle, and low protein consumption are also factors related to sarcopenia [13, 14], and that affect people's functionality, as well as the quality of life [15].

One of the best-known sarcopenia screening scales in the world is the SARC-F scale, which has been validated in the Mexican population since 2016 by Parra et al. This scale measures five domains: strength, walking assistance, rising from a chair, climbing stairs, and falls. Each of these domains is evaluated with a score of 0 to 2 points according to the responses and is classified as having a low probability of sarcopenia with less than four points and a high probability of sarcopenia with more than 4 points. It has an internal consistency (Cronbach's alpha) of 0.641 and an inter-observer agreement of 0.80 [16].

The BMI can be obtained through bioimpedance, which collects parameters and information about the body and metabolism, such as fat mass, lean (muscle) mass, total body water, and basal metabolism, to name a few [17].

There are several instruments and methods used to establish the diagnosis of sarcopenia. The most accurate methods for assessing muscle mass in clinical settings are bioelectrical impedance analysis (BIA) and dual-energy x-ray absorptiometry (DXA), considered the gold standard. Body imaging techniques such as MRI and CT scans are also recommended as that can measure fat, muscle mass, and visceral fat. In addition to

these imaging techniques, the authors can use muscle strength tests, such as hand dynamometry, and physical performance tests, such as walking speed and the chair stand-up test, to evaluate muscle function, as well as anthropometric measurements (a measurement less than 31 cm in the calf is related to disability) [18,19].

In managing sarcopenia, it is recommended that people enroll in a resistance exercise program since these increases both muscle mass and strength. A high protein diet (1 to 1.5 g/day) or protein supplementation is recommended.

High doses of protein (up to 2 g/day) are also recommended in people with severe illness or injury or when there is evidence of a pro-inflammatory or catabolic state [20]. The NSE AMAI Family Socioeconomic Level Survey questionnaire was used to identify the socioeconomic level of the patients [Biennial update in 2022, [21-23].

General objective

To identify the prevalence of sarcopenia in adults aged 20 to 59 years in the Family Medicine clinic in a tertiary care hospital in Mexico.

Secondary objectives

- Know the sociodemographic data of adults between 20 and 59 years old (study sample)
- Calculate the prevalence of sarcopenia according to each body mass index category (average weight, overweight, or obesity)

Methods

It is an observational, cross-sectional, descriptive study performed in a Primary Care clinic at a University Hospital in Monterrey, Nuevo León, Mexico.

The sample to be studied will consist of adults between 20 and 59 who attend the family medicine consultation between October and December 2023 and meet the inclusion criteria.

Inclusion criteria

Adult patients between 20-59 years of age.

Men and women.

Patients who sign informed consent.

Exclusion criteria

Patients with physical disabilities or mobility limitations that prevent gait evaluation. As well as injuries or wounds on the sole that prevent adequate contact for measurement.

Patients with neuromuscular or neurodegenerative diseases such as amyotrophic lateral sclerosis (ALS). Patients with post-polio syndrome, peripheral neuropathy, muscular dystrophies, myasthenia gravis, Alzheimer's disease, Huntington's disease, Lewy body dementia, Parkinson's disease, and spinal muscular atrophy (AME). Patients using anabolic steroids.

Patients with pathologies that produce excess fluid in the tissues, such as ascites and edema. Also, heart failure, chronic kidney disease, chronic liver disease, deep vein thrombosis,

nephrotic syndrome, cancer, congenital anomalies of blood vessels, severe venous insufficiency, Cushing, Addison's disease.

Patients with hyperthyroidism, hypothyroidism, pregnancy, and recent surgeries. Also, rheumatoid arthritis, systemic lupus erythematosus, and patients with implantable medical devices or pacemakers.

Patients with joint pathology or recent or old surgical interventions on hands that prevent the measurement of hand grip strength.

Sample size estimation

A sample size calculation was performed using the formula for estimating a proportion in an infinite population with a Z value of 1.96, delta of 0.05, p of 0.13, and q of 0.87, obtaining a minimum sample size of 174. The information required to carry out this research was collected through a data collection questionnaire of this study and consists of two parts: The first part collects sociodemographic information from the participants: sex (male or female), age (20-59 years), body mass index (malnutrition, normal weight, overweight or obesity), education, urban or rural place of residence, and socioeconomic level.

The second part classifies participants with or without sarcopenia according to the muscle mass index (MMI). It will be obtained using a bioimpedance scale and calculated with the total kilograms of muscle mass divided by the height in meters squared. Muscle strength will be measured using the dynamometry test, and physical performance will be assessed using the Short Physical

Performance Battery (SPPB) test. According to the result, it will be classified as probable sarcopenia, with confirmed sarcopenia or severe sarcopenia. To calculate physical performance, the Short Physical Performance Battery (SPPB) test, which consists of three subtests: a hierarchical balance test, a short walk at the usual pace, and getting up from a chair five consecutive times, will be used.

In addition, muscle strength will be calculated by measuring the grip strength of the dominant hand using a manual dynamometer (BASELINE 12-0241). Three consecutive measurements will be made in each hand, and the highest value will be taken, giving the time of 2 minutes for reset in each intake; for each evaluation, the patient must be seated with the shoulders abducted and neutrally rotated, the elbows flexed at an angle of 90°, the forearm in a neutral position, the wrist in dorsiflexion between 0 and 30° and ulnar deviation of 0 at 15°. Those with a result <27kg in men and 16kg in women will be classified as having low muscle pressure strength; the highest result obtained will be considered.

Subsequently, a measurement will be carried out to assess the muscle mass index with a bioimpedance scale (In-body H2oB, Body composition analyzer) containing stainless steel plates with pressure contact electrodes, with a maximum capacity of 150kg. For the measurement, the patient must fast for 4 hours, not have ingested liquids 30 minutes before the test, have urinated 30 minutes before taking the measurement, have bare feet, be clean and dry, and not have bathed 1 hour before the test. The test or being wet at the time of the test, not having ingested

alcohol in the last 48 hours, and not having done intense exercise in the last 12 hours. The result obtained will be divided by the height in meters squared, where the presence or absence of sarcopenia will be identified in patients who meet the inclusion criteria. A value $<7\text{kg/m}^2$ in men and $<5.5\text{kg/m}^2$ in women will be considered positive.

The Short Physical Performance Battery (SPPB) test will be used to evaluate physical performance. The participant will be instructed to follow the instructions provided by the researchers, and it will be explained that the test consists of three measurements:

- A balance test requires standing up without help or using a cane or walker. Asking the person to stand with feet together side by side, stand with feet in semi-tandem, and stand with the feet in full tandem for 10 seconds.
- Speed and walking test (4-meter route): The participant will be explained to walk normally to the end of the route at the usual speed. Two tests will be carried out, considering the second result.
- Try getting up from a chair five consecutive times. First, bend arms over chest and sit so feet are on the floor, then stand with arms crossed over chest speedy five times, without stopping between lifts. The duration of the procedure will be recorded in seconds with a stopwatch. The scores obtained from the three tests will be added. A result of less than 8 points will be identified as having low physical performance, which will be considered a positive test.

Analysis of data

At the end of the sample data collection, an electronic database will be created in the SPSS V.25 program. For univariate analysis, total frequencies and percentages will be used, and the results will be shown through graphs and tables.

Result

A total of 174 participants were evaluated. Of these, a gender distribution was identified, with 56 men and 118 women. When divided by age groups (20 to 30 years, 31 to 40 years, 41 to 50 years, 51 to 59 years), a total of 81, 32, 32, and 29 participants were obtained, respectively. Sociodemographic data was collected from the following tables (Table 1).

Regarding places of residence, 172 participants are from urban origin and two from rural origin. The level of education, that were distributed as follows: no study (1), primary (13), secondary (46), high school (48), higher education (65), and other studies (1). Regarding the socioeconomic level, A/B (39), C+(42), C (40), C-(23), D+(16), D (13) and E (1) were found. According to the body mass index, those were divided into underweight (4), average weight (60), overweight (58) and obesity (52). This analysis was based on the diagnostic criteria established by the European Working Group on Sarcopenia in Older People (EWGSOP₂), which is divided into probable sarcopenia, confirmatory sarcopenia, and severe sarcopenia according to muscle strength, muscle quality or quantity, and physical performance respectively.

		Age				Total
		20-30 y	31-40 y	41-50 y	51-59 y	
Gender	Man	58	21	23	16	118
	Women	23	11	9	13	56
Place for residence	Urban	80	32	31	29	172
	Rural	1	0	1	0	2
Schooling level	Non	0	0	1	0	1
	Elementary	1	0	7	5	13
	Junior high school	10	15	11	10	46
	High school	23	11	9	5	48
	Bachelor's degree	46	6	4	9	65
	Other	1	0	0	0	1
Socioeconomic status	A/B	29	2	1	7	39
	C+	19	11	8	4	42
	C	14	9	12	5	40
	C-	13	1	4	5	23
	D+	2	8	3	3	16
	D	4	1	4	4	13
	E	0	0	0	1	1
Total		81	32	32	29	174

Table 1: Characteristics measured by age group and sociodemographic data.

In this study, probable sarcopenia was identified in 7 participants, while no cases of confirmatory sarcopenia or severe sarcopenia were found.

The distribution according to gender revealed 4 cases in women and 3 in men.

Of these, the 20 to 30-year-old group presented probable sarcopenia (5), and the 41-to 50-year-old group presented probable sarcopenia (2). According to the body mass index, sarcopenia occurred in patients of average weight (4), overweight (2), and obesity (1) (Table 2 and Table 3).

		Body Mass Index				Total
		Underweight	Normal	Overweight	Obesity	
Age	20-30 y	3	40	21	17	81
	31-40 y	1	10	8	13	32
	41-50 y	0	8	12	12	32
	51-59 y	0	2	17	10	29
Total		4	60	58	52	174
		Level of sarcopenia				Total
		No sarcopenia		Sarcopenia probably		
Age	20-30 y	76		5		81
	31-40 y	32		0		32
	41-50 y	30		2		32
	51-59 y	29		0		29
Total		167		7		174
		Level of sarcopenia				Total
		No sarcopenia		Sarcopenia probably		
Gender	Women	114		4		118
	Men	53		3		56
Total		167		7		174
		IMC				Total
		Underweight	Normal	Overweight	Obesity	
Level of sarcopenia	No sarcopenia	4	56	56	51	167
	Sarcopenia probably	0	4	2	1	7
Total		4	60	58	52	174

Table 2: Characteristics measured by age group, BMI, and level of sarcopenia.

		Frecuency	Percent	Valid Percent	Cumulative percentage
Valid	No sarcopenia	167	16.8	96	96
	Sarcopenia probably	7	0.7	4	100
	Total	174	17.5	100	

Table 3: Measured characteristics of Sarcopenia level.

Discussion

The worldwide prevalence of sarcopenia has been estimated between 5-13% in people between 60-70 years of age and 11-50% in people over 80 years of age [3]. In Latin America, a prevalence of sarcopenia in older adults has been reported at 11.5% in Colombia, 6-15% in the United States, 16% in Brazil, and up to 19.1% in Chile [4].

In Mexico, a cross-sectional study was carried out on participants over 60 years of age from the ENSANUT 2012 to detect the presence of sarcopenia by Espinel et al. A prevalence of sarcopenia of 13.30% was obtained, being higher in women and increasing with age [7].

This study found different results, although the majority of patients with probable sarcopenia were women. The authors obtained a greater probability in women as a larger female population in the study was available; no increase in prevalence was found as age increased. However, it would be worth carrying out longitudinal studies to identify the risk of developing sarcopenia in these patients, dividing that into two groups (control and intervention) to have more significant evidence of sarcopenia in young adults. In a cross-sectional study carried out in Mexico by Godínez-Escobar and collaborators with 293 patients, a prevalence of sarcopenia was found to be 14.28% in patients aged 18-39 years and 11.5% for patients between 40-59 years old, using the IMM as a screening method. It was diagnosed through a bioimpedance scale. This study did not find significant differences in the muscle mass index in individuals from the three age groups [9].

In Chile, in 2016, an observational and cross-sectional study was carried out on 25 overweight or obese adults, where muscle mass, muscle strength, and physical resistance were measured through bioimpedance and the Ruffier-Dickson test. A prevalence of 12% sarcopenia was found in adults between 20-40 years old who are overweight and obese [10]. A study was conducted in Turkey in 2018, with 515 volunteers divided into groups based on ages 18 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79, and 80 and older. It was done by evaluating skeletal muscle mass index (SMMI), physical performance, and muscle strength using the European Working Group on Sarcopenia in Older People (EWGSOP) diagnostic criteria. Finding a prevalence from 40 years of age of 7%, 10.6%, 15.4%, 21.2%, and 36.5%, respectively. No prevalence was reported in the age group of 18 to 39 years so that the prevalence may vary in different demographic situations in each country [12].

Once again, the results found differed from those mentioned above since patients were predominantly without sarcopenia. In the seven patients with probable sarcopenia, it is necessary to identify more specific aspects regarding the comorbidities, physical activity, and diet to compare, with statistical tests, if there is any statistically significant difference in these variables with the presence of sarcopenia. The absence of prevalence of sarcopenia in this study could be attributed to possible changes in the diagnostic criteria for sarcopenia established by the European Working Group on Sarcopenia in Older People (EWGSOP₂) guideline. The cut-off values for muscle strength, muscle

quality/quantity, and physical performance have decreased according to this guideline, which could have affected the identification of cases in the population studied.

Furthermore, since it was carried out in a young and healthy population without comorbidities, the results may possibly reflect the particular characteristics of this demographic group. This study highlights the importance of considering changes in diagnostic criteria, which could play a fundamental role in future research. The authors proposed expanding these studies to more diverse populations, including both older and younger adults, using the new criteria established by EWGSOP₂. It will enable comparisons and contribute to a more complete understanding of the prevalence of sarcopenia in different population segments. It is necessary to point out some limitations, among which it stands out that most of the referenced studies were based on the EWGSOP₁ guideline, where a higher prevalence was observed in the healthy older and young adult population. This contrast highlights the importance of updating methodological approaches to reflect the most recent standards and ensure the validity of the results obtained in future research. These results can be used for future research investigating the risk of developing sarcopenia (odds ratio) or studies with educational, physical, or nutritional intervention to compare the significant

improvement in sarcopenia. In young adults, more information is still needed for recommendations on sarcopenia, as well as expanding what was found in this work to identify population groups at risk and how the characteristics influence sarcopenia. In Colombia, a study was carried out to evaluate the validity and reliability of the short physical performance battery (SPPB), in which a descriptive analysis was carried out, finding a good reliability of 0.87 (95% CI: 0.76-0.93) [24]. The measurements agree with those suggested by Avila from the Institute of Geriatrics [25].

Conclusion

This study reveals the absence of prevalence of sarcopenia in the studding population aged 20 to 59 years, according to the criteria established by the European Working Group on Sarcopenia in Older People (EWGSOP₂). The lack of correlation raises the need for additional research to obtain a more complete picture of sarcopenia in this age group. Compared to other studies, the lack of conclusive results at the University Hospital highlights the importance of undertaking longitudinal and specific research aimed at adults aged 20 to 59 years. This approach will allow a deeper understanding of the factors that could influence the presence or absence of sarcopenia in this population.

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