



Ankylosing spondylitis has a predisposition for the development of sarcopenia in the upper extremities. A single-center observational study.

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Abstract

Introduction: Sarcopenia is associated with chronic diseases, and in rheumatic diseases, there are few reports of its incidence. The study's objective was to determine the relationship between physical activity and sarcopenia in rheumatological patients with ankylosing spondylitis compared to a control group.

Methods: The present case study (CA) of rheumatological patients and controls (CO) was conducted at the IHRED-Guayaquil Medical Center. The variables collected were age, sex, presence of rheumatic disease, percentage of muscle mass, average handgrip dynamometry, SARC-F, and IPAQ score.

Results: There were 70 cases with ankylosing spondylitis and 60 controls. In the AC group, the age was 46.1 ± 15 years; in the CO group, 59.4 ± 9.5 years. In the AC, 84.3% were women, and in the CO group, 81.7%. Significant changes in body composition were evident compared to the control group. There was an association between the percentage of muscle mass and the BASDAI scale. The case group had lower grip strength, 20.5 ± 8.8 Kg, versus 24.2 ± 9.3 Kg ($P=0.0005$), and lower IPAQ activity, 1.33 ± 0.6 in CA versus 2.15 ± 0.51 in CO ($P=0.0005$).

Conclusions: A significant correlation was evident between the degree of physical activity and the incidence of sarcopenia in the case group compared to the control group and a significant decrease in strength in the upper limbs.

Keywords :

MeSH: Sarcopenia, Nutritional Status, Rheumatology, Noncommunicable Diseases, Hand Strength.

Abbreviations

Not declared.

Supplementary information

No supplementary materials are declared.

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Author contributions

Carlos Arturo Brito Ojeda: Conceptualization, data curation, formal analysis, acquisition of funds, research, writing - original draft.

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Introduction

Sarcopenia is described as the progressive and generalized loss of body mass, specifically muscle mass and strength, closely related to age [1]. An approximate loss of 1-2% of muscle mass annually from age 50 and a decrease in muscle strength of 1.5-3% from the sixth decade onwards has been demonstrated. Sarcopenia has been associated purely with aging for several years; however, different causes other than age that contribute to its development are now recognized. Autoimmune diseases, in this case, cause an increase in proinflammatory cytokines, which generate an ideal environment for catabolism and decrease factors related to skeletal muscle anabolism [2]. Resulting in autoimmune patients being a population group with a notable prevalence of low muscle mass index.

According to the parameters established by the European Working Group on Sarcopenia in Older People in its update number 2, low muscle strength is an essential measurement of sarcopenia. In this way, muscle insufficiency or sarcopenia will be determined when it is established that the patient has reduced muscle strength. The diagnosis of sarcopenia has to be confirmed by either low muscle quantity or low muscle quality. Sarcopenia is said to be severe when the patient has low muscle strength, low muscle quality/quantity, and low physical performance [3].

In a study carried out in a rheumatology center in the Republic of Ecuador, it was determined by anthropometric and densimetric methods that at least 66% of the population that attended presented sarcopenia in addition to some rheumatic disease [4]. Being age and physical inactivity two of the main factors causing sarcopenia in the population without rheumatological diseases; according to a study carried out in a gerontological center in the city of Guayaquil, it was identified that at least 46.16% of older adults presented sarcopenia according to the EWGSOP2 scale [5]. It was also described that sarcopenia is more frequent in a population that also presents some comorbidity, the leading causes being the presence of cancer, type 2 diabetes mellitus, chronic obstructive pulmonary disease, and cardiovascular pathologies. These comorbidities directly generate loss of muscle, loss of strength, and physical performance, as in the case of cancer and type 2 diabetes mellitus. However, cardiovascular pathologies depend on the sum of risk factors related to low physical activity, high blood pressure, and inflammatory marker count [6].

An inversely proportional relationship between sarcopenia values and the level of physical activity of patients has been described in several population groups in Asia and

the United States. Evidence is highlighted that a lifestyle modification composed of a moderate to high level of physical activity is necessary to reduce the degrees of sarcopenia, mainly in older adults. On the other hand, it is described that the age group that benefits the most from adding fewer training days during the week will be middle-aged patients, who require less than three days of physical activity per week to see positive results [7-9].

Sarcopenia is related to physical disability, falls, fractures, and even increased mortality [3]. In Ecuador, there are currently several studies related to the measurement of sarcopenia in geriatric patients or with population groups composed mainly of older adults. However, there is limited information related to patients with autoimmune diseases, which shows an evident probability of decreased muscle mass and all the comorbidities that the condition entails.

Identifying an incidence related, in this case, to the practice of physical activities will allow us to consider the importance of this type of lifestyle modification within this group of vulnerable patients. The study aimed to determine the relationship between physical activity and sarcopenia in rheumatological patients compared to a control group in a medical center specialized in rheumatological diseases in Guayaquil, Ecuador.

Materials and methods

Study design

The present study is observational, case-control. The source is ambispective.

Scenery

The study was conducted in the outpatient service of the IRHED Medical Center of the Samborondón, in Guayaquil-Ecuador. The study period was from January 1, 2021, to December 30, 2022.

Participants

Adult patients over 40 years of age were included. 2 groups were formed:

Cases: patients diagnosed with ankylosing spondylitis.

Controls: healthy patients who attend medical consultations with family members.

Patients who followed up with manual dynamometry, bioimpedanciometry, and nutritional surveys were excluded, and the SARC-F questionnaire was not completed. Patients without autonomous ability to respond to the questionnaire were also excluded. Cases of sarcopenia due to amputation and prostration were eliminated.

Variables

The variables were age, weight, height, sex, activity in ankylosing spondylitis according to the BASDAI questionnaire (Bath Ankylosing Spondylitis Disease Activity Index), presence of sarcopenia with the SARC-F questionnaire, IPAQ score (International Physical Activity Questionnaire), survey nutritional, manual dynamometry, electrical bioimpedance.

Data sources/measurements

The source was mixed, direct, and indirect. An electronic form was filled out using data from medical records and patient surveys. The information was treated confidentially; No personal data was included to identify the study subjects. The SACAR-F scale was used: (Strength, Ambulation, Rising from a chair, Stair climbing, and history of Falling) to determine sarcopenia, which has five self-suggestive assessments of strength, assistance when walking, difficulty getting up from one chair and number of falls in the last year that is classified as "none, little or many" in each variable. The IPAQ score, which evaluates the type of intensity of physical activity, was used.

Biases

To avoid interviewer, information, and memory biases, the leading researcher always maintained the data with a guide and records approved in the research protocol. Observation and selection bias was avoided by applying participant selection criteria. Two researchers independently analyzed each record in duplicate, and the variables were registered in the database once their agreement was verified.

Study size

TM program (Version 7.2.5, CDC, Atlanta, USA, September 2022.) with unmatched case-control, the total number of Kelsey cases was 60, and Fleiss controls was 57. The confidence interval was 95%, 80% power, case-control ratio 1.5, percentage of exposed controls 40%, odds ratio 5.0, and percentage of exposed cases 76.9%.

Quantitative variables

Descriptive and inferential statistics were used. The results of categorical variables are expressed as frequency and percentage. Scaled variables are expressed as mean and standard deviation.

Statistic analysis

Inferential statistics are used for the comparative analysis between the groups. Categorical data were formed, and chi-

square was used to establish the association or difference. Data are presented with Odds Ratio (OR), 95% confidence interval for the odds ratio, and P value.

Results

Participants

The study included 70 cases and 60 controls.

Description of the study groups

There were no differences by sex because it was the matching variable. The case group was 13 years younger than the control. The groups had no difference in body mass index ([Table 1](#)). The BASDAI index in the case group was 4.99 \pm 2.3.

Table 1 . Description of the study groups.

	Cases n=70	Controls n=60	Q
Men	11 (15.7%)	11 (18.3%)	0.692
Women	59 (84.3%)	49 (81.7%)	
Age	46.1 \pm 15.4	59.5 \pm 9.6	0.0005
BMI (kg/m ²)	27.7 \pm 4.9	27.0 \pm 4.7	0.05

Body composition

There were statistical differences between the study groups. The cases had higher body fat and lower visceral fat. The distribution of muscle mass was similar in both groups. ([Table 2](#)).

Strength and activity

The control group had greater grip strength in the upper extremities and a more significant activity index with the IPAQ scale ([Table 2](#)).

Secondary analyzes

The intragroup association between body composition variables and sex was measured, and there is a statistically significant negative association between the female sex and muscle mass in both groups ([Table 3](#)). Another statistically significant association was the negative association between the highest percentage of muscle mass and the lowest BASDAI activity index score. The correlation was moderate $R=-0.376$ $P < 0.002$ ([Table 3](#)). There were no other statistically significant associations ([Table 3](#)).

Table 2. Body composition in the study and activity groups _ physical.

	Cases n=70	Controls n=60	P
Body fat percentage.	38.24 ±8.1	37.08 ±8.7	0.0150
Muscle mass percentage (MM).	25.99 ±4.5	26.28 ±4.5	0.200
Visceral fat percentage.	8.76 ±3.8	10.1 ±4.0	0.0005
Grip force (kg).	20.50 ±8.8	24.22 ±9.3	0.0005
IPAQ.	1.33 ±0.60	2.15 ±0.51	0.0005

Table 3 . Association of variables.

	Cases n=70	Controls n=60
% correlation of MM and sex.	R=-0.485 P < 0.001	R=-0.511 P < 0.001
correlation of MM and BASDAI.	R=-0.376 P < 0.002	-
Correlation of MM & IPAQ.	R=0.301 P=0.088	R=-0.111 P=0.400
BASDAI Correlation and Grip Strength.	R=0.034 P=0.851	-
Correlation IPAQ and Grip Strength.	R=0.155 P=0.490	R=0.094 P=0.476

MM: muscle mass. BASDAI: Bath Ankylosing Spondylitis Disease Activity Index.

Discussion

The results of the present study demonstrate that the group of patients with ankylosing spondylitis has lower grip strength and lower activity measured with the IPAQ index, which is interpreted as the presence of sarcopenia in the group of patients with autoimmune diseases with a higher average age at 40 years old. It was noted that female patients predominated compared to male patients, as was evident in 2016 in a rheumatology and rehabilitation center in Guayaquil. In the present case, the percentage of males was 15.7% compared to the 5.26% described in that study. The age described in the latter was also greater than 40 years, with a percentage of the sample composed of 98.65%, while our population was composed of an average age of 45.8 and 92.8% of female and 7.2% male patients. In comparison with literature corresponding to Latin America, in Mexico, a study that compared physical activity and its relationship with sarcopenia in patients with autoimmune diseases described a sample of 43 people composed of 93.1% female patients and 6.9% males. Male with an average age between 40 ± 13.42

years. We highlight age since it has been described that after age 40, the muscle mass index begins to decrease, a factor that we consider important when finding a relationship between sarcopenia and physical activity [2, 10].

In the study carried out at the Fray Antonio Alcalde Civil Hospital of Guadalajara in 2016, a percentage of sedentary lifestyle was evidenced by 82.6% of the sample composed of 46 patients vs. the control group, which was 48%. In our study, on the other hand, of the patients with rheumatic diseases who managed to answer the questionnaire (61), 67.2% had an IPAQ of 1 and a sedentary lifestyle. Meanwhile, in the control group, a sedentary lifestyle was present in 25% of the sample. A higher percentage of this is noted in both groups of cases, so it plays an essential relationship with the degree of sarcopenia present. The percentage could be expanded by implementing a study with a larger sample and adding a larger budget for constant monitoring of the markers that show a sedentary lifestyle in both groups [2].

Considering the inferential statistics presented, it is inferred that female patients have lower muscle mass than male patients. As in patients with rheumatic diseases, the correlation between BASDAI and muscle mass was negative at - 37.6 %, a significant variable with muscle mass percentage. The other correlations in the case group, which cover the variables physical activity and sarcopenia, did not present significance, so it could be interpreted that there is no relationship. However, Yan Du et al., in 2022 at Tulane University in New Orleans, studying a group of patients with osteoporosis and their frequency of physical activity, wrote that patients who exercise more than three days a week are less likely to present sarcopenia among others conditions [9]. Therefore, when studying the different autoimmune diseases, each provides varied information regarding its relationship with physical activity, benefiting one more than the other. This benefit would require a larger sample and resources applicable to a study of the desired characteristics.

Conclusions

The present study demonstrates that muscle mass percentage is associated with more significant physical activity in patients with ankylosing spondylitis predisposed to develop sarcopenia in the upper extremities.

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Statements

Ethics committee approval and consent to participate

The bioethics committee of the Medical School of the Universidad Católica Santiago de Guayaquil approved the study.

Publication consent

Not required when patient-specific images, x-rays, and studies are not published.

Conflicts of interest

The authors declare not to have any interest conflicts.

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