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Somatotype in Spondyloarthritis and their social interactions

Somatotipo na espondiloartrite e suas interações sociais

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ABSTRACT

Spondyloarthritis (SAs) occurs across the anthropometric spectrum as a result of the progression of the disease and the variety of social profiles perceived by the social determinants of health (SDH). **Objetive:** Evaluate and understand the relationship between Somatotype and the social determinants of health, considering whether it influences or is influenced by style, quality of life, socioeconomic, cultural, environmental, behavioral, hereditary and family profiles. **Method:** In this study, SDH were characterized using the Dahlgren and Whitehead model and their interactions with anthropometric measurements were investigated in 61 participants with SAs who were being treated at a teaching hospital in Brazil. Analysis of variance and Fisher's exact test were used to statistically analyze the data to determine the associations. **Results:** The individual's SDH in the sample were as follows: 68.9% men; 31.1% women; 63.9% white; 29.5% brown; 6.6% black; mean age of 54.8 ± 13.68 years; 68.9% from the city of Rio de Janeiro; 22.9% from the municipalities of Greater Rio de Janeiro; and 8.1% from Niterói, São Gonçalo and the lakes region. The analysis of the proximal and intermediate social determinants showed the following characteristics of the sample: married, employed or retired, with one child, having three meals per day, living in good sanitatary conditions, with accessibility to transportation and health services. **Conclusion:** The social sample was heterogeneous, and there was an impact on sleep quality and work environment. Meso-endomorph and mesomorph-endomorph somatotypes were employed (p= 0.033) and had behavior-related problems (p= 0.022); meso-endomorph somatotypes tended to have better sleep quality (p= 0.085). Individuals with ankylosing spondylitis have more access to health services, calm behavior and tend to have more than one child. Conversely, individuals with psoriatic SAs presented a depressive and anxious personality. Body composition was strongly influenced by illness and correlated well with SDH. Through social diagnosis improved approaches can be adopted in the rehabilitation process of patients with SAs.

Keywords: Axial Spondyloarthritis, Social Determinants of Health, Body Composition

RESUMO

A espondiloartrite (EAs) ocorre em todo o espectro antropométrico como resultado da progressão da doença e da variedade de perfis sociais percebidos pelos determinantes sociais da saúde. (DSS). **Objetivo:** Avaliar e compreender a relação entre somatotipo e os determinantes sociais da saúde, considerando se ele influencia ou é influenciado por estilo, qualidade de vida, perfis socioeconômicos, culturais, ambientais, comportamentais, hereditários e familiares. **Método:** Neste estudo, os DSS foram caracterizados utilizando o modelo de Dahlgren e Whitehead e suas interações com as medidas antropométricas foram investigadas em 61 participantes com EAs que estavam sendo tratados em um hospital de ensino no Brasil. A análise de variância e o teste exato de Fisher foram usados para analisar estatisticamente os dados e determinar as associações. **Resultados:** Os DSS do indivíduo na amostra foram os seguintes: 68,9% homens; 31,1% mulheres; 63,9% brancos; 29,5% pardos; 6,6% negros; idade média de 54,8 ± 13,68 anos; 68,9% da cidade do Rio de Janeiro; 22,9% dos municípios da Grande Rio de Janeiro; e 8,1% de Niterói, São Gonçalo e da região dos lagos. A análise dos determinantes sociais proximais e intermediários mostrou as seguintes características da amostra: casado, empregado ou aposentado, com um filho, fazendo três refeições por dia, vivendo em boas condições sanitárias, com acesso a transporte e serviços de saúde. **Conclusão:** A amostra social foi heterogênea, e houve um impacto na qualidade do sono e no ambiente de trabalho. Os somatotipos meso-endomorfo e mesomorfo-endomorfo foram empregados (p= 0.033) e apresentaram problemas relacionados ao comportamento (p= 0.022); os somatótipos meso-endomorfo tendiam a ter melhor qualidade de sono (p= 0.085). Indivíduos com espondilite anquilosante têm mais acesso aos serviços de saúde, comportamento calmo e tendem a ter mais de um filho. Por outro lado, indivíduos com EAs psoriática apresentaram uma personalidade depressiva e ansiosa. A composição corporal foi fortemente influenciada pela doença e correlacionou-se bem com os DSS. Através do diagnóstico social, abordagens aprimoradas podem ser adotadas no processo de reabilitação de pacientes com EAs.

Palavras-chave: Espondiloartrite Axial, Determinantes Sociais da Saúde, Composição Corporal

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INTRODUCTION

Somatotype is of great importance as it offers an overall description of the morphological features of the human body with a strong genetic basis and broad objectives, such as: genetics;[1,2] differences in body composition (BC)[3] between different age groups and genders,[4,5] relationship with dietary patterns and disease prevention;[6] behavior during different diseases,[7,8] social skills[9] and the social issue.[10]

From this rationale, a relationship between somatotype and social determinants of health (SDH) can be determined. However, it is necessary to understand that before clinical disease there is a social disease[11,12] as evidently observed in spondyloarthritis (SAs),[13-15] and it is possible that the somatotype influences or is influenced by the social diagnosis obtained through the analysis of lifestyle and quality of life and of the socioeconomic, cultural, environmental, behavioral, hereditary, and family profiles, known as SDH.[11,12,15-23]

Knowing the patient's family history is important for the prognosis of the disease in the course of the different types of SAs.[15] Additionally, identifying the clinical, economic, and human factors associated with a late diagnosis of axial spondyloarthritis (axSAs)[23] and measuring its impact on work capacity and quality of life[16-18,21-23] are important issues that are still neglected during clinical evaluations and consultations.[24,25]

This study is part of a larger study in which heterogeneity of somatotype components was observed in SAs, influenced by demographic, biomechanical, and anthropometric variables.[26] However, we did not analyze whether or not this distribution was influenced by the SDH.

OBJECTIVE

Thie present study aimed to identify the SDH[11,12] and correlate them with the anthropometric distribution observed in this group of patients.

METHOD

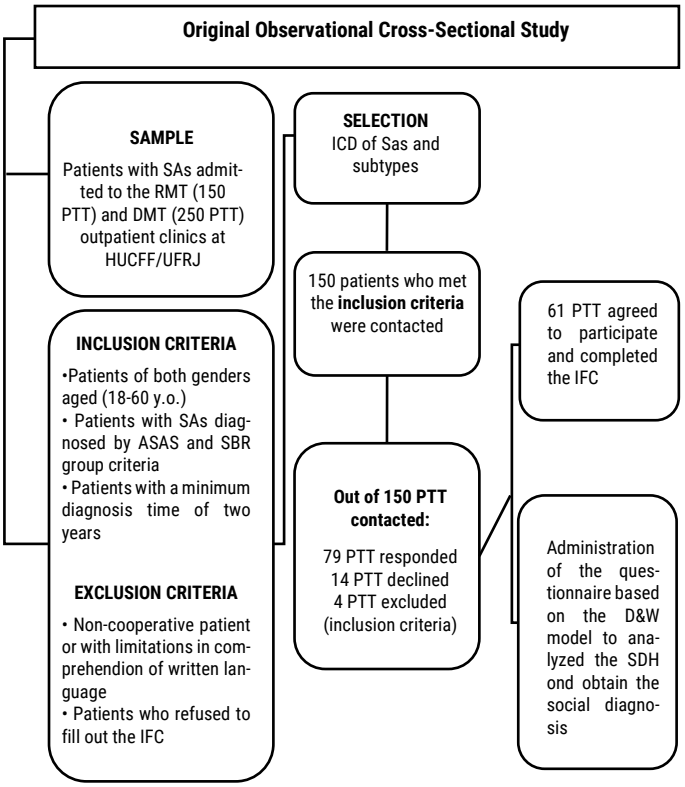
Study design

The present study was a quantitative cross-sectional study with the administration of a specific questionnaire to measure SDH.[11-12]

Population and sample

The study included outpatients diagnosed with SAs and treated at the rheumatology (150) and dermatology (250) departments of the Clementino Fraga Filho University Hospital of the Universidade Federal do Rio de Janeiro (HUCFF/UFRJ). A total of 190 patients with a diagnosis of SAs were selected from the administrative database of the HUCFF/UFRJ according to the International Classification of Diseases (ICD), and its subtypes (H20.0, M07.0, M07.2, M07.6, M45, M46, M46, M46.1). We contacted 150 patients of both genders, aged 25–77 years (mean age 54.9 years), diagnosed with spondyloarthritis at least two years ago, who met the diagnostic criteria for SAs.[13,14] Seventy-nine patients responded to the initial contact, of which 14 did not want to participate. Four were excluded (two because they were wheelchair users and two because they did not meet the diagnostic criteria).

A total of 61 individuals agreed to participate in the study and signed the informed consent form. Subsequently, we analyzed and collected the individuals' demographic data and conducted interviews with them to fill a questionnaire to assess SDH status, based on the Dahlgren and Whitehead model[11,12] (Figure 1).



***SAs**: spondyloarthritis; **PTT**: patients; **IFC**: informed consent form; **RMT**: rheumatology; **DMT**: dermatology; **ICD**: International Code of Diseases; **HUCFF/UFRJ**: Clementino Fraga Filho University Hospital/ Federal University of Rio de Janeiro; **SDH**: Social Determinants of Health[17]*

Figure 1. Flowchart of the method

Measures

We collected data through a directive interview using a previously tested questionnaire for SDH assessment prepared by the researcher according to the assumptions of Dahlgren and Whitehead[11,12] to determine SDH.

The following were considered for this study:

a) **Individual determinants**: age, gender, and ethnicity.
b) **Proximal or family determinants**: marital status, number of children, the ages and education levels of children.
c) **Intermediate determinants**: housing; transport; sanitation (access to water, electricity, and sewage); access to health services; economic (occupation, personal, and household income); access to food (type and number of meals); cultural level; and education.
d) **Behavioral and psychological determinants**: lifestyle, mental health, and well-being profile in everyday life.
e) **Environmental determinants**: provenance or ancestral land.
f) **Hereditary determinants**: family history (Figure 1).

Statistical analysis

For the quantitative variables, measures of tendency and variability were calculated: mean and standard deviation, while for the qualitative variables there were absolute (n) and relative (%) frequency distributions.

Mean comparisons were made using analysis of variance and cross tables with Fisher's exact test. The significance level of the study was set at 5% ($p < 0.05$) in statistical software R version 4.0.2.

Ethical approval

The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board or equivalent committee: ethics committee of the Hospital Universitário Clementino Fraga Filho of the Universidade Federal do Rio de Janeiro (CEP-HUCFFF/UFRJ); Certificate of Presentation of Ethical Appreciation (CAAE) number: 83384818.2.0000.5257.

RESULTS

The demographic, anthropometric, and social data are shown in illustrations, thus Chart 1 shows the demographic characteristics of the sample. The social diagnosis was obtained through the following SDH: proximal or familial; intermediate – food, economic, cultural level and education; behavioral and psychological; environmental, and hereditary, which is presented in Table 1.

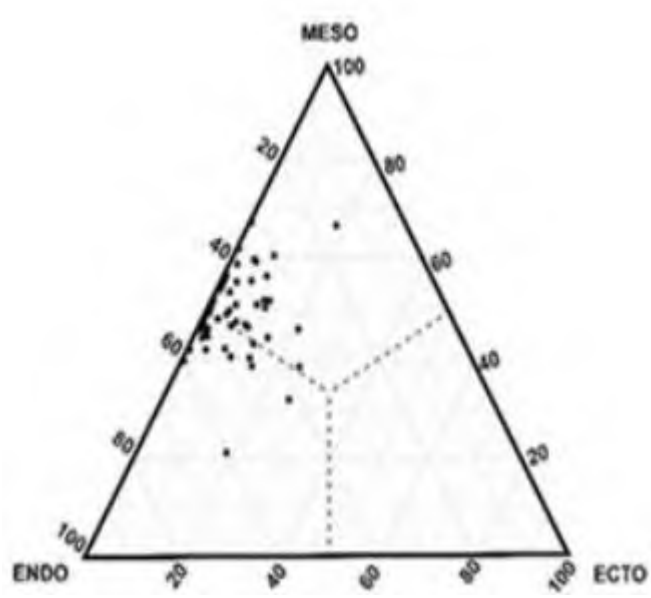


Figure 2. Somatotype distribution: mesomorph, endomorph, and ectomorph

Table 1. Overview analysis of the correlation of somatotype with the variables of interest

Characteristics	Variables	Endo Mesomorph	Endomorph Mesomorph	Meso Endomorph	Balanced Mesomorph	Mesomorph-endomorph	P
	N= 61	19	6	26	1	9	
Employment (%)	No	4 (21.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.033*
	Yes	6 (31.6)	1 (16.7)	5 (1.,2)	0 (0.0)	5 (55.6)	
	No Answer or Not Applicable	9 (47.4)	5 (83.3)	21 (80.8)	1 (100.0)	4 (44.4)	
Behavioral problems (%)	Yes	1 (5.3)	3 (50.0)	4 (15.4)	0 (0.0)	4 (44.4)	0.022*
	No Answer or Not Applicable	18 (94.7)	3 (50.0)	22 (84.6)	1 (100.0)	5 (55.6)	
Sleep quality (%)	Good	14 (73.7)	1 (16.7)	15 (57.7)	0 (0.0)	4 (44.4)	0.086*
	Poor	5 (26.3)	5 (83.3)	11 (42.3)	1 (100.0)	5 (55.6)	

**Tests do not consider balanced mesomorph*

The prevalence of somatotype and the analysis of anthropometric, demographic, and phenotypic variables of this sample have been described in our cohort study.[26] The distribution of somatotypes is graphically represented by a somatochart (Figure 2) and the overall analyses of the correlations among the social diagnosis and somatotype, BC, and SAs type and subtype are presented in Table 2, which shows the overall analyses of the correlations between social diagnosis and somatotype, BC, and type and subtype of spondyloarthritis. The analyses followed a methodological pattern: presence versus absence of the variable.

There were significant values in the variables of the intermediate determinant (access to health services) and the environmental determinant (work environment), in the SAs types. No significant or trending values were observed for the following determinants: individual; proximal or familial; hereditary and other in-termediate and environmental variables. There was a significant correlation ($p= 0.013$) between the axial type and access to health services, especially family clinics [24 (61.5%)] compared to the peripheral type [11 (50%)].

There was a trend correlation ($p= 0.074$) between the axial type and being happy in work envi-ronment [18 (46.2%)] and a trend correlation ($p= 0.085$) between the axial type and getting along well at work [19 (48.7%)], both compared to the peripheral type. However, there was a significant number of participants, in both types of SAs, who did not answer the questions related to the environmental determinant – being happy at work: axial [16 (41.0%)] and peripheral [15 (68.2%)] and getting along well at work: axial [20 (51.3%)] and peripheral [17 (17.3%)] (Table 2).

Table 2. Correlation of SAs (spondyloarthritis) and WC (body composition) with DSS (social determinants of health)

Types of SAs × SDH				
Determinants	**Axial**	**Peripheral**	**Result**	**Comments**
Access to health services	FC [24 (61.5%)]	FC [11 (50%)]	p= 0.013	Patients with the axial type sought healthcare significantly more frequently, especially in FCs, than those with the peripheral type
Work Environment	Happy [18 (46.2%)]	Happy [7 (31.8%)]	p= 0.074	Patients with the axial type tended to be happier at work and to get on better than those with the peripheral type. However, in both types, there was a high number of no respondents to both questions: HAPPY AT WORK: axial [16 (41.0%)] and peripheral [15 (68.2%)]; GETS ON WELL AT WORK: axial [20 (51.3%)] and peripheral [17 (17.3%)]
	Gets on well [19 (48.7%)]	Gets on well [5 (22.7%)]	p= 0.085	
Subtypes of SAs × SDH				
Determinants	**AS**	**PsSpA**	**Result**	**Comments**
Proximal – children	1 child [9 (31%)]; 2 children [7 (24.1%)]; 3 children [5 (17.2%)]	No description	p<0,089	Patients with AS tended to have 1, 2, or 3 children. There was no significance or tendency to have children in those with PsSpA (p= 0.164). However, there was a tendency for participants without AS to have 1 child [14 (43.8%)] or 2 children [13 (40.6)]
Behavioral	Calm [22 (75.9%)]	No description	p= 0.089	Patients with AS tended to be calm [22 (75.9%)]
Work Environment	Happy [15 (51.7%)]	No description	p= 0.037	Patients with AS were happy at work [15 (51.7%)]
Access to health services	No description	Non-PsSpA – CF [22 (59.5%)]	p<0,012	Patients who do not have EasPs have access to the public health service, especially the FC [22 (59.5%)]. Those with EasPs have less access [13 (54.2%)]
Work Environment	No description	Non-PsSpA – Happy [19 (51.4%)]	p= 0.044	Patients who do not have EasPs are happy at work [19 (51.4%)]. Those who have AEsPs are not flexible at work [6 (25%)]. However, there was a great abstinence in the answers to the environmental question: HAPPY AT WORK – those who have EasPs [17 (70.8%)] and those who do not [14 (37.8%)]
BODY CONDITIONS				
Determinants	**Trend**	**Significance**	**Result**	**Comments**
Employment	↓BFM {17 [20.8 (5)]}		p= 0.096	Employed individuals tended to have lower BFM
Private Healthcare	↑RM {34 [20.3 (3.3)]}	↑ BM {34 [7 (0.6)]} ↑ MM {34 [32.4 (4.8)]} ↑ LBM {34 [59.6 (8.1)]}	p= 0.086 p= 0.001 p= 0.028 p= 0.020	Patients treated in private healthcare centers tended to have higher RM and had higher BM, higher MM, and higher LBM
Health Center	↑BM {33 [6.9 (0.6)]}		p= 0.061	Patients who had health insurance tended to have higher BM
Depression	↓%MM {13 [36.5 (44)]}		p= 0.069	Patients with depression tended to have a lower %MM
Agitated Behavior	↓LBM {17 [55.8 (7.3)]}	↓ MM {17 [29.8 (4.7)]}	p= 0.067	Patients who had agitated behavior tended to have lower LBM and lower MM. Patients who had a calm behavior tended to have higher LBM and higher MM
Calm Behavior	↑LBM {42 [57.9 (7.2)]}	MM {42 [31.5 (4.3)]}	p= 0.044	
Retired		↑BFM {35 [26.4 (7.1)]} ↑RM {35 [20.5 (3.3)]} ↓MM {35 [37 (3,8)]}	p= 0.001 p= 0.013 p= 0.002	Retirees had higher BFM, higher RM, and lower MM
Happy / Unhappy work environment		↓MM {25 [32.6 (4.8)]} ↑%MM {25 [40.4 (4.2)]}	p= 0.041 p= 0.024	Patients who were happy at work had less MM and patients who were not happy had higher %MM
Good Relationship at Work		↑%MM {24 [40.1 (4.2)]}	p= 0.032	Patients who got along well at work had higher %MM
Economic Profile correlation of				
Own income	BM r = 0.238		p= 0.064	According to Spearman's correlation analysis, there was a slight correlation between having personal income or family income and BC. There was a trend correlation between higher BM and having personal income and a trend correlation between higher %MM and having family income. There was a significant correlation between having higher MM mass and higher LBM and having personal income and between lower BMI and having personal income
		↑MM r = 0.305	p= 0.017	
		↑LBM r = 0.259	p= 0.043	
Family income	%MM r = 0.227		p= 0.078	
	BMI r = −0.312	p= 0.014	BMI r = −0.312	

***SAs**: spondyloarthritis; **AS**: ankylosing spondylitis; **PsSpA or PsA**: Psoriatic Spondyloarthritis or Psoriatic Arthritis; **SDH**: social determinants of health; **FC**: family clinic; **BM**: bone mass; **%MM**: % muscle mass; **MM**: muscle mass; **BFM**: body fat mass; **RM**: residual mass; **LBM**: lean body mass; **BMI**: body mass index*

In the ankylosing spondylitis (AS) subtype, there were significant values in the following variables: the proximal or familial determinant (having children); the behavioral determinant (personality); and the environmental determinant (work environment). Therefore, there was no significant or trending value in the individual, intermediate and hereditary determinants and, in other variables of the proximal or familial, behavioral, and environmental determinants. There was a significant correlation (p= 0.037) between AS and being happy at work [15 (51.7%)], a trend correlation between AS and being calm [22 (75.9%)], and a trending correlation (p=0.089) between AS and having 1 child [9 (31%)], 2 children [7 (24.1%)], or 3 children [5 (17.2%)]. It is noteworthy that there was no significance or trend for having children (p= 0.164) in patients with PsSAs. However, patients without AS tended to have 1 child [14 (43.8%)] or 2 children [13 (40.6)] (Table 2).

In the PsSAs subtype, there was a significant value in the variables of intermediate determinant (access to health services) and of environmental determinant (work environment). There were no significant or trending values in the individual, proximal or familial, hereditary, and other intermediate and environmental determinants. There was a significant correlation (p= 0.012) between not having PsSAs and access to health services, especially family clinics [22 (59.5%)], compared to having PsSAs, who accessed it less [13 (54.2%)]. There was a significant correlation (p= 0.044) between not having PsSAs and feeling happy at work [19 (51.4%)], that is, patients with PsSAs were not happy at work [6 (25%)]. However, a significant number of participants with and without PsSAs [17 (70.8%) and 14 (37.8%)], respectively, did not answer questions related to the environmental determinant (Table 2).

We obversed a probability of significance between BC and the following determinants: intermediate - access to private healthcare and higher bone mass {34 [7 (0.6), p= 0.001], higher muscle mass {34 [32.4 (4.8), p= 0.028]}, and higher lean body mass {34 [59.6 (8.1), p= 0.020]}; being retired and higher body fat mass {35 [26.4 (7.1), p= 0.001]}, higher residual mass {35 [20.5 (3.3), p= 0.013]}, lower muscle mass {35 [37 (3.8), p= 0.002]}; behavioral and psychological determinants: agitated behavior and lower muscle mass {17 [29.8 (4.7), p= 0.044]}; calm behavior and higher muscle mass {42 [3.5 (4.3), p= 0.044]}; happy at work and lower muscle mass {25 [32.6 (4.8), p= 0.041]}; not happy at work and higher percentage of muscle mass {25 [40.4 (4.2), p= 0.024]}; and getting along well at work and higher percentage of muscle mass {24 [40.1 (4.2), p= 0.032]}.

We verified a probability of a trend between BC and the following determinants: intermediate – being employed and lower body fat mass {17 [20.8 (5), p= 0.096]}, access to private health and higher residual mass {34 [20.3 (3.3), p= 0.086]}, having health insurance and higher bone mass {33 [6.9 (0.6), p= 0.061]}; behavioral and psychological determinants: depression and lower percentage of muscle mass {13 [36.5 (44), p= 0.069]}, agitated behavior and lower lean body mass {17 [55.8 (7.3), p= 0.067]}, calm behavior and higher lean body mass {42 [57.9 (7.2), p= 0.067]}.

Because significant and trend correlations were found between the intermediate and behavioral determinants and the economic variable, we decided to analyze the correlation between BC and this variable. To this end, Spearman's nonparametric correlation showed a slight correlation between BC and personal income or family income. There was a trend correlation between higher bone mass and having personal income (r= 0.238, p= 0.064) and a trend correlation between higher muscle mass percentage and having family income (r= 0.227, p= 0.078). There was a significant correlation between higher muscle mass (r= 0.305, p= 0.017), higher lean body mass (r= 0.259, p= 0.043), and lower BMI (r= 0.312, p= 0.014) and having personal income.

DISCUSSION

Herein we describe the results of an investigation into the relationship between somatotype and its components in SAs and the social interactions in a group of patients treated at the rheumatology and dermatology departments of a large tertiary university hospital in the city of Rio de Janeiro. The aim of this investigation was to continue the study of somatotype prevalence in SAs,[26] with the analysis of the social diagnosis of the disease in this group of patients. Therefore, the relationship between SAs, somatotype, and BC was analyzed, and the social diagnosis was made through the analysis of SDH.[10-12]

The majority of participants were from Rio de Janeiro, were male, of white ethnicity, were overweight, and were nonatrophic. Ideally, the study would have been a prospective one, because there are social aspects that deteriorate due to factors such as advancing age, differences between genders, disease progression, postural pattern, postural stability, body shape, BC, genetics, sedentary lifestyle habits, being physically active, and/or being an athlete,[1-9; 13-25] however, this was not feasible due to time variable.

The focus was to carry out the social diagnosis of the disease, which, together with the anthropometric results presented in the previous study,[26] may possibly guide future proposals for pharmacological and non-pharmacological interventions. Thus, based on the premise that there is a social diagnosis before a clinical diagnosis,[11-15] it is important to know the patient, which is neglected by most physicians.[25] We discuss results not yet found in the literature and, although they reflect the sample, they are representative of its social diagnosis. Significant results are indicators of social health, and a coincidence was observed in the absence of significant or trending values regarding individual and hereditary determinants and somatotypes in the types and subtypes of SAs. Furthermore, we found an absence of environmental determinants and other variables of intermediate and behavioral determinants in an isolated analysis of the somatotypes identified, while the SA types and subtypes revealed an absence of proximal determinants, behavioral determinants, and othervariables of intermediate and environmental determinants. This demonstrates that social variables are ends, while somatotype and type and subtype of SAs are means, that can be interpreted as causes of those variables.

On the other hand, it has already been observed in prevalence studies that significance can contribute to the somatotype, thus it was observed, in the employment variables, a presence of behavioral problems and sleep quality, and also that participants with endo-mesomorph somatotype tend to be more active, to have a job and be calm, which are characteristics followed by the mesomorph-endomorphs and meso-endomorphs. However, there was a significant number of absent answers among all somatotypes on this question, but it was more noticeable in participants among meso-endomorphs, who responded to this question. Behavioral problems were found among all somatotypes, though meso-endomorphs and mesomorph-endomorphs tended to be calm. This clearly shows the influence of the somatotype in an indiviual's life, with endo-mesomorphs and meso-endomorphs having good sleep quality and endomorph-mesomorphs and mesomorph-endomorphs having poor sleep quality.

Although there are not many studies involving somatotype, sleep quality, and spondyloarthritis, mesomorphic predominance was correlated with higher morbidity regarding the relationship between sleep quality, obesity, and somatotype,[21,27-29] and non-restorative sleep was reported in participants with axSAs.[27] Therefore, this issue deserves further clarification.

Among the SAs types, participants with axSAs present a greater access to health services, especially family clinics, and declared that they were calm, happy at work, and that they were getting along well. Individuals with PSAs had less access to health services and predominantly sought emergency care units (entitled UPA) and a portion declared themselves unhappy at work. However, there was a significant absence of responses from the participants of both types, which shows a resistance to revealing their feelings regarding behavioral and environmental determinants, especially regarding happiness at work; there were more nonrespondents among those with the peripheral type. With regard to the variable getting along at work, there were more nonrespondents among those with the axial type.

Among the SAs subtypes, participants with AS tended to have more than one child, be calm, and be happy at work. It is interesting to note that there was no significant or trending correlation between having children and having PsSAs. However, those without AS tended to have one or two children exhibited agitation. Participants with PsSAs had less access to health services and were unhappy at work. However, there was a significant number of participants with and without PsSAs who did not answer the questions related to the environmental "being happy at work" determinant, an issue that needs to be examined.

We hypothesized that this particular finding is related to the cutaneous manifestations of the disease, leading to non-inclusive experiences in the work environment. Futhermore, in recent research Nikiphorou et al.[30] described that in axSpa, high disease activity affects the individual's ability to work, especially in jobs that require physical strength, while Kiltz et al.[31] described that patients with axSpA report negative experiences in the work environment and observed that low disease activity and better physical function are predictors for intact work participation. However, Zhao et al.[32] associated socioeconomic and intellectual level with greater access to health care with more favorable work outcomes, regardless of the SAs phenotype, but did not consider somatotype.

In our study, we observed that in individuals with AS who feel unhappy in the work environment, there is a possible relationship with their quality of life and lifestyle, due to their changes in postural biomechanics,[19,33,34] that induce microinjuries, activating inflammation,[35] and contributing to poor work performance.[33-37]

Despite this mechanobiological evidence,[33-35] there is still a hidden social issue involving employers, coworkers and their poor understanding of AS, which generates non-inclusive experiences in the work environment. This was well related by Santos et al.[38] who concluded that in SAs disease activity and physical function are determinants of health-related quality of life and global functioning and health.

We found a higher correlation between variables when we analyzed BC and SDH, and demonstrated a strong influence of SAs in BC and a strong correlation between BC and SDH. The following correlations were observed: having access to health services, in particular private services, and having higher residual and bone masses, especially among those with a health insurance or plan; being retired and having higher body fat mass, higher residual mass, and lower muscle mass; agitated behavior and having lower muscle mass and tending to have lower lean body mass or vice versa, calm behavior and having higher muscle mass and tending to have higher lean body mass; being happy at work and having less muscle mass and, not having and having a higher percentage of muscle mass; and getting along well at work and having a higher percentage of muscle mass.

This may seem confusing because individuals with depression have a lower percentage of muscle mass and decreased strength and autonomy,[36] as confirmed in the present study. So, how is the binomial "being happy at work and having less muscle mass" possible? One explanation may be the low number of responders to the questions related to the environmental determinant "being happy in the work environment" it is clear that they demonstrate their discomfort without you witnessing it, however, confirming their low self-esteem[37] and negative impact on this environment.[31,36,37] It is possible that they perceive the work environment to be happy, but this does not reveal that they do not feel happy there. This is a problem that deserves to be addressed better. Moreover, employment tends to lead to lower fat mass.

These significant and trending results show a relationship between the economic intermediate determinant and BC, confirming the socioeconomic influence on the outcomes of the disease,[18,24,32,38] as well as the influence of social habits.[39] Those with a personal income had higher muscle mass, lean body mass, lower BMI, and higher bone mass, whereas those with a family income tended to have higher muscle mass. Unfortunately, it is a social diagnosis with a complex solution.

Inflammatory musculoskeletal diseases have an impact on BC, muscle strength, and trophism. However, few studies have been conducted on this topic, and even fewer involve SAs. One example is the SARCOSPA study[40] which showed a higher incidence of sarcopenia in individuals with SpA than in healthy controls.

CONCLUSION

The interpretation of the results of the multiple correspondence analysis considering the relationships between age, gender, disease duration, somatotype, type and subtype of SpA, and BC allowed concluding that: younger people tended to have the axSpA and AS subtypes, with only one phenotype; older individuals tended to have the disease for longer, namely the PSpA and PsSpA subtypes, with two or more phenotypes (cutaneous and enthesopathic) and were endomorph-mesomorphs. Brance et al.[41] reported that rheumatoid arthritis was associated with neither gender nor BMI. This study reveals that through social diagnosis and maybe the somatotype,[32,38,39,42,43] more adapted approaches can be adopted in the rehabilitation process of patients with SAs.[42-45] These findings suggest the need for improvements in socio-educational strategies, but, above all, it proposes greater care in medical care standards in the perception of the needs of socioeconomically vulnerable patients in order to make them more aware of their health status, with independence and autonomy.

In conclusion, meso-endomorphs and mesomorph-endomorphs tended to have better sleep quality and had behavioral problems. Individuals with AS had more access to health services, had a calm behavior, and tended to have more than one child. The opposite occurred in participants with PsSpA, who presented a depressive and anxious profile. BC was strongly influenced by the disease and correlated well with SDH, especially in the

intermediate; behavioral/psychological, environmental, and proximal determinants.

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AUTHOR CONTRIBUTIONS

All authors have accepted responsibility for the entire content of this manuscript and approved its submission. Hamdan PC: Conceived and designed the analysis; contributed data/analysis tools and wrote the paper; Carneiro SCS: Data collection and wrote the paper; Maleh HC: Data collection and wrote the paper; Abreu MM: Conceived and designed the analysis; contributed data/analysis tools and wrote the paper.

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Chart 1. Demographic and social characteristics of the sample (continue)

OVERALL		
Characteristics	**Variables**	**Total**
N		**61**
City (%)	Belford Roxo	2 (3.3)
	Mesquita	1 (1.6)
	Niterói	1 (1.6)
	Nova Iguaçu	5 (8.2)
	Rio das Ostras	1 (1.6)
	Rio de Janeiro	42 (68.9)
	Seropédica	1 (1.6)
	São Gonçalo	3 (4.9)
	São João de Meriti	5 (8.2)
Rio de Janeiro (%)	No	19 (31.1)
	Yes	42 (68.9)
Ethnicity (%)	White	39 (63.9)
	Black	4 (6.6)
	Brown	18 (29.5)
Age [mean (SD)] years		54.87 (13.68)
Gender (%)	Female	19 (31.1)
	Male	42 (68.9)
Duration of illness (mean (SD)) - years		20.38 (10.44)
Time since diagnosis (mean (SD)) - years		16.16 (10.30

FAMILY		
Characteristics	**Variables**	**Total**
N		**61**
Marital status (%)	Married/common-law marriage	44 (72.1)
	Divorced/separated	7 (11.5)
	Single	7 (11.5)
	Widower	3 (4.9)
Children (%)	1	23 (37.7)
	2	20 (32.8)
	3	6 (9.8)
	No Answer/Not Applicable	12 (19.7)
Adults (%)	Yes	37 (60.7)
	No Answer/Not Applicable	24 (39.3)
Minors (%)	Yes	12 (19.7)
	No Answer/Not Applicable	49 (80.3)
Employed (%)	Yes	33 (54.1)
	No Answer/Not Applicable	28 (45.9)
Contribute to income (%)	Yes	1 (1.6)
	No Answer/Not Applicable	60 (98.4)
In school - public (%)	Yes	7 (11.5)
	No Answer/Not Applicable	54 (88.5)
In school - private (%)	Yes	9 (14.8)
	No Answer/Not Applicable	52 (85.2)

ECONOMIC		
Characteristics	**Variables**	**Total**
N		**61**
Employment (%)	No	4 (6.6)
	Yes	17 (27.9)
	No Answer/Not Applicable	40 (65.6)
Institution (%)	Private	10 (16.4)
	Public	4 (6.6)
	No Answer/Not Applicable	47 (77.0)
Entrepreneur (%)	Yes	4 (6.6)
	No Answer/Not Applicable	57 (93.4)
Domestic (%)	Yes	1 (1.6)
	No Answer/Not Applicable	60 (98.4)
Small services (%)	Yes	3 (4.9)
	No Answer/Not Applicable	58 (95.1)
Informal (%)	Yes	13 (21.3)
	No Answer/Not Applicable	48 (78.7)
INSS Leave of Absence (%)	Yes	1 (1.6)
	No Answer/Not Applicable	60 (98.4)
Retired (%)	Yes	35 (57.4)
	No Answer/Not Applicable	26 (42.6)
Type of leave/retirement (%)	Illness	1 (1.6)
	Disability	8 (13.1)
	Pensioner	3 (4.9)
	Time	24 (39.3)
	No Answer/Not Applicable	25 (41.0)
	Illness	1 (1.6)
	Disability	8 (13.1)
	Pensioner	3 (4.9)
Household income (mean (SD))		5.68 (6.12)
Number of pPeople per MW (%)	1	25 (41.0)
	2	36 (59.0)
Personal income - MW (mean (SD))		3.34 (3.56)

FOOD		
Characteristics	**Variables**	**Total**
N		**61**
Number of meals per day (%)	3	40 (65.6)
	4	18 (29.5)
	5	3 (4.9)
Meat (%)	No	1 (1.6)
	Yes	60 (98.4)
Cereals (%)	Yes	61 (100.0)
Vegetables (%)	Yes	60 (98.4)
	No Answer/Not Applicable	1 (1.6)
Milk and dairy products (%)	Yes	60 (98.4)
	No Answer/Not Applicable	1 (1.6)
Pasta (%)	Yes	61 (100.0)
Fruits (%)	Yes	61 (100.0)
Breads (%)	Yes	60 (98.4)
	No Answer/Not Applicable	1 (1.6)
Filtered water (%)	Yes	60 (98.4)
	No Answer/Not Applicable	1 (1.6)

HOUSING		
Characteristics	**Variables**	**Total**
N		**61**
Masonry house (%)	Yes	61 (100.0)
Home ownership (%)	Yes	42 (68.9)
	No Answer/Not Applicable	19 (31.1)
Rented house (%)	Yes	8 (13.1)
	No Answer/Not Applicable	53 (86.9)
Family's house (%)	Yes	10 (16.4)
	No Answer/Not Applicable	51 (83.6)
Paved street (%)	No	1 (1.6)
	Yes	59 (96.7)
	No Answer/Not Applicable	1 (1.6)
Community (%)	No	57 (93.4)
	Yes	4 (6.6)
Personality (%)	Calm	56 (91.8)
	Violent	5 (8.2)
Freedom to come and go (%)	No	3 (4.9)
	Yes	58 (95.1)

MEANS OF TRANSPORT		
Characteristics	**Variables**	**Total**
N		**61**
Private (%)	Yes	34 (55.7)
	No Answer/Not Applicable	27 (44.3)
Public (%)	Yes	55 (90.2)
	No Answer/Not Applicable	6 (9.8)
Close to home (%)	No	2 (3.3)
	Yes	54 (88.5)
	No Answer/Not Applicable	5 (8.2)
Easy access (%)	20 min walk	1 (1.6)
	No	2 (3.3)
	Yes	54 (88.5)
	No Answer/Not Applicable	4 (6.6)
Available at any time (%)	Until 11 PM	1 (1.6)
	No	3 (4.9)
	Yes	52 (85.2)
	No Answer/Not Applicable	5 (8.2)

ACCESS TO HEALTH SERVICES		
Characteristics	**Variables**	**Total**
N		**61**
Easy (%)	No	1 (1.6)
	Yes	59 (96.7)
	No Answer/Not Applicable	1 (1.6)
Public (%)	Yes	60 (98.4)
	No Answer/Not Applicable	1 (1.6)
Private (%)	Yes	28 (45.9)
	No Answer/Not Applicable	33 (54.1)
Health insurance (%)	Yes	33 (54.1)
	No Answer/Not Applicable	28 (45.9)
Health center close to the residence (%)	Yes	58 (95.1)
	No Answer/Not Applicable	3 (4.9)
Type (%)	CF	35 (57.4)
	HP	8 (13.1)
	PS	12 (19.7)
	UPA	5 (8.2)
	No Answer/Not Applicable	1 (1.6)

Chart 1. Demographic and social characteristics of the sample (continuation)

SANITATION		
Characteristics N	**Variables**	**Total 61**
Water (%)	Running	58 (95.1)
	Well	3 (4.9)
Do you buy water? (%)	Yes	1 (1.6)
	No Answer/Not Applicable	60 (98.4)
Sewage (%)	Yes	61 (100.0)
Electricity (%)	Electric Lighting	61 (100.0)

ENVIRONMENTAL		
Characteristics N	**Variables**	**Total 61**
Place of residence (%)	Countryside	1 (1.6)
	City	58 (95.1)
	No Answer/Not Applicable	2 (3.3)
Work environment – happy? (%)	No	5 (8.2)
	Yes	25 (41.0)
	No Answer/Not Applicable	31 (50.8)
Work environment – get along well (%)	Yes	24 (39.3)
	No Answer/Not Applicable	37 (60.7)
Work environment – does it cause you stress? (%)	No	7 (11.5)
	Yes	13 (21.3)
	No Answer/Not Applicable	41 (67.2)
Health center close to the residence (%)	Yes	58 (95.1)
	No Answer/Not Applicable	3 (4.9)
Work environment – if not happy, why (%)	Customer service	1 (1.6)
	Clientele Demands	1 (1.6)
	Client Demands	1 (1.6)
	Goal Demands	1 (1.6)
	Competition	1 (1.6)
	Misses a lot due to constant lower back pain and is often fired	1 (1.6)
	Poor earnings	1 (1.6)
	Dealing with employees	1 (1.6)
	Dealing with the public and staff	1 (1.6)
	Administrative changes	1 (1.6)
	Due to the clientele and tiredness	1 (1.6)
	Due to research and deadlines	1 (1.6)
	Relationship with colleagues	1 (1.6)
	Responsibility for the goods you transport	1 (1.6)
	Seasonal and unstable	1 (1.6)
	No Answer/Not Applicable	46 (75.4)

CULTURAL		
Characteristics N	**Variables**	**Total** 61
Level of education (%)	Complete primary education	8 (13.1)
	Incomplete primary education	8 (13.1)
	Complete secondary education	21 (34.4)
	Incomplete secondary education	5 (8.2)
	Complete higher education	14 (23.0)
	Incomplete higher education	5 (8.2)
Level of education – grouped (%)	Primary	16 (26.2)
	Secondary	26 (42.6)
	Higher	19 (31.1)

PSYCHOLOGICAL		
Characteristics N	**Variables**	**Total 61**
Depression (%)	Yes	13 (21.3)
	No Answer/Not Applicable	48 (78.7)
Public (%)	Yes	60 (98.4)
	No Answer/Not Applicable	1 (1.6)
Anxiety (%)	Yes	30 (49.2)
	No Answer/Not Applicable	31 (50.8)
Sleep quality (%)	Good	34 (55.7)
	Poor	27 (44.3)
Behavior (%)	Agitated	17 (27.9)
	Calm	42 (68.9)
	No Answer/Not Applicable	2 (3.3)
Behavioral problems (%)	Yes	12 (19.7)
	No Answer/Not Applicable	49 (80.3)
Conduct problems (%)	Yes	3 (4.9)
	No Answer/Not Applicable	58 (95.1)
Aggressiveness (%)	Yes	5 (8.2)
	No Answer/Not Applicable	56 (91.8)
Hostility - destructive profile (%)	Yes	1 (1.6)
	No Answer/Not Applicable	60 (98.4)
Personality disorders (%)	Yes	1 (1.6)
	No Answer/Not Applicable	60 (98.4)
Neuroses (%)	Suspicious	2 (3.3)
	OCD	1 (1.6)
	No Answer/Not Applicable	58 (95.1)
Avoidant/fearful behavior (%)	Defensive, aggressive, always vigilant and attentive	2 (3.3)
	Insecure	2 (3.3)
	Fear of violence	2 (3.3)
	Fears and insecurities	1 (1.6)
	Negativism and suicidal thinking	1 (1.6)
	No Answer/Not Applicable	53 (86.9)

HEREDITARY		
Characteristics N	**Variables**	**Total 61**
Family history (%)	Yes	23 (37.7)
	No Answer/Not Applicable	38 (62.3)
Family history - Disease (%)	Dermatological	1 (1.6)
	Endocrine	5 (8.2)
	Mental	1 (1.6)
	Oncological	2 (3.3)
	Rheumatological	14 (23.0)
	No Answer/Not Applicable	38 (62.3)
Family history - Diagnosed (%)	Bipolar	1 (1.6)
	Diabetes	5 (8.2)
	Autoimmune diseases	1 (1.6)
	Spondyloarthritis	14 (23)
	Cancer	2 (3.3)
	Psoriasis	1 (1.6)
	No Answer/Not Applicable	38 (62.3)