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Brief communication

Nutritional profile in rheumatoid arthritis

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ABSTRACT

Background: Atherosclerosis in Rheumatoid Arthritis (RA) patients may be aggravated by obesity.

Objective: To study the nutritional status of patients with RA.

Methods: Observational cross sectional study of 102 RA. Patients were studied for clinical, demographic, serologic, activity and nutritional profile. In the latter we included: measurement of body mass index (BMI), waist-hip ratio; bicipital skinfold (BSF) and their adequacy; triceps skinfold measure (TSF) and its adequacy and arm muscle circumference (AMC) and its adequacy. Association studies of nominal data were done using Fisher and chi-square tests and the Mann Whitney and unpaired Student t tests for numerical data. For correlation calculations the Spearman test was used.

Results: In the sample there were 14/102 men, 88/102 women with mean age of 52.1 ± 11.5 years and mean disease duration of 10.6 ± 7.47 years. The mean waist-hip ratio was 0.92 ± 0.07 . According to BMI 30.3% had normal weight and 65.5% a total weight above normal. According to BSF, 74.5% were normal and 25.5% had depletion of muscular mass; according to TSF, 83.3% were normal and 16.7% depleted. Association of nutritional variables with gender, rheumatoid factor, age, nodules, and disease activity showed no differences ($p = NS$) except for a lower waist/hip ratio in individuals with nodules ($p = 0.02$) and a modest correlation of TSF with disease duration ($p = 0.02$; $R = 0.22$; 95% CI = 0.01 to 0.40).

Conclusion: We found a high prevalence of overweight and obesity in patients with RA and a small frequency of muscle depletion.

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Perfil nutricional na artrite reumatoide

RESUMO

Objetivo: Estudar o perfil nutricional de pacientes com artrite reumatoide (AR).

Métodos: Estudo transversal observacional de 102 pacientes com AR. Os pacientes foram estudados para dados clínicos, demográficos, sorológicos, atividade de doença e perfil nutricional. Neste último incluiu-se a medida do índice de massa corporal (IMC), relação quadril/cintura, pregas cutâneas bicipitais (PCB) e sua adequação; prega cutânea tricípital (PCT) e sua adequação e circunferência muscular do braço (CMB) e sua adequação. Estudos de associação foram feitos usando os testes de Fisher e qui-quadrado para dados nominais

Palavras-chave:

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e teste t não pareado e Mann Whitney para dados numéricos. Para cálculo de correlação usou-se o teste de Spearman.

Resultado: Na amostra existiam 14/102 homens e 88/102 mulheres com idade média de 52,1 \pm 11,5 anos e duração média de doença de 10,6 \pm 7,4 anos. A relação cintura/quadril média era de 0,92 \pm 0,07. De acordo com IMC, 30,3% tinham peso normal e 65,5% tinham peso acima do normal. De acordo com PCB, 74,5% eram normais e 25,5% tinham depleção; de acordo com a PCT, 83,3% eram normais e 16,7% tinham depleção. Associação de variáveis nutricionais com gênero, fator reumatoide, nódulos e atividade da doença não mostraram diferenças ($p = \text{NS}$) exceto, por uma relação cintura/quadril menor em indivíduos com nódulos ($p = 0,02$) e uma correlação modesta da PCT com a duração de doença ($p = 0,02$; $R = 0,22$; 95% IC = 0,01-0,40).

Conclusão: Existe uma alta prevalência de sobrepeso e obesidade em artrite reumatoide e uma pequena frequência de depleção muscular.

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Introduction

Rheumatoid arthritis (RA) is a chronic disease that affects 1% of Brazilian population¹ and causes significant morbidity and mortality.¹ Joint pain and fatigue associated with the inflammatory process, deformities that hinder the performance of daily activities result in work absenteeism, early retirement and economic losses.^{1,2,3} Among the causes of increased mortality in these patients, accelerated atherosclerosis by the chronic inflammatory process with subsequent cardiovascular repercussions occupies a prominent role.^{2,3,4} It is estimated that a RA patient is 1.5 to 2 times more likely to develop myocardial infarction than the general population. This risk is comparable to that of a patient with diabetes mellitus type 2 and can be increased by the traditional risk factors such as obesity.⁵

RA is an autoimmune disease with genetic and environmental factors.² The first explains the familial clustering of the disease and is responsible for the variability of the clinical and auto antibodies profiles.² In the latter, smoking plays a major role.²

In this context, one can conclude that nutritional factors should be studied and treated in RA, taking into account the genetic load and living habits of the population. In the present work we studied the nutritional status of patients with RA in a population in Southern Brazil.

Methods

This is a cross-sectional study approved by the local Committee on Ethics in Research; all included participants signed consent. The included subjects met at least four of the classification criteria for a diagnosis of RA of the American College of Rheumatology 1987² and were between 18 and 80 years. Pregnant patients and those with uncontrolled hypothyroidism were excluded.

The anthropometric measurements were performed by a single dietitian prior to the consultation, who measured body weight, height, waist circumference, hip circumference, arm circumference, biceps and triceps skinfolds. The weight measurement was performed by a digital balance Mars® and the

height was measured using a stadiometer Cardiomed®. The body mass index (BMI) was calculated by dividing weight in kilograms by height in squared meters.⁶ The circumferences of the hip, arm and waist were made according to the technique described by Cuppari⁷ using an inelastic anthropometric tape. Measurements of skinfold thickness of biceps and triceps were made with the aid of a Cescorf® caliper according to standardized technique described by Cuppari.⁷ Assessment of skin folds adequacy was described by Frisancho⁸ and states that the patient is in severe malnutrition when the adequacy of arm muscle circumference is less than 70%, with moderate malnutrition when it is between 70% and 80%, with mild malnutrition when between 80% to 90% and euthrophic when over 90%.

Medical records of patients were reviewed to obtain demographic and clinical data, duration of disease, autoantibody profile such as rheumatoid factor (RF), disease activity (measured by DAS28 4v).^{9,10}

Data were collected on frequency and contingency tables. For association studies of nominal data we used the Fisher and chi-square tests, and for numerical data the Mann Whitney and unpaired Student t tests. For correlation calculations we used the Spearman test. The calculations were made using the Graph Pad Prism Software®, version 5.0 (San Diego, California). The adopted significance was of 5%.

Results

Descriptive analysis of clinical and laboratory profile of the sample

Of the 102 patients, 14 (13.7%) were men and 88 (86.2%) were women, aged from 23 to 80 years (mean 52.1 \pm 11.5 years), with age at diagnosis between 20 and 69 years (mean 41.9 \pm 12.0 years) and disease duration between 1 and 38 years (median 9 years; IQI = 5-14,5). Of these, 9.8% had rheumatoid nodules. Rheumatoid factor was positive in 65.6%. The DAS28 ranged from 0.76 to 7.82 (mean 3.54 \pm 1.53) and showed that 16.6% of patients had high activity, 33.3% had moderate activity, 21.4% had low activity and 28.6% were in remission of RA.

An analysis of treatments showed that 73.5% were on glucocorticoid (dose from 2.5 mg to 60 mg/prednisone/day; me-

dian 10 mg), 66.6% used methotrexate, 44.1% antimalarial; 29.4% leflunomide; 14.7% used biological therapy (14/102 anti TNF- α and 1/102 abatacept); 10.7% sulphasalazine and 2.9% azathioprine.

Descriptive analysis of nutritional assessment

The BMI of patients ranged between 16.0 and 45.5 kg/m² (mean of 27.9 \pm 5.7 kg/m²). The BMI distribution in the sample can be appreciated in Fig. 1, which shows that most patients are above the accepted weight.

The study of the relation between waist and hip measurements showed values between 0.75 and 1.14 (mean 0.92 \pm 0.07). In 11/102 (10.7%), the waist hip ratio exceeded 1.0. Regarding arm circumference adequacy, we observed that it ranged from 68.6% to 136.2% (mean 99.9 \pm 13.7%), and according to this, 74.5% of the patients were eutrophic, 24.5% had mild depletion and 0.98% had severe muscle depletion.

Analysis of triceps skinfold adequacy showed values between 24.4% and 336.4% (median 94.4%; IQI = 66.7-112.6). The distribution of findings regarding triceps skinfold adequacy can be seen in Fig. 2, that shows that almost half of patients have some degree of depletion.

Analysis of arm muscle circumference adequacy showed values between 76.7% and 142.4% (mean 103.3 \pm 14.2%). According to this measure 83.3% of the population was eutrophic, 12.7% had mild depletion and 4% had moderate depletion.

Studies of association and correlation between clinical variables and nutritional profile

No association/correlation was found between BMI, waist-hip ratio, brachial skinfold adequacy, triceps skinfold adequacy and adequacy of arm muscle circumference with patients gender, presence of rheumatoid factor, age, disease activity measured by DAS28 4v and use of glucocorticoid ($p = NS$).

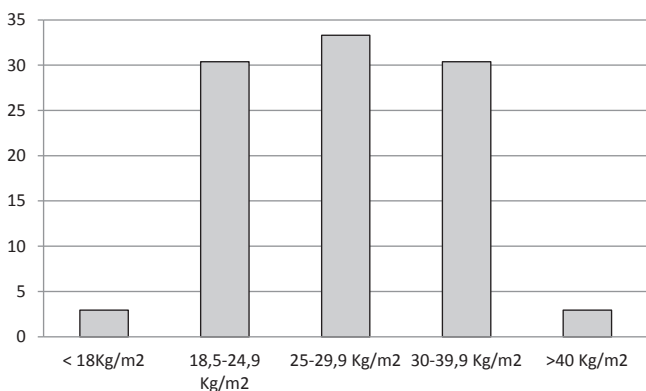


Grafico de IMC	
	%
< 18 kg/m ²	2.94
18,5-24,9 kg/m ²	30.39
25-29,9 kg/m ²	33.3
30-39,9 kg/m ²	30.39
> 40 kg/m ²	2.94

Fig. 1 – Prevalence (in %) of body mass indexes (BMI) in 102 patients with rheumatoid arthritis.

Patients without nodules have a higher value of waist-hip ($p = 0.02$) (Table 1). There was a modest correlation between triceps skinfold adequacy and disease duration ($p = 0.02$; $R = 0.22$; 95% CI 0.01 to 0.40).

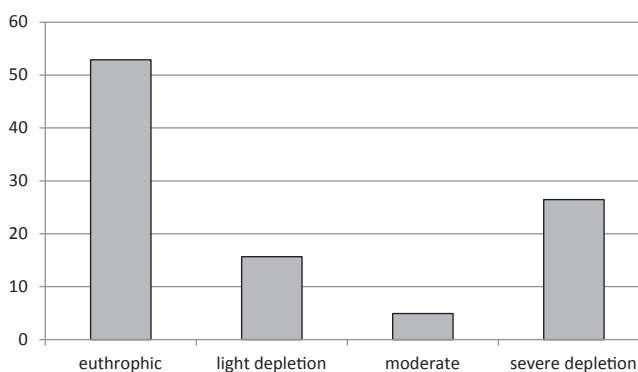
Discussion

The results of this study show that most patients with RA are above normal weight. This is an observation already made by other researchers: a multicenter study showed a prevalence of obesity in 18% of RA patients.¹¹ Another study, made in England, showed an even greater prevalence, of 31%.¹² As in ours, in both studies more than 60% of patients had a higher than desired weight.

We also observed in the present analysis that, despite the increased BMI, most patients had normal or depleted triceps skinfold. As the latter assesses patient's muscles, the current findings point to the fact that increased BMI occurs at the expense of adipose tissue rather than muscle gain.

There are several factors that contribute to an increased body fat and a decreased muscle mass in a patient with RA. One of these is, undoubtedly, the inactivity imposed by a painful and crippling joint disease.¹³ On one hand inactivity reduces energy expenditure, and on the other it leads to muscle atrophy. Another contributing factor is the use of medications such as glucocorticoids that cause increased appetite and fat accumulation.¹⁴

Regardless of etiology, increased body weight has important implications for these patients. The first is the mechanical burden imposed on the joints, especially those of the lower limbs, which are already weakened by chronic inflammation.¹⁵ They will suffer structural damage more easily leading to secondary osteoarthritis. The second is the already mentioned association between RA and accelerated atherosclerosis. Although in RA atherosclerotic disease is mainly secondary to inflammation, it also suffers influence of traditional risk factors including obesity.¹⁶ The sum of traditional risk



Triceps Skinfold Adequacy:	
Eutrophic	52.9
Light depletion	15.68
Moderate depletion	4.9
Severe depletion	26.47

Fig. 2 – Distribution of findings of triceps skinfold adequacy (in %). Analysis of 102 rheumatoid arthritis patients.

Table 1 – P values of association/correlation studies between clinical and nutritional variables in 102 rheumatoid arthritis patients.

	Body mass index	Waist hip ratio	Brachial skinfold adequacy	Triceps skinfold adequacy	Arm muscle circumference adequacy
Gender	0.76	0.28	0.44	0.99	0.49
Presence of rheumatoid factor	0.33	0.18	0.92	0.78	0.44
Rheumatoid nodules	0.99	0.02	0.45	0.35	0.61
Age	0.53	0.76	0.33	0.47	0.12
Disease duration	0.09	0.97	0.12	0.02	0.82
DAS284v.	0.19	0.20	0.76	0.91	0.49
Prednisone use	0.61	0.34	0.66	0.30	0.09

factors and inflammation will increase the chance of stroke and myocardial infarction. According to Kremers et al.¹⁷, obesity increases 10-fold the risk of a cardiovascular event in patients with RA.

Yet a third implication is the role of adipose tissue on the inflammatory process itself. Adipose tissue is not merely a deposit of energy elements but an organ that secretes biologically active molecules, the adipokines, many of which play a role in regulating inflammation.¹⁶ As a general rule, high levels of adipokines cause an increase in the inflammatory process in such a way that obesity is currently recognized as a pro inflammatory state.¹⁶ There are more than 50 adipokines, the most important of which are leptin, adiponectin, resistin and visfatin.¹⁶ Altered serum adipokine levels is associated with rheumatoid arthritis.¹⁸ Not only do they worsen an already settled RA but, according to some authors, obesity *per se* is associated with increased risk of developing RA.¹⁸ However data in this last issue are contradictory.^{17,19}

We could not find correlation of use of glucocorticoid with nutritional status. It is well known from literature that this medication is associated with weight gain and increased abdominal fat deposition.²⁰ One explanation for this finding is that most of our patients were using low doses of this medication as is usually done in rheumatoid arthritis. Correlation with cumulative glucocorticoid exposure could offer further information, but unfortunately we did not have this information.

It must be remarked that, since we used only skinfolds as a measurement of nutritional status, this can be seen as a limitation; studies with DEXA could offer additional information.

In conclusion, it can be said that there is a weight gain in subjects with RA despite of loss of muscle mass, mainly at the expense of adipose tissue. Obesity mass must be properly cared for in order to best treat patients with this disease.

Conflicts of interest

The authors declare no conflicts of interest.

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