Lungs and Breathing

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Lung affection in individuals with rheumatoid arthritis

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Abstract

To establish the frequency of lung affection in individuals with rheumatoid arthritis (RA) from Piaui. Participants and methods: The sample comprised 97 individuals. Results: A total of 85 participants (88.0%) were female; 77.0% were non-white; and the average age of the sample was 47.3 years old. A total of 54 participants (56.0%) exhibited extra-articular manifestations, most frequently subcutaneous nodules (19.0%). Lung assessment detected affection in 54 (55.7%) participants.

Introduction

Rheumatoid arthritis (RA) is an autoimmune disease whose etiology is unknown, while its immunopathogenesis involves the participation of both genetic and environmental factors.

Although RA can affect any joint, the participation of the metacarpal, metatarsophalangeal, proximal interphalangeal, wrist and knee joints is most frequent and is characterized by swelling, sensitivity on palpation, morning stiffness and severe motion impairment [1].

Some patients also exhibit signs and symptoms of severe extra-articular affection involving distant organs [2]. The frequency of such manifestations is difficult to estimate, but they are known to occur more frequently among individuals with severe active disease [3].

The lung is a frequent site of extra-articular RA, reported to be either the second most common cause of death (18%) following infection (27%) [4-6] or the third (9.9%) following infection (23.5%) and cardiovascular disease (17.3%) [3].

Pulmonary involvement in RA is highly variable; its earliest stage is usually asymptomatic, and the clinical manifestations are unspecific [7], usually including progressive dyspnea on exertion and dry cough [8].

The pathogenesis of RA as a systemic and lung disease has not yet been elucidated. [9]

The reported prevalence of lung affection among individuals with RA is variable. Such variability might be partially accounted for by the genetic basis of the investigated population as a function of the influence of genes, such as HLA-DR1 and HLA-DR4, on the phenotype of disease. Polymorphisms of the alleles HLA-B40 and B54 are particularly associated with lung abnormalities, fibrosis and bronchiolitis [10-11].

High-resolution computed tomography (HRCT) of the chest affords the best means for early diagnosis of lung disease in RA. Its diagnostic power was documented in a study in which it was able to detect interstitial lung disease in 50% of the participants with RA, whereas only 10% of them exhibited relevant clinical symptoms [12].

Participants and methods

Participants

The study was approved by the research ethics committee of the Federal University of Piaui; all the participants signed an informed consent form. The sample comprised 97 adult individuals from Piaui diagnosed with RA according to the American College of Rheumatology (ACR) revised criteria 12. The volunteers were followed up by the same physician at a university hospital and at the physician's private office and were requested to respond to a questionnaire including data on the age at onset, length of disease and the presence or absence of extra-articular manifestations.

High-resolution computed tomography of the lungs

The volunteers were subjected to HRCT, which was performed in a supine position, using a Siemens Somatom Spirit scanner with two channels and GE Healthcare LightSpeed Pro 16; all the scans were encoded.

Pulmonary function test

All participants were subjected to spirometry using a Beatrice Pulmonary Assessment System (Sistema de Avaliação Pulmonar Beatrice – PC). The device was coupled to a computer, and the results were compared to the predicted values for healthy individuals of the same age, gender and height (Brazilian Society of Pneumology and Phthisiology /Sociedade Brasileira de Pneumologia e Tisiologia – SBPT) using the reference values used described by PEREIRA et al. [13].

Results

Clinical characteristics

Most participants were female (88.0%) and non-white (77%). The average age of the sample was 47.3 years old; the average length of

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disease was 7.72 years; and 84 (87%) participants tested positive for RF. Extra-articular manifestations (subcutaneous nodules, anemia, skin ulcers, Raynaud's phenomenon) were identified in 54 participants (56%), most frequently subcutaneous nodules (19%); 32 volunteers (33.0%) exhibited more than one type of extra-articular manifestation. Pulmonary symptoms were found in 35 participants (36.0%), most frequently dyspnea (20.0%), chest pain (13.0%), dry cough (11.0%) and productive cough (10.0%) (Table.1)

Lung involvement

The pulmonary function test (PFT) results were normal in 65 participants (67.0%), while 12 (12.0%) exhibited restrictive ventilatory defect, 18 (19.0%) obstructive ventilatory defect and 2 (2.0%) a mixed pattern (Table.2).

On HRCT, the results were normal in 57 (59.0%) participants, while nodules were found in 12 (12.0%) and fibrosis in 31 (32.0%) (Table.3). Joint analysis of the HRCT and PFT results indicated lung affection in 54 (55.7%) participants.

Discussion

The clinical progression of RA is variable, including mild, moderate or destructive alterations, significant joint deformities, functional disability and extra-articular manifestations. The possibility of predicting the occurrence of extra-articular manifestations at the onset of disease might allow the establishment of more aggressive treatment at the early stages of affection [14]. HLA genotyping might contribute to defining the prognosis, especially when it is performed at an early stage of the disease, i.e., before the establishment of irreversible joint damage and appearance of extra-articular manifestations [15]. As ethnic differences in gene determinants might influence the expression of the disease [16], we investigated the HLA system in individuals with RA from Piaui and compared the results for individuals with and without lung affection.

The results of this study show that most participants (54.6%) exhibited some modality of lung affection. This high prevalence agrees with reports by previous authors, such as Skare et al. [18] who found lung alteration in 55% of 71 individuals; Zrour et al. [17], who found lung alteration in 49.3% of 75 individuals in Tunisia; and Bilgici et al. 6 who found lung alteration in 67.3% of 52 individuals in Turkey. In addition, Teraski et al. [19] assessed a sample of individuals with RA and respiratory symptoms and found CT changes in 90% of them.

Table 1. RA – Disease characteristics of the 97 participants with rheumatoid arthritis

F:M		85:12
White:non-white		23:74
Average age (years)		47.3 ± 11.18
Average length of disease (years)		7.72 ± 7.79
Positive rheumatoid factor		84 (87%)
Extra-articular manifestations	Total	54 (56%)
	Nodules	18 (19%)
	Anemia	32 (33%)
	Ulcers	05 (5%)
	Raynaud	04 (4%)
	Weight loss	20 (21%)
Pulmonary symptoms	Total	35 (36%)
	Dyspnea	19 (20%)
	Chest pain	13 (13%)
	Cough	21 (21%)

Table 2. Results of pulmonary function tests in 97 individuals with rheumatoid arthritis

Pattern	n (%)	%
Normal	65 (67%)	67
Restrictive	12 (12%)	12
Obstructive	18 (19%)	19
Mixes	02 (2%)	2

Table 3. Findings on HRCT of the chest corresponding to 97 individuals with rheumatoid arthritis

Pattern	N	%
Normal	57	59
Nodules	12	12
Fibrosis	31	32
Bronchiectasis	05	5
Pleura affection	05	5

Conclusion

In this study, 54.6% exhibited some modality of lung affection.

References

1. Grassi W, De Angelis R, Lamanna G, Cervini C (1998) The clinical features of rheumatoid arthritis. *Eur J Radiol* 27 Suppl 1: S18-24. [Crossref]
2. Turesson C, Jacobsson L, Bergström U, Truedsson L, Sturfelt G (2000) Predictors of extra-articular manifestations in rheumatoid arthritis. *Scand J Rheumatol* 29: 358-364. [Crossref]
3. Turesson C, Jacobsson L, Bergström U (1999) Extra-articular rheumatoid arthritis: prevalence and mortality. *Rheumatology* 38: 668-674. [Crossref]
4. Tyoshima H, Kusaba T, Yamaguchi T (1993) Cause of death in autopsied rheumatoid arthritis patients. *Ryumachi* 33: 209-14.
5. Anaya JM, Diethelm L, Ortiz LA, Gutierrez M, Citera G, et al. (1995) Pulmonary involvement in Rheumatoid *Arthritis. Semin Arthritis Rheum* 24: 242-254. [Crossref]
6. Bilgici A1, Ulusoy H, Kuru O, Celenk C, Unsal M, et al. (2005) Pulmonary involvement in rheumatoid arthritis. *Rheumatol Int* 25: 429-435. [Crossref]
7. Prete M, Racanelli V, Digiglio L, Vacca A, Dammarco F, et al. (2011) Extra-articular manifestations of rheumatoid arthritis: An update. *Autoimmunity Reviews* 11: 123.131. [Crossref]
8. Nannini C1, Ryu JH, Matteson EL (2008) Lung disease in rheumatoid arthritis. *Curr Opin Rheumatol* 20: 340-346. [Crossref]
9. Migita K, Nakamura T, Koga T, Eguchi K (2010) HLA-DRB1 alleles and rheumatoid arthritis-related pulmonary fibrosis. *J Rheumatol* 37: 205-207. [Crossref]
10. Charles PJ1, Sweatman MC, Markwick JR, Maini RN (1991) HLA-B40: a marker for susceptibility to lung disease in rheumatoid arthritis. *Dis Markers* 9: 97-101. [Crossref]
11. Sugiyama Y, Ohno S, Kano S (1994) Diffuse panbronchiolitis and rheumatoid arthritis: a possible correlation with HLA-B54. *Inter Med* 33: 612-4.
12. Lioté H1 (2008) [Pulmonary manifestation of rheumatoid arthritis]. *Rev Mal Respir* 25: 973-988. [Crossref]
13. Pereira CAC, Carvalho CRR, Nakatani J (1996) Pneumologia – Atualização e Reciclagem [Pneumology – updates and continuing education] - Sociedade Paulista de Pneumologia e Tisiologia, Ed. Atheneu.
14. Emery P1, Salmon M (1995) Early rheumatoid arthritis: time to aim for remission? *Ann Rheum Dis* 54: 944-947. [Crossref]
15. Gough A, Faint J, Salmon M, et al. (1994) Genetic typing of patients with inflammatory arthritis at presentation can be used to predict outcome. *Arthritis Rheum* 37: 1166-1170. [Crossref]
16. Bertolo MB, Costallat LTL, Persoli LB, Costa FF. Alelos HLA-DRB1 (2001) e o prognóstico da artrite reumatoide em pacientes brasileiros [HLA-DRB1 alleles and prognosis of rheumatoid arthritis in Brazilian patients]. *Rev Bras Reumatol* 41: 151-156.
17. Zrour SH, Touzi M, Beijia I, Golli M, Rouatbi N et al. (2005) Correlations between high-resolution computed tomography of the chest and clinical function in patients with rheumatoid arthritis. Prospective study in 75 patients. *Joint Bone Spine* 72: 41-7. [Crossref]

18. Skare TL, Nakano I, Escuissiato DL, Batistetti R, Rodrigues TO, et al. (2011) Pulmonary changes on high-resolution computed tomography of patients with rheumatoid arthritis and their association with clinical, demographic, serological and therapeutic variables. *Rev Bras Reumatol* 51 (4): 325-337. [Crossref]

19. Teraski H, Fujimoto K, Hayabuchi N, Ogoh Y, Fukuda T (2004) Respiratory symptoms in rheumatoid arthritis: relation between high resolution CT findings and functional impairment. *Radiat Med* 22: 179-85. [Crossref]