

The effect of disease activity of rheumatoid arthritis on pulmonary function in Mosul City

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ABSTRACT

Background: Pulmonary manifestation is one of the most common extra-articular features in rheumatoid arthritis (RA) leading to significant morbidity. Lung function testing helps in identifying the type of respiratory defect. Early detection helps in effective management of the lung involvement in RA. Aims and Objectives: In this study, we compared the lung function of RA patient with the normal controls.

Materials and Methods: Spirometry was performed in 100 participants (50 RA patients and 50 normal controls). Lung parameters such as forced vital capacity, forced expiratory volume in 1 s, forced expiratory flow in 25-75%, and peak expiratory flow rate were measured. Statistical analysis was performed < 0.05 was considered statistically significant.

Result: In this study, restrictive ventilatory defect was seen in 64% of patients, and obstructive ventilatory defect was seen in 10% of patients. Pulmonary function abnormalities are common in asymptomatic rheumatoid patients which were found to be restrictive defect.

Conclusion: Restrictive ventilatory defect may be due to idiopathic pulmonary fibrosis characterized by high levels of rheumatoid factor, antinuclear antibody and deposits of immunoglobulin A, and complement on the alveolar wall. Screening of RA patients with spirometer helps in early detection of pulmonary involvement.

Key Words: Rheumatoid Arthritis; Restrictive Defect; Spirometer

INTRODUCTION

Rheumatoid arthritis (RA) is an inflammatory systemic disease with unknown etiology that is characterized with peripheral symmetric polyarthritis. The prevalence of this disease is about 1% in general population.[1,2,3]

Extra-articular manifestations of RA can emerge during the course of the disease and even before the onset of arthritis.[1] One of the most important extra-articular manifestations of RA is pulmonary involvement that usually can be seen in patients with a high titer of rheumatoid factor and in smokers.[4]

Pulmonary involvement in RA patients can be assessed as interstitial pneumonitis and fibrosis, pleural involvement, pulmonary nodule, bronchiolitis obliterans organizing pneumonia, arthritis associated with pulmonary hypertension, and involvements of small and large airways.[5,6]

Interstitial lung disease (ILD) is another type of pulmonary manifestation in patients with RA that usually has a poor prognosis. Mostly RA-ILD has no symptoms and is only diagnosed by clinical examination, pulmonary function test (PFT), and high-resolution computed tomography (HRCT); so it seems that diagnosis of pulmonary involvement in early stages of RA is of great importance.[1,4,7,8,9]

Therefore, we decided to evaluate RA patients in terms of history, clinical examination, chest X-ray (CXR), PFT to ascertain that the evaluation of RA patients without pulmonary symptoms by using the above-mentioned methods is justifiable, reasonable

INCLUSION CRITERIA

Proven RA patients on rheumatoid drugs (ARA Criteria,2010), Absence of respiratory symptoms, Age group – 25-60 years.

Exclusion Criteria

Age <25 years, >60 years, Smokers, alcoholics, Pregnancy, Any previous respiratory and cardiac disease, Previous significant chest injury.

METHODS

We conducted a cross-sectional study in a referral rheumatology clinic in ibn Sina teaching Hospital of Mosul, Iraq, during 2011–2012.

In this study, forty-two consecutive patients, diagnosed with RA according to American College of Rheumatology-European League Against Rheumatism classification criteria for RA 2010,[10] were enrolled. Patients with a history of smoking, known pulmonary diseases, collagen vascular diseases associated with known pulmonary effects and the use of gold, penicillamine, sulfasalazine, methotrexate (MTX) (more than a year), and cytotoxic drugs were excluded from the study.

Demographic and clinical data such as sex, age, occupation, comorbidities, drug history and history of systemic and respiratory symptoms were collected.

A complete physical examination of the joints was performed by an expert rheumatologist in all subjects. The activity of RA was evaluated in all patients by Disease Activity Score 28 (DAS28).[11]

An expert pulmonologist performed a complete respiratory examination in all participants. Then all patient were referred for CXR, PFT .

DISCUSSION

Rheumatoid arthritis mostly is seen in the 25-55 year age group. Patients usually experience morning stiffness lasting at least 30 min that often improves gradually after physical activity.[1] Pulmonary involvement is one of the most important extra-articular manifestations of RA. Results of a prospective study about RA showed that RA-ILD is the second cause of mortality in these patients.[12] ILD characterized with dry cough and increasing dyspnea with restricting pattern in spirometry. The major risk factor of RA-LID to be prevented is smoking.[1,7]

Diagnosis of RA-ILD is based on clinical examination, PFT, and HRCT. Bronchoscopy and broncho-alveolar lavage were used in some past studies for the diagnosis of RA-ILD, but these instruments are usually used to rule out other diffuse pulmonary diseases and are not necessary in the diagnosis of RA-ILD.[8]

In the present study, female participants were approximately four times more than men, while in past similar studies, the ratio of women to men was about 2-3 to 1.[13] This difference is likely due to considering smoking as an exclusive criterion for participants in the present study; because in our society, due to cultural issues, smoking is more common in men as compared to women.

Previous studies have shown that pulmonary involvement in RA patients is associated with aging, a higher severity of the disease, higher titers of rheumatoid factor, and male gender.[5,14,15,16] In our study, PFT findings had no significant differences in two gender groups that may be due to small sample size and elimination of smokers from this study; because smoking is a preventable risk factor for ILD.DAS28 is a system to determine the disease activity in RA patients that is based on the evaluation of 28 joints and also erythrocyte sedimentation rate or C-reactive protein lab results of patients.[11]

In this study, abnormal PFT had significant relation with increasing disease activity (based on DAS28), unlike abnormal HRCT. These results are similar to Al-Tayyar et al. study.[17] Hence, we can conclude that DAS28 can be a predictor factor for abnormal PFT and, with increasing disease activity in RA patients, serial PFTs can be helpful in assessment, and prediction of pulmonary involvement. In our study, with the increasing frequency and severity of clinical examination findings and respiratory complaints, abnormal PFTs also increased significantly but in Youssef's study, patients' respiratory complaints had significant relation with both PFT findings.[18].In this study, to eliminate the confounding effect of this drug, we excluded the patients, who used this drug for more than 1 year, while in past similar studies use of MTX was not limited in the subjects. This study indicates using PFT in respiratory assessment of RA patients may be limited to persons with high

grades of disease activity (based on DAS28), respiratory complaint and positive findings in clinical respiratory examination. We warranted further studies with a larger sample size and a control group for comparison with the results of healthy subjects.

RESULTS

Patients included in this study, 9 (20.45%) males and 35 (79.55%) females, were 21–73 years old and their mean age was 49 ± 13 . Symptoms and respiratory findings of patients were listed in (Table 1).

Table 1: Symptoms and respiratory findings of patients

	<i>n=44 (%)</i>
Symptoms	
Fever	1 (2.3)
Weight loss	2 (4.6)
Dyspnea	10 (22.7)
Dry cough	6 (13.6)
Productive cough	8 (18.2)
Hemoptysis	0
Chest pain	12 (27.3)
Respiratory findings	
Wheezing	2 (4.5)
Crackles	5 (11.4)
Pleural friction rub	1 (2.2)

Of the forty-four RA patients, 41 subjects were in their 1st year of the disease and among them only two individuals (4.5%) had systemic symptoms (including fever and weight loss).

Dyspnea and chest pain were the most common complaints of patients (10 patients [22.7%] and 12 patients [22.3%], respectively), and crackles were the most common finding in the respiratory examination of patients heard in all subjects in the bibasilar areas. Stridor, decreased respiratory sounds, abnormal bronchial sound, and clubbing were not found in these patients (Table 2).

Table 2: Pulmonary function test findings of patients

	<i>n=44 (%)</i>
Pulmonary function test findings	
Normal	21 (47.7)
Air trapping	17 (38.6)
Obstructive	
Mild	1 (2.3)
Moderate	1 (2.3)
Total	2 (4.5)
Restrictive	
Mild	2 (4.5)
Moderate	2 (4.5)
Total	4 (9)

The average disease activity of patients, based on DAS28, was 3.84 ± 1.21 . Of the 15 patients with low disease activity ($\text{DAS28} < 3.2$), 6 patients (40%), among the 23 subjects with moderate disease activity ($3.2 \leq \text{DAS28} \leq 5.1$), and 11 patients (47.8%) and in all patients (6 persons) with high disease activity ($\text{DAS28} > 5.1$) PFTs were abnormal. These results indicated a significant relation between disease activity rate and PFT ($P = 0.038$).

Gender had no significant relation with respiratory complaints, clinical respiratory examination, PFT, and activity of RA disease ($P = 0.619$, and 0.689 , respectively).

CONCLUSION

Pulmonary manifestations are one of the common extraarticular manifestation in RA. It is often asymptomatic. They can be evaluated with pulmonary function tests, chest radiography, and CT scan. In this study, restrictive ventilatory defect is more common than obstructive type. Pulmonary function test can be used as screening test for early detection of the abnormalities and disease activity.

Statistical analysis

The analysis was performed by t-test, Chi-square, and Fisher's exact tests. All statistical analyses were done by SPSS software 17.0 (Kivuto Solutions Inc, Ottawa, ON, CA). A $P < 0.05$ was considered significant.

Conflicts of interest: There are no conflicts of interest.

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