Original Research Article

An observational study of pulmonary screening in rheumatoid arthritis patients at a tertiary hospital

Arsh Kumar Garg[1*], Avneet Garg[2]

[1]Associate Professor, [2]Assistant Professor, Department of Respiratory Medicine, Adesh Institute of Medical Sciences, Bathinda, INDIA.
Email: doctorarsh67@gmail.com

Abstract

Background: Rheumatoid arthritis (RA) is an inflammatory systemic disease, given the impact of lung disease on morbidity and mortality in RA, screening of asymptomatic RA patients for pulmonary involvement has been recommended. Present study was an observational study of pulmonary screening in rheumatoid arthritis patients at a tertiary hospital. **Material and Methods:** Present study was cross sectional, observational study, conducted in patients of age >21 years, of either sex having who met the ACR EULAR (2010) criteria for Rheumatoid arthritis underwent pulmonary screening by physiological (pulmonary function test) and radiological methods (chest X-ray, HRCT chest). **Results:** In present study, 64 patients of rheumatoid arthritis were evaluated. Mean age was 53.62 ± 11.03 years. Male patients (26.6 %) were less than female patients (73.4 %). Most of patients ha d duration of RA disease >10 years (60.9 %), normal BMI (45.3 %) and were non-smoker (59.4 %). 14.1 % were current smoker. Common symptoms noted were cough (43.8 %), breathlessness (17.2 %), sputum (14.1 %) and wheezing (7.8 %). X-Ray chest findings was normal in majority of patients (81.3 %) followed by b/l lower zone haziness (14.1 %) and prominent pulmonary vasculature (4.7 %). On HRCT, majority of patients had normal findings (73.4 %) followed by ground glass pat (both lower lobes) (17.2 %), sub pelural reticulations (10.9 %), pleural thickening (3.1 %) and pulmonary vascular prominence (3.1 %). Pulmonary function test findings were normal in majority of patients (65.6 %) followed by rrestrictive changes (17.2 %), oobstructive changes (10.9 %) and 6.3 % were non-cooperative. **Conclusion:** Pulmonary screening in rheumatoid arthritis patients helps in early diagnosis, treatment and monitoring to reduce morbidity and mortality.

Keywords: Pulmonary screening, rheumatoid arthritis, chest X-ray, HRCT chest

[*]**Address for Correspondence:**
Dr Avneet Garg, Assistant Professor, Department of Respiratory Medicine Adesh Institute of Medical Sciences, Bathinda, INDIA.
Email: doctorarsh67@gmail.com

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INTRODUCTION

Rheumatoid arthritis (RA) is an inflammatory systemic disease with unknown etiology and is associated with significant morbidity and mortality, resulting in substantial health care utilization and cost. Extra-articular manifestations of RA can emerge during the course of the disease and even before the onset of arthritis.[1] Approximately 50% of RA patients have extra-articular manifestations with pleuropulmonary affection being a significant cause of morbidity and mortality in this patient population.[2] Pulmonary manifestations of RA includes pulmonary parenchymal disease (Interstitial Lung disease, pulmonary nodules), pleural inflammation (pleural effusion and thickening), airways and pulmonary vasculature (bronchiolitis obliterans, vasculitis and pulmonary hypertension), and respiratory tract infections (RTI).[3] Airway involvement occurs as airway obstruction, upper airway disease (Cricoarytenoiditis), bronchiectasis, and Bronchiolitis obliterans.[4] The patient's poor functional status resulting from long term systemic and articular inflammation, usually mask the classic respiratory manifestations which may cause delayed diagnosis. Given

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the impact of lung disease on morbidity and mortality in RA, screening of asymptomatic RA patients for pulmonary involvement has been recommended by some experts.[4,5,6] Present study was an observational study of pulmonary screening in rheumatoid arthritis patients at a tertiary hospital.

MATERIAL AND METHODS

Present study was cross sectional, observational study, conducted in department of chest and tuberculosis at Adesh Institute of Medical Sciences, Bathinda, India. Study was conducted over duration of 1 year (January 2020 to December 2020). Study approval was taken from institutional ethical committee.

Inclusion criteria: Patients of age >21 years, of either sex having who met the ACR EULAR (2010) criteria for Rheumatoid arthritis, willing to participate in study

Exclusion criteria: Patients with history of obstructive lung disease, cardiopulmonary disorder, collagen vascular disease (SLE, scleroderma), viral infection (hepatitis B and C, HIV), tuberculosis and inhalational exposure/occupational lung disease (asbestos, silica). Subjects with respiratory illness. Subjects with coronary artery disease. Subjects with thoracic and vertebral abnormality. Cases of juvenile Rheumatoid Arthritis. Patients with mixed connective tissue disease.

A detailed history and clinical examination was performed with special emphasis on the respiratory system. Detailed history regarding duration of illness and various risk factors like smoking, gender, age, high RF titres and high anti CCP titres and clinically severity of disease (as per Clinical Disease Activity Index-CDAI) was taken. Patients were examined clinically for respiratory signs and symptoms. Patients were further evaluated for pulmonary manifestations by physiological (pulmonary function test) and radiological methods (chest X-ray, HRCT chest). Routine investigations included are CBC, urine microscopy, serum creatinine, serum electrolytes, LFTs, serum total proteins and serum calcium were done. Rheumatoid arthritis factor, C-reactive protein, ASO tires, sputum microscopy were done. Pulmonary function tests, chest x-ray, and HRCT chest were performed. Based on the ATS criteria, those who had an FEV1/FVC of less than 70%, were identified as having obstructive disease; its severity was determined according to FEV1 decline. The patients with normal FEV1/FVC and decreased FVC (< 80%) were diagnosed as having restrictive disease; its severity was determined by the decrease in FVC. In patients with clinical suspicion of tuberculosis sputum for AFB was done for exclusion of pulmonary tuberculosis. Patients with evidence of pulmonary fibrosis on HRCT chest were further investigated for HBsAg, anti-HCV, HIV to rule out pulmonary fibrosis secondary to viral infections. Data was collected and compiled using Microsoft Excel and statistical analysis was done using descriptive statistics.

RESULTS

In present study, 64 patients of rheumatoid arthritis were evaluated. Mean age was 53.62 ± 11.03 years. Male patients (26.6 %) were less than female patients (73.4 %). Most of patients ha d duration of RA disease >10 years (60.9 %), normal BMI (45.3 %) and were non-smoker (59.4 %). 14.1 % were current smoker. Common symptoms noted were cough (43.8 %), breathlessness (17.2 %), sputum (14.1 %) and wheezing (7.8 %).

Table 1: Patient characteristic

	No. of patients / Mean±SD	Percentage
Age (years)	53.62 ± 11.03	
Gender		
Male	17	26.6
Female	47	73.4
Working status		
Work	37	57.8
Non-work	27	42.2
BMI (kg/m2)		
Normal	29	45.3
Overweight	25	39.1
Obese	10	15.6
Smoking status		
Current smoke	9	14.1
Ex-smoke	17	26.6
Non-smoke	38	59.4
Duration of the RA disease (years)		
<5	7	10.9
05-10	18	28.1
>10	39	60.9

Any symptoms		
Cough	28	43.8
Breathlessness	11	17.2
Sputum	9	14.1
Wheezing	5	7.8

X-Ray chest findings was normal in majority of patients (81.3 %) followed by b/l lower zone haziness (14.1 %) and prominent pulmonary vasculature (4.7 %). On HRCT, majority of patients had normal findings (73.4 %) followed by ground glass pat (both lower lobes) (17.2 %), sub pelural reticulations (10.9 %), pleural thickening (3.1 %) and pulmonary vascular prominence (3.1 %). Pulmonary function test findings were normal in majority of patients (65.6 %) followed by restrictive changes (17.2 %), obstructive changes (10.9 %) and 6.3 % were non-cooperative.

Table 2: X-Ray chest, HRCT and pulmonary function test finding in RA patient.

Characteristics	No. of patients	Percentage
X-Ray chest		
Normal	52	81.3
B/L Lower zone haziness	9	14.1
Prominent Pulmonary vasculature	3	4.7
HRCT		
Normal	47	73.4
Ground glass pat (both lower lobes)	11	17.2
Sub pelural reticulations	7	10.9
Pleural thickening	2	3.1
Pulmonary vascular prominence	2	3.1
PFT		
Normal	42	65.6
Restrictive	11	17.2
Obstructive	7	10.9
Not Cooperative	4	6.3

DISCUSSION

Rheumatoid arthritis (RA) particularly affects joints and results in possible deformity, and limited physical function. The symptoms of RA may be unpredictable due to the alleviation or exacerbation of the disease, which may have a significant effect on the patients' daily lives.[7] Clinical symptoms of pulmonary insufficiency occur less frequently than the histological changes because RA imposes limitations that make physical exertion difficult, thus respiratory involvement may be asymptomatic. However, the mortality rate from pulmonary disease in RA is twice that of the general population.[3] The onset of lung impairment and its association with rheumatic disease or potential drug toxicity remains controversial since the majority of cases are identified months or years after RA diagnosis and treatment initiation. Therefore, it remains unknown if most interstitial lung disease (ILD)-RA cases present established fibrotic signs at diagnosis. Previous work has suggested an association between lung disease development and RA activity and inflammation.[8,9,10] Therefore, the identification of predictive factors of pulmonary involvement could help in optimizing lung screening for RA patients. Age and smoking have been shown to be risk factors for the development of ILD and high titres of Rheumatoid factor (RF) and anti-cyclic citrullinated peptides (anti-CCP) are known risk factors for extra-articular manifestations of rheumatoid arthritis, including ILD.[11,12,13] The most frequent patterns of RA-associated ILD (RA-ILD) are usual interstitial pneumonia and nonspecific interstitial pneumonia.[14] In study by Ganga B *et al.*,[15] 122 patients were screened, 33 were diagnosed with RA. The mean age was 40–50 years, was more common in women, and PFT showed both restrictive and obstructive pattern. Review of HRCT pattern of all patients showed nonspecific interstitial pneumonia pattern as the most common finding. Patients had desaturation after 6MWT and worsening of dyspnea. The degree of pulmonary involvement in RA is related to the duration of the disease. Clinical assessment, PFT, and 6MWT used in combination are cost-effective tools in early detection. HRCT provides a better understanding of the pattern of pulmonary involvement in RA. Considering the symptomatology of RA with pulmonary involvement, cough was a more persistent symptom, involving about half of the patients with pulmonary involvement (dry cough in 25% and productive cough in 21.4%). Lung crepitations can be sign with high sensitivity used for the prediction of ILD in patients of RA as reflected by results of our study where lung crepitations were found in 64.3% of patients with ILD. Banotra P *et al.*,[16] studied 100 patients, 34% had lung involvement. ILD was present in 34% patients on HRCT. ILD was the most common lung

manifestation of RA. Lung involvement was twice more common in males as compared to females. Longer duration of illness had significant impact. The other risk factors which were found significant in our study were smoking, clinically severe RA, high RF titres and high anti CCP titres. UIP was the most common ILD seen in RA in our study. History of smoking, male sex, presence of rheumatoid factor, duration of illness and clinical severity of illness are all associated with progression to pulmonary involvement. Fatima N *et al.*,[17] studied 62 patients of RA, 40.3% patients had some pulmonary symptoms with exertional dyspnoea in 21%, cough with expectoration in 17.7%, fine respiratory rales in 11.3%, patients X-ray chest bilateral lower zone haziness in 16% and prominent pulmonary vasculature in 3.2%. 43% had abnormal PFT-restrictive pattern in 29%, obstructive pattern 8% and mixed pattern in 6.4%. HRCT revealed abnormal findings in 33.8% commonest being ground glass pattern in both lower lobes 19.3%, sub pleural reticulations in 9.6%, pleural thickening in 3.2% and pulmonary vascular prominence in 1.6%. In study by Ravikumar P *et al.*,[18] out of 50 cases, majority (70%) of cases were females and belonged to the age group of 31 to 40 years (44%). Among respiratory symptoms, dyspnoea was the most common (20%) followed by cough (14%), chest pain and wheezes (10% each). The Rheumatoid factor and anti CCP positivity was seen in 76% and 82% of patients with significant association with PFT abnormalities respectively. The high disease activity were observed to have PFT abnormalities. Chest X-rays findings were hyperinflation (36%), interstitial pattern (28%) and volume loss (08%). In 86% of patients, HRCT showed the most common findings were bronchiectasis (34%), rheumatoid nodules (26%) and air trapping (20%). Among RA patients, 28 (56%) were normal, 08 (16%) had obstructive and 14 (28%) had restrictive lung diseases. Similar findings were noted in present study. Nermeen S *et al.*,[19] studied 160 RA patients, 85% were females and 15% males with a mean age of 37.8 ± 11.3 years and disease duration of 4.98 ± 5.53 years. 50% of patients had chest manifestations suggestive of ILD. 60% demonstrated abnormalities in PFT and 63.75% in HRCT. The most common HRCT findings were reticulation (66.6%) and ground glass appearance (64.7%), followed by bronchiectasis (50.9%) and honey combing (46%). usual interstitial pneumonia (UIP) was the most common HRCT subtype (49%). RA-ILD patients were significantly older, had longer disease duration, more frequent arthritis, higher DAS28 and Sharp score, significantly positive rheumatoid factor and anti-citrullinated protein antibody (ACPA). Among the various pulmonary manifestations, interstitial lung disease (ILD), a progressive fibrotic disease of the lung parenchyma, is the commonest and most important, contributing significantly to increased morbidity and mortality. Pulmonary functions and aerobic capacity may be adversely affected in rheumatic diseases. Negative effects of the musculoskeletal system limitations and positive reflections of functional wellness on the pulmonary system shows the importance of physical activity in rheumatic diseases and demonstrates that aerobic exercises should be underlined especially in RA patients with low aerobic capacity.

CONCLUSION

Lung complications in patients with rheumatic disease are common and may lead to significant morbidity and mortality. Pulmonary screening in rheumatoid arthritis patients helps in early diagnosis, treatment and monitoring to reduce morbidity and mortality.

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