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Original Article

Study of Pulmonary Function with Rheumatoid Arthritis Disease Patients

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Abstract

Introduction: Rheumatoid arthritis (RA) is a multisystem disease of unknown cause. It is a common inflammatory arthritis and an important cause of potentially preventable disability. The characteristic feature of RA is persistent inflammatory synovitis usually involving peripheral joints both small and large in a symmetric distribution.

Aim: This study aims to study the association pulmonary function with the disease activity in RA.

Materials and Methods: This is a cross-sectional study was done in 25 patients with RA who have met the updated requirements of the American Rheumatological Association. All the data were gathered from the patients, and the patients received informed consent. The findings have been analyzed and, statistically, discussed below.

Results: Out of 25 patients, 9 patients were male, and 16 patients were female. The mean age of duration was 41.24 years, the mean duration of RA was 5.25 years, five patients had small airway obstructive diseases, four patients had restrictive pulmonary diseases, and three patients had large airway obstructive diseases. Nineteen patients were included in functional class 3 and 4, six patients were included in functional class 1 and 2. Cough presents in eight patients. Wheeze and crepitation present in two patients. Nineteen patients had a positive rheumatoid factor. Mean hemoglobin and ESR values are 11.41 and 62.42.

Conclusion: We concluded from this analysis that in RA patients, the prevalence of pulmonary function disorders was high. Males were more vulnerable to rheumatoid pulmonary diseases due to other habits. There was no link between RA duration and rheumatoid lung disease.

Keywords: Rheumatoid arthritis, Pulmonary function, Small airway disease

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disorder that presents the most prominent manifestations in the diarthrodial joints.[1] The incidence of this disease is around 1% in the general population.[2] Symmetrical, disruptive, and deforming polyarthritis affecting small and large synovial joints with associated systemic disturbances is the most prevalent type of the disease. In addition to a number of extra-articular characteristics and the presence of antiglobulin circulating antibodies (rheumatoid factor).[3]

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Destructive polyarthritis and extra-articular organ involvement characterize the extra-articular types of RA.[4-6] Extra-articular characteristics and non-articular RA complications are standard and are typically associated with more severe morbidity and mortality. They need to be identified early and treated promptly.[7] Pulmonary involvements that can commonly be seen in patients with a high rheumatoid factor (RF) titer and smokers are one of the essential extra-articular manifestations of RA.[5]

RA patients have a high incidence of defects in their pulmonary system. In these patients, irregular lung functions can range from interstitial lung diseases (ILDs) to both large and small airway diseases. Both restrictive and obstructive patterns indicate lung abnormalities. Although not always clinically recognized, pulmonary involvement in RA is frequent. Pleural disease is widespread but generally asymptomatic; in 50% of cases, autopsy studies have reported pleural involvement, with only 10% clinical participation. Lung involvement is a significant contributor

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to the morbidity and mortality of RA patients and is the second most common cause of death, with infections being the first.

In RA patients, pulmonary involvement may be assessed as interstitial pneumonitis and fibrosis, pleural involvement, pulmonary nodule, pneumonia organizing bronchiolitis obliterans, pulmonary hypertension-related arthritis, and small and wide airway involvement.[8,9]

Another type of pulmonary manifestation in patients with RA who usually have a poor prognosis is interstitial ILD. RA-ILD mostly has no signs and is only diagnosed through clinical review, 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.[10-12]

Therefore in terms of history, clinical review, chest X-ray, PFT, and HRCT, we agreed to evaluate RA patients to verify that the assessment of RA patients without pulmonary symptoms is justifiable, rational, and cost effective using the methods described above.

Aim

This study aims to study the association pulmonary function with the disease activity in RA.

MATERIALS AND METHODS

This is a cross-sectional analysis was done in 25 patients with RA who meet the updated requirements of the American Rheumatological Association (ARA). Inclusion criteria: Patients who have completed the revised criteria of the ARA, regardless of whether there are respiratory signs or symptoms or not. Exclusion criteria: Bronchial asthma/chronic obstructive airway disorder, current/past lung tuberculosis, occupationally resistant patients, X-ray radiological lesion, and extreme pulmonary function test – interference-related disease patients with a detailed history of the disease period are evaluated. Exclusion criteria medical test assigned rheumatological functional status. A thorough examination of the respiratory system, with particular attention to chest growth, pleuritic, pleural effusion, and were done. The patients and controls submitted to computerized spirometric tests after reviewing these baseline clinical and laboratory parameters.

Data are presented as mean, percentage and number of instances, and standard deviations. The continuous data compared to independent t-tests, and the Pearson Chi-square tests compared categorical data.

RESULTS

Based on diseases parameters, mean value of the functional class is 1.58, the tender joint count is 5.62, hemoglobin is 11.41, and ESR is 62.42 [Table 1].

Out of 25 patients, 4 patients had restrictive pulmonary diseases, 3 patients had large airway obstructive diseases, and 5 patients had small airway obstructive diseases [Table 2].

Based on spirometric parameters, mean value of forced vital capacity (FVC) is 88.2, forced expiratory volume in 1 s (FEV1) is 84.51, FEV1/FVC is 94.82, forced expiratory flow (FEF) 50% is 78.91, and FEF 25–75% is 79.82 [Table 3].

Based on clinical features, 13 had age >40 years, 12 patients had age <40 years, 9 were males, and 16 were females, 8 patients had a duration of diseases >5 years, 17 had <5 years, 19 patients were included in functional class 3 and 4, 6 patients were included in functional class 1 and 2, 8 patients had the symptom of cough, and 17 patients had no cough, 19 patients had positive RF factor, and 6 patients had negative RF factor [Table 4].

Table 1: Rheumatoid arthritis activity parameters

Disease parameters	Mean (S.D)
Functional class	1.58
Tender joint count	5.62 (4.14)
Haemoglobin (g/dL)	11.41 (1.11)
Erythrocyte sedimentation rate (mm/h)	62.42 (28.61)

Table 2: Gender distributions of abnormal pulmonary function tests

PFT abnormality	Number of patients	Males	Females
	n=25	*n*=9	*n*=16
Restrictive	4	2	2
Large airway obstructive	3	1	2
Small airway obstructive	5	2	3
Total	12	5	7

Table 3: Pulmonary function tests

Spirometric parameter	RA patients	
	Mean	S.D
FVC	88.2	10.01
FEV 1	84.51	9.28
FEV1/FVC	94.82	11.25
FEF 50%	78.91	14.95
FEF 25–75%	79.82	16.42

Table 4: Clinical features of rheumatoid arthritis patients

Clinical feature	With abnormal PFT (*n*=9)	With normal PFT (*n*=16)
Age		
>40 years	3	10
<40 years	6	6
Gender		
Male	4	5
Female	5	11
Duration of disease		
>5 years	2	6
<5 years	7	10
Functional class		
III and IV	7	12
I and II	2	4
Cough		
Present	5	3
Absent	4	13
RF		
Positive	8	11
Negative	1	5

DISCUSSION

One of the most frequently linked extra-articular organs for RA is the lung. Pulmonary dysfunction in RA has a worse forecast. Provenzo *et al*.[13] observed in a sample of 24 RA patients that 2 patients have obstructive patterns and 1 patient has restrictive patterns. The majority of our study identified small obstructed lung disorders followed by restrictive conditions. About 20% had HRCT detected pleural disease. Perez *et al*.[14] observed broad 18% airway blockages in their sample of 50 RA patients; low 8% airway illnesses; and restrictive 8% lung disease. Malaviya *et al*.[15] observed pulmonary dysfunction in 8% in a North Indian RA sample.

The only risk factor in ILD development in RA was identified by Gabby *et al*.,[16] male gender. In this study, the patient's age and pulmonary impairment were not associated. The period of RA and lung activity was not associated. There was also a detrimental correlation with the magnitude of RA. Cortet *et al*.[17] and Gabby *et al*.[16] also showed similar results as a non-association. However, Vergnegeree *et al*.[18] have demonstrated that RA was associated with lung dysfunction severity. Perez *et al*.[14] have found FEV1/FVC to decrease, but not to a significant statistic. Geddes *et al*.[19] have encountered a considerable smoking and airway obstruction relationship. Collins *et al*.[20] have concluded that an increased PFT abnormality can be explained in RA alone by smoking. Saag *et al*.[21] stated that cigarettes are the most consistent independent risk factor for ILD growth. Davidson *et al*. also showed a strong association between smoking and reduced gas transfer during their study of PFT in RA patients. Cortet *et al*.[17] found that cough and bronchitis have been highly prevalent, and respiratory infections have played a lead in the pathogenesis of rheumatoid lung disease. A similar finding was observed. The study of 62 patients showed a significant correlation between RF positivity and reduced diffusion capacitance, which is also the basis of the substantial correlation between respiratory symptoms (cough and dyspnea) and airway diseases diagnosed by PFT and HRCT by Perez *et al*.[14] and Schernthaner *et al*.[22]

CONCLUSION

We concluded from this analysis that in RA patients, the prevalence of pulmonary function disorders was high. Males were more vulnerable to rheumatoid pulmonary diseases due to other habits. There was no link between RA duration and rheumatoid lung disease.

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