



STUDY OF DLco IN RHEUMATOID ARTHRITIS PATIENTS

Orthopaedics

Dr. Vishnu Garg PG JR-3, Muzaffarnagar Medical College & Hospital, Muzaffarnagar

Dr. Shafali Saluja Professor, Muzaffarnagar Medical College & Hospital, Muzaffarnagar

ABSTRACT

Introduction : Rheumatoid arthritis is a chronic systemic inflammatory disease that predominantly manifests affecting multiple joints of the body having female predominance. This study was carried out to assess the value of carbon monoxide diffusing capacity (DLCO) and spirometry manifestations in the early detection of pulmonary involvement in patients with RA

Study Design: This is a hospital based prospective study conducted on 50 patients of RA coming to OPD of General Medicine in Muzaffarnagar Medical College for 1 year.

Results : Present study shows that most patients had seropositive rheumatoid arthritis. Most patients of rheumatoid arthritis (52%) were in mild category of DLCO and 66% had normal findings in spirometry.

Conclusion : In this study we found that there is significant pulmonary abnormality in patients suffering from Rheumatoid arthritis. The present study has highlighted the significant pulmonary morbidity associated with Rheumatoid arthritis and the need to monitor their lung functions periodically.

KEYWORDS

INTRODUCTION

Rheumatoid arthritis (RA) is a multisystem, chronic condition with no recognised cause. 1-2% of the general population are afflicted by this systemic inflammatory disorder. The characteristic feature of RA is inflammatory synovitis that is persistent and involves most of the peripheral joints depending on the duration of disease causing cartilaginous and bony erosions. The joint involvement is often characteristically symmetrical and involves not only the large joints but also small joints of the hands and feet. Women are more frequently affected by arthritis than males, almost three times more frequently. But this sex difference gets diminished in older age group.^{1,2} Although children as young as two years old can be affected, the disease often manifests itself in the fourth and fifth decades. With a prevalence rate of 0.75%, India's rate of rheumatoid arthritis prevalence is comparable to that of worldwide indices, meaning that there are seven million rheumatoid arthritis sufferers in India as a whole.³ The mortality and morbidity of RA is mostly attributed to its extraarticular involvement. Extra-articular manifestations are seen in nearly 50% of patients with RA, the commonly affected sites being the skin, eye, heart, and lungs.⁴ The involvement of lung is the second most common cause of death (18%) after infection (27%) in patients with RA.⁵ Prospective studies using high resolution computed tomography [HRCT] of the lungs demonstrated that in 20% of patients, there is associated fibrosing alveolitis.⁶ Both ILD and pleural effusion can precede articular symptoms.

Studies done using pulmonary function tests and diffusion capacity of the lung for carbon monoxide has shown that upto 41% of the rheumatoid arthritis patients had Interstitial lung involvement but this prevalence rate increased to 65% when High Resolution Computed Tomography of the chest was used to diagnose the condition.

Pulmonary function tests in these patients reveal restrictive pattern and diffusion abnormalities. Thus a significant proportion of patients with rheumatoid arthritis develops pulmonary involvement and usually is detected late. This results in irreversible pulmonary damage and morbidity that decreases the quality of life in these patients. RA can affect airways of all diameter and can cause varying disease manifestation.⁷⁻⁹

Pulmonary involvement can be studied using HRCT and DLCO for anatomical and physiological abnormalities respectively.

MATERIALS & METHODS :

It was a hospital based prospective study conducted on 50 R.A. patients who came to OPD/IPD of department of General Medicine, MUZZFARNAGAR MEDICAL COLLEGE over a period of one year considering inclusion and exclusion criteria.

INCLUSION CRITERIA:

1. Patients diagnosed with RA newly or those being followed up for

the disease.

2. Consenting to participate in the study.

EXCLUSION CRITERIA:

1. Smokers
2. Occupational lung disease
3. Chronic kidney disease
4. Active Pulmonary TB.

Relevant history taking, general physical examination and clinical examinations and interpretation of laboratory results was done.

Lung function was assessed using DLCO and spirometry and correlation was found out of R.A patients with DLCO and spirometry.

According to the ATS recommendations, the following measures of DLCO sb severity were assessed:

- (1) Average: 80–120% of anticipated.
- (2) Mild: less than 80% but greater than 60% of expected.
- (3) Moderate: less than 60% but greater than predicted by 40%.
- (4) severe: less than 40% of anticipated

The following classification of abnormal functional patterns with regard to PFTs was carried out in accordance with the ATS's recommendations¹⁰:

- 1) If the FEV1/FVC ratio was less than 0.7, a large airways obstructive pattern would be present.
- 2) Small airways obstructive pattern if the FEF25-75% value decreased with a normal FEV1/FVC ratio without a restrictive pattern.
- 3) If the FEV1/FVC ratio was normal and the predictive percent of FVC was less than 80%, there would be a restrictive pattern.

RESULTS :

Table 1: Rheumatoid factor among the RA subjects

Rheumatoid Factor	N	%
Negative	7	14
Positive	43	86
Total	50	100

Table 1 shows that most of the patients 86% belong to seropositive category of rheumatoid arthritis.

Table 2: Incidence of respiratory signs and symptoms in patients of R.A (N=50)

Respiratory Symptoms And Signs	18-40 Yrs	41-50 Yrs	>50 Yrs
No Symptom	5	7	7
Breathlessness	0	6	7
Dry Cough	2	3	7
Wheezing	0	1	2

Nasal Allergy	0	0	1
Breathlessness And Cough	0	0	2

In this study, 31 patients had respiratory symptoms, breathlessness (13) was the most common symptom among all the patients of different age groups followed by dry cough (12), wheezing (3) and nasal allergy (1).

Table 3: DLCO findings among the RA subjects

DL _{co}	N	%
Normal	14	28
Mild	26	52
Moderate	8	16
Severe	2	4
Total	50	100

Table 3 shows that most patients (52%) of rheumatoid arthritis belong to mild category of DLCO i.e <80% and >60%.

Table 4: Spirometry findings among the RA subjects

Spirometry	N	%
Normal	33	66
Obstructive	6	12
Restrictive	7	14
Small Airway Disease	4	8
Total	50	100

Table 4 shows that most patients of R.A. had normal spirometry findings (66%).

Table 5 : Association between spirometry and the severity of carbon monoxide diffusing capacity

Spirometry	N	DLCO*							
		Normal		Mild		Moderate		Severe	
		N=14	%	N=26	%	N=8	%	N=2	%
Normal	33	11	78.57	20	70.97	2	25	0	0
Obstructive	6	1	7.14	2	9.68	3	37.5	0	0
Restrictive	7	1	7.14	3	16.13	1	12.5	2	100
Small Airway Disease	4	1	7.14	1	3.23	2	25	0	0
Total	50	14	28	26	52	8	16	2	4
Chi Square		12.173							
p value		0.2							

*: moderate and severe DLCO findings were clubbed together for the purpose of chi square value calculation and were found to be statistically non significant.

In Table 5 it was found that out of 33 subjects with normal spirometry, 11 had normal DLCO, while 20 had mild DLCO, 2 had moderate DLCO. Out of 17 subjects with abnormal spirometry, 3 had normal DLCO, 6 had mild DLCO, 6 had moderate DLCO and 2 had severe DLCO. Hence, patients with restrictive pattern in spirometry fall into severe category of DLCO.

Table 6: Association Between Duration Of Rheumatoid Arthritis And The Severity Of Carbon Monoxide Diffusing Capacity

DL _{co}	Mean Duration	SD	Anova test	P value
Normal	41.57	17.48	16.81	<0.05*
Mild	49.24	26.11		
Moderate-Severe	173.89	56.72		

*: statistically significant

It was found that mean duration of RA in normal DLCO category was 41.57±17.48, in mild category was 49.24±26.11 and mean duration of moderate-severe was 173.89±56.72. Hence there was positive correlation between DLCO severity and duration of RA. Value of Anova test was 16.81 and the results were highly significant with p value less than 0.05

DISCUSSION

Lung illness is a rather common extra-articular symptom of rheumatoid arthritis (RA), which can appear with a restrictive and/or obstructive pattern, and is typically clinically under diagnosed¹¹⁻¹². In people with RA, severe restrictive lung disease, most often interstitial lung disease (ILD), occurs in 8 to 15 percent of patients¹³⁻¹⁴. Clinical symptoms are diverse, most typically dyspnea and cough, with some

patients rapidly deteriorating while others stay reasonably stable¹⁵. The three primary kinds of RA-ILD are ordinary interstitial pneumonia (UIP), non-specific interstitial pneumonia (NSIP), and organizing pneumonia (OP); of which UIP is the most common^{16,17}.

In patients with idiopathic pulmonary fibrosis (IPF) forced vital capacity (FVC) and diffusing capacity for carbon monoxide (DLCO) are the most sensitive indicators for determining the clinical course¹⁸. The purpose of the study was to investigate the DLCO and spirometry symptoms of Rheumatoid Arthritis.

It was observed that mean age of patients was above 50 yrs belonging to mild category of DLCO and had female preponderance having dry cough as the most common symptom in all patients if different age groups. 86% patients had positive rheumatoid factor. 66% patients had normal spirometry and 34% had abnormal findings. Similarly Mohammed A. Farraga et al¹⁹ in their study reported that normal spirometric pattern was the main pattern (63%), followed by a restrictive pattern and mild airway blockage, whilst the obstructive pattern was observed the least.

CONCLUSION

Lung involvement is one of the most important extra articular manifestations of rheumatoid arthritis. The number of patients with PFT abnormalities increased as the duration of rheumatoid disease increased but the severity of these abnormalities did not increase.

A key component of the evaluation is determination of the type of ILD, as all of the histopathologic types of idiopathic interstitial lung disease can occur in the context of RA.

DLCO represents an effective, noninvasive technique for the detection of RA-ILD, even in the absence of clinical symptoms, making this procedure an effective screening tool for early ILD that may allow institution of more aggressive therapy directed toward the prevention of end-stage, fibrotic lung disease.

Even in patients who are clinically asymptomatic and have a normal chest radiograph, pulmonary function tests, and more specifically DLCO, can be an effective screening technique for the early diagnosis of RA-ILD. It is recommended to screen for pulmonary involvement in RA patients, even clinically asymptomatic patients, using regular and routine PFTs with DLCO, especially in those with prolonged illness duration.

REFERENCES

- Spector TD. Rheumatoid arthritis. *Rheum Dis Clin North Am* 1990; 16(3):513-37.
- Extra-articular manifestations in 587 Italian patients with Rheumatoid arthritis. *Rheumatism* (2000); 19(6): 213-7
- Malaviya AN, Kapoor SK, Singh RR, Kumar A et al Prevalence of rheumatoid arthritis in the adult Indian population. *Rheumatol Intl* 1993;13(4): 131-4
- Firestein GS, "Etiology and pathogenesis of rheumatoid arthritis". Kelly's Textbook of Rheumatology; Ruddy S, Harris E, Sledge C; 6th ed., W. B. Saunders, Philadelphia
- Boers M, Dijkmans B, Gabriel S, Maradit-Kremers H, O'Dell J, Pincus T. (2004) "Making an impact on mortality in rheumatoid arthritis". *Arthritis Rheum* 50:1734-9.
- Dawson JK, Fewins HE, Desmond J, et al. "Fibrosing alveolitis in patients with rheumatoid arthritis as assessed by high resolution computed tomography, chest radiography, and pulmonary function tests". *Thorax* 2001; 56:622-627.
- Gilligan DM, Pugnere N, Antonini MT, Arnaud M, Melloni B, Treves R, Bonnaud F. "Airway obstruction and rheumatoid arthritis". *Eur Respir J* 1997;10:1072-1078.
- Geddes DM, Webley M, Emerson PA. "Airways obstruction in rheumatoid arthritis". *Ann Rheum Dis* 1979;38:222-225.
- Perez T, Remy-Jardin M, Cortet B. "Airways involvement in rheumatoid arthritis: clinical, functional and HRCT findings". *Am J Respir Crit Care Med* 1998;157:1658-1665.
- Gabriel, S.E. The epidemiology of rheumatoid arthritis. *Rheum Dis Clin North Am*. 2001; 27: 269-281.
- Suzuki A, Ohosone Y, Obana M et al. Cause of death in 81 autopsied patients with rheumatoid arthritis. *J Rheumatol*. 1994; 21(1):33-6.
- Nannini C, Medina-Velasquez YF, Achenbach SJ et al. Incidence and mortality of obstructive lung disease in rheumatoid arthritis: a population-based study. *Arthritis Care Res (Hoboken)*. 2013; 65(8):1243-50.
- Doyle JJ, Eliasson AH, Argyros GJ et al. Prevalence of pulmonary disorders in patients with newly diagnosed rheumatoid arthritis. *Clin Rheumatol*. 2000; 19(3):217-21.
- Bongartz T, Nannini C, Medina-Velasquez YF et al. Incidence and mortality of interstitial lung disease in rheumatoid arthritis: a population based study. *Arthritis Rheum* 2010; 62(6): 1583-1591.
- Travis WD, Costabel U, Hansell DM et al. An official American Thoracic Society/European Respiratory Society statement: Update of the international multidisciplinary classification of the idiopathic interstitial pneumonias. *Am J Respir Crit Care Med*. 2013; 188(6):733-48.
- Kim EJ, Elicker BM, Maldonado F, et al. Usual interstitial pneumonia in rheumatoid arthritis-associated interstitial lung disease. *Euro Respir J* 2010; 35: 1322-28.
- Nannini C, Ryu JH, Matteson EL. Lung disease in rheumatoid arthritis. *Curr Opin Rheumatol*. 2008; 20(3):340-6.
- Ley B, Collard HR, King TE Jr. Clinical course and prediction of survival in idiopathic pulmonary fibrosis. *Am J Respir Crit Care Med*. 2011; 183(4):431-40.
- Farrag MA, El-Sayed AM, Mohammed RM, El Bagalaty MF. Evaluation of carbon monoxide diffusing capacity as an early detection of pulmonary involvement in rheumatoid arthritis patients without respiratory symptoms. *Egyptian Journal of Bronchology*. 2014; 8(2): 167-72.