**Original Article**

**Profile of pulmonary manifestations of rheumatoid arthritis: a cross-sectional study**

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**Abstract:**

**Introduction:** In Rheumatoid arthritis( RA),Although joint disease is the main presentation, there are a number of extra- articular manifestations. Lung involvement is most common extra-articular manifestation and it ranges between 10% to 67% , among which pulmonary involvement accounts for 10-20% mortality.

**Aim:** The present study aimed to evaluate the spectrum of pulmonary affection in RA patients by means of clinical assessment, spirometric evaluation and HRCT thorax study.

**Materials and Methods:** In this Descriptive, cross-sectional, study, we had evaluated total 50 consecutive patients of RA by clinical, spirometry and High Resolution Coaxial Tomography (HRCT) scan of thorax.

**Results:** In this study we had foundRA was more common in female and most common age group affected was 41-50 years account for 36% patients. Majority of the patients (50.8%) presented with disease for >11 years.About 84% of the RA patients had respiratory symptoms. Among respiratory symptoms, most common symptoms observed was chough with sputum consisting 22% , followed by dry cough 20% , wheezing with dyspnoea involving 18% , only wheezing in 14% cases and dyspnoea in 10% patients. Bibasal crepitations was found in nine (18%) cases. Restrictive pattern was most common spirometric abnormality in 30% cases, 8% patients had obstructive abnormality. Majority (66%)of patients had normal chest X-ray findings but abnormal HRCT findings were observed in 64% cases. The most common HRCT findings were decreased attenuation (14), followed by Bronchiectasis (11), Bronchial wall thickening (9), Reticulo-nodular pattern (7),Air trapping (6), Ground glass opacities (5), Pulmonary nodules (3) and honeycombing (2). Pleural effusion was observed in eight cases.

 **Conclusion:** Pulmonary manifestations are very common in RA and they often remain clinically silent particularly in early stage of the disease. Most respiratory symptomatic patients have long duration of disease. Pulmonary evaluation should be done early in RA patients irrespective of presence of any respiratory symptoms.

**Key words:** Rheumatoid arthritis, Pulmonary manifestations.

**INTRODUCTION:**

Rheumatoid arthritis (RA) is an inflammatory systemic disease with unknown etiology that is characterized by peripheral symmetric polyarthritis1 . The prevalence of this disease is about 0.5 -2% in general population2. Although joint disease is the main presentation, there are a number of extra- articular manifestations including subcutaneous nodule formation, vasculitis, inflammatory eye disease and lung disease3,4. Lung involvement is most common extra-articular manifestation and it ranges between 10% to 67% in different studies5. 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 airways6,7.

 Till now there is lesser number of study on pulmonary manifestations of RA from India. The present study has aimed to evaluate the spectrum of pulmonary affection in RA patients in a rural based teaching hospital of West Bengal, India by clinical assessment, spirometric evaluation and thoracic high resolution CT scan study. This may lead to better understanding of pulmonary manifestations of RA and will eventually enable us for early detection and to formulate appropriate management strategy for better outcome.

**MATERIALS & METHODS:**

After obtaining approval from the Institutional Ethical Committee, the present descriptive, cross-sectional study was carried out at Burdwan Medical College & Hospital, a rural based tertiary care teaching hospital of West Bengal, India from the period of March 2018 to September 2019. Consecutive 50 willing patients of all ages who were attending the Medicine outpatient department & Rheumatology clinic were taken. Written informed consent were taken from each participants . To diagnose RA a ACR/EULAR score ≥6 (American College of Rheumatology and European League Against Rheumatism 2010 criteria) were taken 8 . Patients having Interstitial lung disease due to pneumoconiosis or any other causes, those having past history of tuberculosis and smoker patients were excluded from study. Patients were evaluated by clinical assessment, spirometry, and HRCT of thorax. A preformed questionnaire and a standard proforma were prepared for collection and record keeping of clinical evaluation including history and physical examination findings. Necessary blood reports including Rheumatoid Factor (RF), anti CCP antibody, C-reactive protein (CRP) and ESR etc., were utilised for case confirmation and evaluation in a case to case basis. Spirometry was done by RMS Helios 702, version 2 machine following the ATS/ERS guideline9. Xray Chest PA view and HRCT of thorax,taken at end inspiration in supine position by 16 slice multidetector Brivo CT385 of Hangwe were done in all cases.

All collected data were first entered into a Microsoft excel spread sheet, 2007 version and later analysed by SPSS, version 20 software.

**RESULTS:**

**\**Among fifty (n=50) patients included in our study, 21(42%) were male and 29 (58%) were female.We found a slight female predominance in our study with male to female ratio of 1:1.38.The most common age group affected by rheumatoid arthritis was 41-50 years account for 36% (18) patients and the least common age group of our study was >60 years accounts for 10% (5) patients.

As shown in Figure 2 majority of the patients i.e. 32 (50.8%) patients presented with disease for >11 years, 34% patients who had a history of disease from 5-10 years. And 18% patients had a history of disease <5 years.(Figure-01)

In our study 84% (n=42) patients had respiratory symptom with rheumatoid arthritis whereas 16% (n=8) patients had no respiratory symptom . Among respiratory symptoms, most common symptom observed among the all study subjects (n=50) was chough with sputum consisting 22% (11) patients, followed by dry cough accounts for 20%(10) patients, wheezing with dyspnoea involving 18% (9) patients, only wheezing was found in 14% (7) cases and dyspnoea in 10% (5) patients.Bibasal crepitations was found in nine (18%) cases.(Table no-01)

During spirometric evaluation majority of patients in our study, i.e. 40%(n=20) showed an normal spirometric finding, 30% (n=15) had restrictive pattern, 8% (n=4) had obstructive pattern. Spirometric findings were abnormal but could not be interpreted in 22% (n=11) patients because subjects didn’t perform the proper manueover. We observed normal chest X-ray findings in majority 66% (n=33) of patients. Bilateral lower zone haziness was observed among 24% (n=12) patients and 10% (n=5) showed prominent pulmonary vasculature.Pleural effusion was observed in eight cases.(Figure no-02)

 Abnormal HRCT findings were observed in 64% (n=32) cases. Different HRCT abnormalities are depicted in (Table- 02). Most abnormalities were manifested in an overlapped manner. Eighteen patients (36%) presented without any HRCT abnormalities.

**Figure-01:Duration of diseases with percentage of RA patient (N=50)**

|  |  |  |
| --- | --- | --- |
| **SYMPTOMS** | **NO OF CASES(N=50)** | **PERCENTAGE(%)** |
| **Cough** | **10** | **20** |
| **Cough and sputam** | **11** | **22** |
| **Wheezing** | **07** | **14** |
| **Dyspnoea** | **05** | **10** |
| **Wheezing with Dyspnoea** | **09** | **18** |
| **Total** | **42** | **100** |

**Table:01. Symptom distribution of pulmonary manifestation (N=50)**

**Figure-02:Characteristic of X-Ray chest among RA patient(N=50)**

|  |  |  |
| --- | --- | --- |
| HRCT findings | No of cases(N=32) | Percentage |
| A)Decreased attenuation | 14 | 28% |
| B)Bronchiectasis | 11 | 22% |
| C)Bronchial wall thickening | 9 | 18% |
| D) Reticulonodular pattern | 7 | 14% |
| E) Air trapping | 6 | 12% |
| F) Pulmonary nodules | 3 | 6% |
| G) Ground glass opacities | 5 | 10% |
| H) Honeycombing | 2 | 4% |
| I) Pleural effusion | 8 | 16% |

**Table 02: Distribution of HRCT findings in RA patients.(Single patient may have multiple findings)**

**DISCUSSION**

 This present descriptive crossectional study was conducted among 50 consecutive patients of pulmonary disease arising from Rheumatoid Arthritis who were diagnosed with RA . Our study aimed to evaluate the clinical, spirometric and radiological findings of the study subjects.

In our study the most of the patients were aged below 50 years. Age ranged varied from <30 years to >60 years. This observation was quite similar with a similar study done by Raniga S et al10,where the average age of male and female patients were 48.4 years and 45.8 years respectively. We found that wemen are more likely affected by RA compared to men. In our study we observed a male to female ratio of 1.38:1. This was consistent with the study done by Fatima N et al11,which showed RA predominantly occurs in females with female:male ratio of 3:1. Yuksekkaya R et al12,that states that RA occurs 3 times more common in women. The variation in the level of sex hormones of females (oestrogen and progesterone, which regulate the inflammatory process) is the main cause of development of RA among them13.

The study conducted by Banik S et al14,evidently found their study population is relatively young. Mean age of the patients was 45.22 years, (median 46.13 years); with proportionally more number of patients presenting early in the disease with a median 4 years and mean disease duration ±SD was 7.48±7.052 years with more than half (50.8% or 32 patients) has a disease duration <5 years. Majority of the patient of our study had a history of disease for >11 years which also indicate early age of presentation of RA.

 In our study 8 of 50 patients were asymptomatic which is more or less consistent with study done by Yuksekkaya R et al12. The most common symptom we observed among the study subjects is cough with sputum (11), followed by cough (10), wheezing with dyspnoea (9), wheeze (7) and dyspnoea (5). In the study by Raniga S et al10,six of the thirty patients had respiratory complaints (20%). The symptoms include cough, breathlessness, wheeze, sputum production and chest pain. Only three patients (10%) had clinical evidence of respiratory involvement in form of rhonchi and crackles. In our study we found crackles in 18% patients. In the study by Fatima N et al11,the RA cases studied for pulmonary involvement,nearly one-fourth (21%) gave history of dyspnoea and a productive cough. These symptoms are a common presentation in diffuse interstitial fibrosis of the lungs10. Dyspnoea may also point towards pleural effusion, pulmonary vasculitis or to a chest infection10, while wheeze seen in 11% patients may indicate an obstructive pulmonary disease. Another similar study carried out by Wilsher M et al15. from New Zealand revealed that 30% patients with RA reported respiratory symptoms: cough (11%), dyspnoea (11%) and wheeze (8%).

Majority of patients of our study, i.e. 30 (60%) showed an abnormal spirometric findings and 20 (40%) patients showed normal spirometric findings. These results were similar to Bilgici et al13. who reported abnormal spirometric results in 55.8% of their study group. In a study by Fatima N et al11,majority of RA patients had a restrictive pattern on pulmonary function testing which again highlights the presence of lung fibrosis and an underlying interstitial lung disease16.

The predominant presentation on X-ray Chest was a bilateral lower zone diffuse shadow (24%) predominantly, reticular and nodular pattern and prominent pulmonary vasculature. These findings are suggestive of an underlying interstitial lung disease. Also, prominent pulmonary vasculature (10%) could be due to pulmonary vasculitis which is a less common pulmonary manifestation of RA. HRCT thorax findings of our study showed that 32 patients had an abnormal HRTC finding . The most common HRCT findings were decreased attenuation (14), followed by Bronchiectasis (11), Bronchial wall thickening (9), Reticulo-nodular pattern (7),Air trapping (6), Ground glass opacities (5), Pulmonary nodules (3), honeycombing (2) and pleural effusion (8). This observation was quite in a agreement with a study by Banik S et al14.In their study decreased attenuation was the most common HRCT abnormality. Second most frequent finding was bronchiectasis. Bronchial wall thickening in HRCT thorax is usually found after long standing airway inflammation. When reticulonodular shadows and ground-glass opacities found in HRCT indicates interstitial involvement. Tanaka et al16. also reported Ground Glass Opacity was the most frequent finding in their study (90%), and the previously mentioned study by Skare et al17. (39%). In addition Akira et al18. reported that reticulation was the most frequent (72%) finding in their study.Banik S et al14showed presence of pleural disease on HRCT inabout 24% of all patients.

Our study was limited by few factors like small sample size, conduction of study from a smaller geographical region, possibility of referral bias as study was performed in a tertiary care centre. DLCO could not be performed due to logistical limitation. Lung biposy of suspected Interstitial lung disease cases was not done in our study. Prospestive multicentric study involving large sample size with better logistic support may overcome these limitation.

From this study we can reestablish some known facts regarding clinical profile, spirometric and radiologic presentation of Rheumatoid arthritis which were previously studied in different geographical region. In upcoming days these observations may help physicians to evaluate, formulate early management strategy and prognosticate their RA patients having pulmonary manifestations.

 **CONCLUSION:**

So to conclude Pulmonary manifestations are very common in RA and they often remain clinically silent particularly in early stage of the disease. Most respiratory symptomatic patients have long duration of disease. Pulmonary evaluation should be done early in RA patients irrespective of presence of any respiratory symptoms.

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