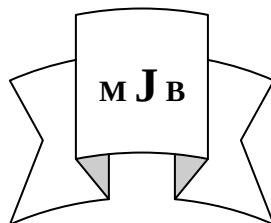


Spirometrical Changes in Patients with Rheumatoid Arthritis*

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Abstract

Rheumatoid arthritis is relatively common disease with many extra articular manifestations; one of these manifestations is respiratory involvement that may occur by RA itself or as a side effect to pharmacological treatment. The study was designated to estimate the difference in spirometrical results between RA patients and control group. The cross-sectional/control study was conducted in rheumatology unit in Marjan teaching hospital in AL-Hilla city from 12th /November/2011 to 31th / May / 2012. The total number of subjects involved in this study was 200 (140 patients & 60 healthy control persons). Spirometrical test {Forced vital capacity (FVC), forced expiratory volume in one second (FEV1), Forced vital capacity/ forced expiratory volume in one second (FEV1/FVC), peak expiratory flow (PEF), forced expiratory flow 25-75% (FEF25-75 %) and its subdivision } was done to all patients and control group. All spirometrical parameters were significantly lower in RA patients than in control. This indicate that respiratory involvement is common in RA even in symptom-free patients.

الخلاصة

التهاب المفاصل الروماتيزمي هو مرض شائع نسبياً مع الكثير من الاعراض البعيدة عن المفاصل، واحدة من هذه الاعراض هي اصابة الجهاز التنفسي التي قد تحدث من قبل التهاب المفاصل نفسه أو من الآثار الجانبية للعلاج الدوائي. صممت الدراسة لحساب الفرق في مقياس التنفس بين مرضى التهاب المفاصل الروماتيزمي ومجموعة السيطرة. تمت هذه الدراسة المقطعية/المقارنة (Cross-sectional/control study) في وحدة أمراض الروماتيزم في مستشفى مرجان التعليمي في مدينة الحلة من ١٢ تشرين الثاني ٢٠١١ إلى ٣١ ايار ٢٠١٢. وكان العدد الكلي للأشخاص المشتركين في هذه الدراسة 200 شخص (140 مريضاً و 60 سيطرة). تم عمل اختبار مقياس التنفس (spirometrical results) (FVC, FEV1, FEV1/FVC, PEF, FEF25-75 % وأقسامها) لجميع مرضى التهاب المفاصل الروماتيزمي ومجموعة السيطرة، كل نتائج مقياس التنفس كانت أقل بصورة ملحوظة في مرضى التهاب المفاصل الروماتيزمي مما في مجموعة السيطرة. هذا يدل على ان اصابة الجهاز التنفسي هي شائعة لدى مرضى التهاب المفاصل الروماتيزمي حتى في حال عدم وجود اعراض الاصابة.

Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory disease characterized by uncontrolled proliferation of synovial tissue and a wide array of multisystem co morbidities [1]. RA usually appears during 3rd to 5 th decades of life and its prevalence increases with age [2]. Prevalence is estimated to be 1-1.2%

worldwide, with women twice to three times as likely to develop the disease as men. Twenty to thirty percent of untreated patients with RA become permanently work-disabled within two to three years of diagnosis [3].

Like many autoimmune diseases, the etiology of RA is multifactorial. Genetic, stochastic and environmental factors may all have a role in the

activation of the innate and adaptive immune system involved in the development of rheumatoid arthritis [4].

Rheumatoid arthritis primarily is a clinical diagnosis. Patients commonly present with pain and stiffness in multiple joints, although one third of patients initially experience symptoms at just one location or a few scattered site [5].

The extra-articular manifestations of RA can occur at any age after onset. It is characterized by destructive polyarthritis and extra-articular organ involvement, including the skin, eye, heart, respiratory systems, renal, nervous and gastrointestinal systems [6]. Rheumatoid arthritis affects all of the anatomic compartments of the lung. The prevalence of a particular complication varies based on the characteristics of the population studied, the definition of lung disease used, and the sensitivity of the clinical investigations employed [7].

Pulmonary involvement in RA may be due to various causes including infection, drug toxicity and specific manifestations of the immune process [8]. Pulmonary involvement contributes significantly to morbidity and mortality of patients with RA and is the second most common cause of death [9]. Pulmonary manifestations may account for 10–20% of all RA related deaths. These include opportunistic pulmonary infections, drug-induced lung disease and pulmonary manifestations directly associated with RA, which may affect all anatomic compartments of the lung [7].

It has been estimated that nearly 50% of RA patients will develop some form of respiratory abnormality during their lifetime [10]. Pleural disease (with or without effusion), interstitial lung disease (most commonly with a histopathological pattern of usual

interstitial pneumonia) and rheumatoid (necrobiotic) lung nodules are the most frequent manifestations, with a prevalence varying according to the investigation employed [11].

Subjects and Methods

The study was conducted in Merjan Teaching Hospital from November/2011 to May/2012. In this study 140 patients who had RA were included. All the patients diagnosed with rheumatoid arthritis according to ACR revised criteria 1987 and clinically assessed by Rheumatologist. All patients were nonsmoker and they have no previous history of cardiac ,respiratory or inflammatory disease that may affect results of pulmonary function test.

Sixty healthy persons were chosen as control group , they were similar to patients in age, sex, occupation and residence with no history of smoking or cardiac ,respiratory disease.

Spirometrical tests were done to all RA patients and control group using flowmeter and computerized spirometer(MIR spirolab III). The variables measured were: forced vital capacity(FVC), forced expiratory flow in the first second(FEV1), Ratio of forced vital capacity/ forced expiratory flow in the first second(FVC/FEV1), peak Expiratory Flow(PEF), Forced Expiratory flow25_75(FEF25-75%), Forced Expiratory flow25(FEF25%), Forced Expiratory flow50(FEF50%) and Forced Expiratory flow75(FEF75%)

The highest of three reproducible measurements was used, and was expressed as the percentage of the value predicted for age, height, weight and gender according to standardized tables and compared between RA patients and control.

Results

Forced Vital Capacity (FVC) was significantly lower (p value<0.05) in RA patients (mean 86.37 ± 22.44 liter) than in control group (mean 95.38 ± 11.75 liter).

Forced Expiratory Volume in one second (FEV1) show highly significant decrease ($P<0.01$) in RA patients (mean 84.50 ± 20.09 liter) than in control group (mean 98.67 ± 11.91 liter).

Ratio of FEV1/FVC was significantly lower ($P<0.05$) in RA patients (mean $98.19 \pm 9.93\%$) than in control group (mean $102.58 \pm 8.21\%$).

Also PEF show highly significant decrease ($P<0.01$) in RA patients (mean 71.99 ± 21.80 liter/second) than in control group (mean 90.43 ± 14.10 liter/second).

Forced Expiratory Flow 25_75% show highly significant decrease

($p<0.01$) in RA patients (mean 84.15 ± 27.45 liter/second) than in control group (mean 101.92 ± 17.72 liter/second).

Forced Expiratory Flow 25% show highly significant decrease ($p<0.01$) in RA patients (mean 71.57 ± 22.13 liter/second) than in control group (mean 85.98 ± 15.54 liter/second).

Forced Expiratory Flow 50% show highly significant decrease ($p<0.01$) in RA patients (mean 78.51 ± 26.28 liter/second) than in control group (mean 93.82 ± 17.57 liter/second).

Forced Expiratory Flow 75% was significantly lower ($p<0.05$) in RA patients (mean 83.66 ± 32.15 liter/second) than in control group (mean 97.95 ± 18.72 liter/second). Table (1) summarize these results.

Table 1 Spirometrical results of rheumatoid arthritis patients and control group

Variables	Group	mean± S.D	P value
FVC (liter)	patients	86.37±22.44	p<0.05
	control	95.38±11.75	
FEV1 (liter)	patients	84.50±20.09	P<0.01
	control	98.67±11.91	
FEV1/FVC %	patients	98.19±9.93	P<0.05
	control	102.58±8.21	
PEF L/s	patients	71.99±21.80	P<0.01
	control	90.43±14.10	
FEF 25-75% L/s	patients	84.15±27.45	P<0.01
	control	101.92±17.74	
FEF 25% L/s	patients	71.57±22.13	P<0.01
	control	85.98±15.54	
FEF50% L/s	patients	78.51±26.28	P<0.01
	control	93.82±17.57	
FEF 75% L/s	patients	83.66±32.15	P<0.05
	control	97.95±18.72	

-FVC: Forced Vital Capacity

-FEV1: Forced Expiratory Volume in first second.

-PEF: Peak Expiratory Flow.

-FEF25%-75%: Forced Expiratory Flow during 25%-75% of first second.

-Values in table are mean ± standard deviation.

Discussion

All spirometrical result (FVC, FEV1, FEV1/FVC , PEF, FEF25-75%,FEF 50% ,FEF 75%) show significant decrease($p<0.05$) in RA patients as compare to predictive value in control group. This consistent with 12 .

Results of current study goes with other studies 9,11, 13,14, 15 who found that most common abnormalities were:

- small air way disease defined by decrease FEF 25-75% ; FEF 25% ; FEF 50% and FEF 75%.
- Restriction defined by decrease FEV1,FVC and obstruction defined by decrease FEV1/FVC below 70% of predicted value.

This difference between RA patients and control group is due to direct effect of RA on all parts of respiratory system which disrupt the normal physiological functions or by effect of drugs that increase susceptibility to infection resulting in cells infiltration and disruption of normal physiological function .

In conclusion, the results from this study demonstrated that the high incidence of pulmonary dysfunction observed in the study patients was unexpected and suggests that all patients with RA should undergo spirometrical tests for complete assessment.

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