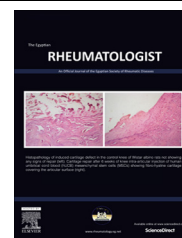




Egyptian Society of Rheumatic Diseases  
**The Egyptian Rheumatologist**

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ORIGINAL ARTICLE

# Obstructive sleep apnea in patients with rheumatoid arthritis: Correlation with disease activity and pulmonary function tests



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Received 8 April 2014; accepted 10 April 2014  
Available online 21 May 2014

## KEYWORDS

Rheumatoid arthritis;  
Obstructive sleep apnea;  
Polysomnography;  
Disease activity score-28;  
Pulmonary function tests

**Abstract** *Aim of the work:* To assess obstructive sleep apnea (OSA) as one of the common primary sleep disorders in patients with rheumatoid arthritis (RA) and study its correlation to disease activity and pulmonary function tests.

*Patients and methods:* This study included 30 female patients with RA who fulfilled the American College of Rheumatology/European league against rheumatism classification criteria. All the patients were subjected to full medical history, thorough clinical examination with evaluation of the disease activity using disease activity score-28 (DAS28), laboratory assessment of highly sensitive C-reactive protein (hsCRP), pulmonary function tests (PFTs) (FVC, FEV1 and FEV1/FVC) and one night polysomnography at the sleep laboratory.

*Results:* Polysomnographic data revealed OSA in 14 RA patients (46.7%). Patients with OSA showed longer disease duration ( $7.0 \pm 1.94$  years), higher BMI ( $30.8 \pm 2.48$ ), hsCRP level ( $6.7 \pm 0.6$  mg/L) and DAS28 ( $4.9 \pm 1.85$ ) than patients with no OSA ( $4.0 \pm 1.72$  years,  $20.3 \pm 1.55$ ,  $4.9 \pm 0.3$  mg/L and  $3.7 \pm 1.28$  respectively). There was non-significant difference between both groups regarding the PFTs ( $p > 0.05$ ). The study showed a significant correlation between AHI (apnea-hypopnea index) and BMI, hsCRP and DAS28 ( $r = 0.45$ ,  $0.43$  and  $0.51$ , respectively) ( $p < 0.05$ ). No significant correlation was detected between AHI and PFTs.

*Conclusion:* Obstructive sleep apnea is commonly associated with RA patients; these findings possibly suggest common underlying pathological mechanisms which may be linked to chronic

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Peer review under responsibility of Egyptian Society of Rheumatic Diseases.

<http://dx.doi.org/10.1016/j.ejr.2014.04.002>

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inflammation. Co-existence of OSA in RA patients may influence the disease activity and the level of circulating inflammatory markers. Considering diagnosis and treatment of this sleep disorder in RA patients may help in improved clinical care, better prognosis and avoid rheumatoid-associated morbidities.

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## 1. Introduction

Rheumatoid arthritis (RA) is a chronic, inflammatory disease that is characterized by joint pain and swelling and can lead to disability and functional limitations [1,2]. In addition, more than half of patients with RA report sleep disturbance, a rate of prevalence that is 2–3 times greater than that found in the general population [3]. Such disturbed sleep may be due to pain, depression, lack of exercise, or corticosteroid usage [4].

Cross-sectional studies have found that sleep disturbance correlates with greater pain and disease activity [5]. It is often thought that difficulties with sleep are due to RA-related pain. However, sleep disturbance and pain may be bidirectionally related [6]. Sleep dysfunction and primary sleep disorders are increasingly recognized in people with RA [7]. The morbidity and mortality which may be associated with untreated sleep disorders, particularly obstructive sleep apnea (OSA), raise the priority of this aspect of patient care [8].

Obstructive sleep apnea (OSA) is a significant public health concern and contributes to increased cardiovascular morbidity and mortality [9]. It is defined by the American Academy of Sleep Medicine [10] as repetitive episodes of upper airway obstruction occurring during sleep and usually associated with a reduction in oxygen saturation [11]. Symptoms of concern include sleep episodes during wakefulness, daytime sleepiness, unrefreshing sleep, fatigue, insomnia, waking up breath holding, gasping or choking and loud snoring [12].

Diagnosis of obstructive sleep apnea can be indicated by symptomatology and the presence of known risk factors as increasing age, obesity and large neck circumference, although OSA can occur in individuals with none of these risk factors [13]. Also a number of tools and methods are available for the assessment of sleep health as self-reported questionnaire instruments [14]. However, the gold standard for diagnosis of OSA is the overnight polysomnography (PSG) [15].

The aim of the work was to assess obstructive sleep apnea (OSA) as one of common primary sleep disorders in patients with rheumatoid arthritis (RA) and study its correlation to disease activity and pulmonary function tests.

## 2. Patients and methods

The present study is a cross sectional one that included 30 female patients with RA, fulfilling the American College of Rheumatology/European league against rheumatism (ACR/EULAR) criteria for classification of RA [16]. They were selected from patients attending the Rheumatology and Rehabilitation outpatient clinic in Ain Shams University Hospitals (ASUH).

All the patients were on a stable disease-modifying drug regimen for three months prior to study entry. The study was approved by the local ethics committee and written

consent was obtained from all patients after a full explanation of the study.

### 2.1. Exclusion criteria

- Patients on anti-tumor necrosis factor (TNF) or corticosteroid therapy.
- Patients on sedative or hypnotic drugs or with history of withdrawal of stimulants as coffee or tobacco.
- Patients with abnormalities in soft palate or upper airway.
- Pregnancy.

### 2.2. Clinical assessment

- Full history taking was performed laying stress on disease duration and symptoms suggestive of OSA e.g. day-time sleep, somnolence, morning headache, fatigue, waking up, breath holding, gasping or choking and loud snoring.
- Local examination of the chest, ear, nose and throat was carried-out.
- The BMI ( $\text{kg/m}^2$ ) was determined by weight (kg) and height (m) (Quelet index).
- The disease activity was assessed using disease activity score 28 (DAS28) [17]. Patients with DAS28 score  $\leq 2.6$  were considered in remission [18].

### 2.3. Laboratory assessment

- Complete blood picture was assessed using coulter counter.
- Rheumatoid factor (RF) was evaluated by enzyme-linked immunosorbent assay (ELISA).
- Erythrocyte sedimentation rate (ESR) was determined using Westergren Blot method.
- Highly sensitive C-reactive protein (hsCRP) concentration was measured using a latex-particle enhanced turbidimetric immunoassay [19]. Samples of peripheral venous blood were collected and stored at  $-80^\circ\text{C}$  until the time of assay.

### 2.4. Pulmonary function tests

The tests were done in the pulmonary laboratory. The best of 3 measures obtained while the patient is breathing room air by flow volume spirometry (Flow mate model 2500) were used to calculate the following parameters:

- Forced vital capacity (FVC): amount of air that can be forcefully expelled from maximally inflated lung.
- Forced expiratory volume in 1st second (FEV-1): Volume of air expelled during the first second of FVC.
- Ratio of FEV-1 to FVC (FEV-1/FVC).

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