

Radiological changes in rheumatoid arthritis patients at a teaching hospital in Saudi Arabia

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التغيرات الشعاعية في مرضى التهاب المفاصل الروماتويدي في أحد المستشفيات التعليمية السعودية

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الخلاصة: أُجري هذا التقيُّص حول تواتر حدوث التغيرات الشعاعية في اليدين والقدمين في مستشفى يشتمل على جُمهرة سكانية محدَّدة من مرضى التهاب المفاصل الروماتويدي في مدينة جدة بالمملكة العربية السعودية. واختير، عشوائياً، سبعة وخمسون مريضاً يستوفون معايير تشخيص التهاب المفاصل الخاصة بالكلية الأمريكية لطب الروماتزم 1987، من العيادة الخارجية لطب الروماتيزم في مستشفى جامعة الملك عبد العزيز. ولوحظ لدى المرضى وجود التآكل في 60٪، كما لوحظت قلة المادة العظمية في 34٪ منهم؛ والتشوه في 26٪، وتورُّم الأنسجة الرخوة في 14٪ منهم. وكانت نسبة التآكل أقل من المعطيات المسجَّلة في سكان أوروبا الشرقية وأمريكا الشمالية، ولكنها أعلى من المعطيات السابقة المسجَّلة في المنطقة الوسطى بالمملكة العربية السعودية.

ABSTRACT The frequency of radiological changes of the hands and the feet were investigated in a well-defined hospital population of patients with rheumatoid arthritis in Jeddah, Saudi Arabia. A total of 57 patients who fulfilled the American College of Rheumatology 1987 criteria for the diagnosis of rheumatoid arthritis were randomly chosen from the rheumatology outpatient clinic at King AbdulAziz University Hospital. Erosions were seen in 60% of the patients and periarticular osteopenia in 34%; deformity and soft tissue swelling were present in 26% and 14% of patients respectively. The proportion with erosions is lower than data reported from Western European and North American populations but higher than previous data from the Central region of Saudi Arabia.

Modifications radiologiques chez des patients atteints de polyarthrite rhumatoïde dans un hôpital universitaire en Arabie saoudite

RÉSUMÉ La fréquence des modifications radiologiques au niveau des mains et des pieds a été étudiée au sein d'une population hospitalière bien définie constituée de patients atteints de polyarthrite rhumatoïde, à Jeddah en Arabie saoudite. Au total, 57 patients répondant aux critères de l'*American College of Rheumatology* 1987 pour le diagnostic de la polyarthrite rhumatoïde ont été choisis au hasard dans le service de consultation rhumatologique externe de l'hôpital universitaire Roi Abdul Aziz. Des érosions ont été observées chez 60 % des patients et une ostéopénie péri-articulaire chez 34 % ; des déformations et des œdèmes au niveau des tissus mous étaient présents chez 26 % et 14 % des patients, respectivement. La proportion de patients présentant des érosions s'avère plus faible que les données rapportées sur les populations d'Europe occidentale et d'Amérique du Nord, mais plus élevée que les données précédemment recueillies dans le centre de l'Arabie saoudite.

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Received: 26/12/08; accepted: 17/03/09

Introduction

Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by inflammatory erosive polyarthritis and systemic features. It leads to irreversible joint damage, disability and even premature mortality [1–3]. Work disability occurs in 20%–30% of patients with RA if left untreated [4]. It is well known that the progression of radiological changes is slowed by the use of disease-modifying antirheumatic agents (DMARD) [5] and can be ameliorated by the use of biologic agents [6–8]. Therefore to improve the outcome, it is important to diagnose and treat the disease early.

In clinical trials, the diagnosis of RA is usually based on the American College of Rheumatology (ACR) classification criteria that includes clinical manifestations, laboratory investigations and radiographic bone erosions [9]. In typical outpatient practice, a definitive diagnosis using these criteria may be difficult to obtain early in the disease process [10]. Reports suggest that erosions at the metacarpophalangeal and proximal interphalangeal joints can be seen on plain radiography in 15%–30% of patients during the first year of disease and in patients who do not respond to therapy the incidence rises to 90% by the end of the second year [11,12]. In some patients, erosions occur first in the ulnar styloid or the 5th metatarsophalangeal joint, whereas in other cases erosion at the feet occurs earlier and faster over the years than erosions at the hand [13,14]. It is therefore worth evaluating both the hands (including the wrists) and the feet in all patients in whom a diagnosis of RA is suspected [15].

A number of markers have been suggested as predictors of erosive disease in RA [16–21] including levels of the autoantibody rheumatoid factor (RF). Seropositive patients have more aggressive disease and more common extra-articular manifestations than seronegative patients and radiographic

progression is more rapid among RA patients with positive levels of RF at initial evaluation [16,17].

The prevalence of RA in the Saudi Arabian population was reported to be about 0.02% in a study in the Central region [22]. Another study in our country showed that the proportion of RA patients with radiological changes in the form of erosions at the hands and the feet was 39% and that foot erosions were less frequent than hand erosions (6% versus 39% respectively) [23]. In the present study we investigated the frequency of radiological changes of the hands and the feet at a teaching hospital in Jeddah, Saudi Arabia and compared the findings with those from other studies here and elsewhere. We also studied the relationship between radiological changes and the levels of the prognostic marker RF.

Methods

Study design and setting

A prospective study was conducted at King Abdulaziz University Hospital, the only government teaching hospital in Jeddah in the Western region of Saudi Arabia. With a bed capacity around 700 it provides health care to a multinational population of mixed socioeconomic status.

Sample

All RA patients attending the outpatient clinic of our hospital over the period June to December 2007 ($n = 57$) were enrolled in the study. All had been diagnosed with RA according to the 1987 ACR classification criteria [9].

Data collection

The following data were collected from the clinical records: demographic features; clinical findings, e.g. duration of disease at the time of the study and activity of the disease based on the 28-item disease activity score (DAS28) [24]; serum level of RF; and smoking

history (defined as current smoker or nonsmoker). A DAS score ≥ 5.1 was considered as active disease. RF was measured by immunonephelometry with the quantitative N Latex RF system (Dade Behring, Germany), with a normal upper limit of 20 IU/L, according to the manufacturers' instructions.

Radiological changes were evaluated by taking X-rays of the hands and wrists (anteroposterior, lateral and semisupine) and the feet (anteroposterior and lateral). These were reviewed by 2 radiologists and the authors. The radiological changes noted included: soft-tissue swelling, periarticular osteopenia (defined as a localized area of decreased bone density with loss of the trabecular pattern at the periarticular area); joint space narrowing; erosions (defined as erosion through the cortex of the bone around the margins of the joint "bare area" where the bone is not protected by overlying cartilage); and subluxation and deformity.

Statistical analysis

Data analysis was done using SPSS, version 16 software. Mean and standard deviation (SD) was calculated for quantitative data and proportions for categorical variables. Student *t*-test was used for comparing means of continuous variables. The chi-squared test was used to analyse group differences for categorical variables and a *P* value of < 0.05 was considered significant.

Results

Radiological changes were reviewed in 57 patients fulfilling the 1987 ACR classification criteria for the diagnosis of RA: 44 (77%) women and 13 (23%) men, a female to male ratio of 3:1. Their mean age at the time of the study was 45.3 (SD 11.8) years. The majority of the patients (61%) were Saudi Arabian nationality while 39% were non-Saudi Arabians. All patients were Muslims ex-

cept for 3 patients (5%). Only 1 patient was a current smoker.

The mean disease duration at the time of the study was 7.3 (SD 4.2) years (range 1–13 years).

There were 22 patients (39%) with active disease according to their DAS28 scores. Radiological changes were detected in 38 patients (67%). However, none of them was disabled or using a wheelchair. All of the patients were receiving DMARD treatment. Table 1 defines the joint involvement in the 57 RA patients according to the radiological changes; some patients had more than 1 finding. The most frequently involved joints were the proximal interphalangeal joint, ulnar styloid and the metatarsophalangeal joint in 13 patients each (23%), followed by the metacarpophalangeal joint in 12 patients (21%), the carpal bones in 7 patients (12%) and the distal interphalangeal joint in 3 patients (5%).

Radiological evaluation revealed erosions in 34 patients (60%), followed by periarticular osteopenia in 21 patients (37%), deformity with subluxation in 15 patients (26%) and soft-tissue swelling in 8 patients (14%).

RF was classified as positive in 29 patients (51%). There was no correlation between radiological changes and disease activity ($r = 0.38$, $P = 0.53$) or RF positivity ($r = 2.12$, $P = 0.145$).

Discussion

Our data showed that 60% of RA patients developed erosions over the course of disease and the number of erosions were similar at the hands and the feet. Our data are different from the radiological changes of RA in some industrialized countries. A Swedish 10-year follow-up study of 181 patients with early RA showed that 90% developed erosion by year 2 and 96% by year 10. Feet were more involved than the hands at the early stages in these patients, but later the hands and the feet were equally

affected [16]. In the Netherlands 147 patients with RA were followed for 3 years; 70% of the patients developed erosion by the end of the study and foot involvement were higher than hand involvement [11]. A study of 58 RA patients in the United States who were followed up for 2 years showed that erosions started early in the feet, and by the end of the 2-year study feet erosions were greater than hand erosions [25]. All the above studies suggest that RA is a more aggressive disease in Western European and North American populations, that foot involvement occurs earlier than hand involvement and that these differences may persist until late in the disease. Based on a literature search there was only one other study conducted in our country, in the Central region, showing that radiological changes were less severe than our data and that feet were less involved than the hands (6% versus 39%) [23].

The finding that RA in our country is milder than in industrialized populations has also been reported from Kuwait [26], Oman [27], UAE [28], Iraq [29] and Egypt [30]. Radiological erosions developed in 42% of RA patients in Kuwait, 45.2% in Oman, 55.2% in UAE, 48% in Iraq and 75% in Egypt. Even the highest figure, from Egypt, is still lower than the figures of 90%–96% from Sweden and 93%–96% from the United States [11,12].

Although seropositive RF has been suggested to be an independent risk

factor for the development of radiological changes [16,17], no association with erosions was found in our study.

While smoking has also been linked to joint damage in RA [18–21], we could not to determine any association of smoking with erosions as there was only 1 smoker in our sample, possibly because most of our RA patients were women (77%) and the rate of smoking among women in Saudi Arabia is traditionally very low (0.9% in 1999) [31].

The difference between our data and those from patients in industrialized countries could be explained by different associations of human leukocyte antigen (HLA) alleles between Saudi Arabian and other populations. RA in the Saudi Arabian population is associated with HLA-DR10, whereas in Caucasians it is associated with HLA-DR4 and HLA-DR1 [32]. Other possible factors are the differences in social habits: slippers rather than shoes are more commonly worn due to the hot climate; the preferred sitting position is on the floor, which may improve the blood circulation at the feet compared with sitting on a chair; and the 5 times daily ablutions and Muslim religious prayers involve many actions that flex and exercise the joints [23,33]. Studies have been published from other cultures that support our hypothesis about the possible influence of lifestyle and cultural activities on the range of movements. A Japanese study examined the effect of the Japanese way of sitting after

Table 1 Joint involvement in 57 rheumatoid arthritis patients according to radiological changes

Joint involvement	Radiological changes		No radiological changes	
	No.	%	No.	%
Proximal interphalangeal joint	13	23	44	77
Ulnar styloid	13	23	44	77
Metatarsophalangeal joint	13	23	44	77
Metacarpophalangeal joint	12	21	45	79
Carpal bones	7	12	50	88
Distal interphalangeal joint	3	5	54	95

total knee replacement in patients with RA, and found that this had beneficial postoperative results [34]. Another study conducted in the United Arab Emirates (UAE) indicated that Muslim patients with knee osteoarthritis were more mobile than non-Muslim patients [35]. At the same time, studies from Norway and the Netherlands clearly demonstrated the positive effect of hand exercises in RA patients

on handgrip strength and erosions [36,37].

Conclusions

Our findings showed a higher rate of radiological changes in RA patients in the Western region of Saudi Arabia than in the Central region but a lower rate than among patients from

industrialized countries. The hands and the feet were equally involved. There was no significant association between the radiological findings and RF or smoking history. We recommend a large prospective study to document the predictors for radiological progression, as well evaluations of the effect of cultural factors such as Muslim prayer on erosions of the hands and feet in RA patients.

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