

Frequency Distribution of Bone Fractures in Rheumatoid Arthritis Patients: A Cross-Sectional Study in Police Teaching Hospital, Khartoum 2019

Mosab Ahmed Abker Adam^{1,2*}, Alaa Othman Awadalkareim Gasmalla^{2,3} and Wagas Abbas Mohamed Ahmed Mansour^{2,4}

¹Department of Orthopedics, Omdurman teaching hospital, Omdurman, Sudan

²Department of clinical research, Sudanese Medical research association, Sudan

³Faculty of Medicine, Bahri University, Khartoum, Sudan

⁴Faculty of Medicine, Khartoum University, Khartoum, Sudan

Corresponding Author*

Dr. Mosab Ahmed Abker Adam,
Department of Orthopedics, Omdurman teaching hospital, Omdurman,
Sudan, Tel: 00249916520032; E-mail: Mosabkater10@gmail.com.

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Abstract

Background: Rheumatoid arthritis (RA) is the most common form of inflammatory arthritis in adults. This study reveals the frequency distribution of bone fractures and the most frequent fracture sites in RA patients in Police teaching hospital, Sudan.

Materials and method: A cross-sectional study was conducted in Khartoum, Sudan from September 2018 to September 2019. The questionnaire is in form of Multiple choice questions, Composed of Demographic information (age, sex, Occupation, and social habit), Information about the RA disease (duration, Risk factor, and investigation). Information concerning Bone fracture (if there is any fracture, site, how it detected). Statistical analysis was performed using SPSS, Version 22.0. (IBM, USA).

Results: From patients diagnosed with RA, 25% had bone fractures out of 72 RA patients. A 72 rheumatic patients were involved in this cross-sectional study, 11 of them (15.3%) were males and 61 (84.7%) were females. the mean of age was 50.6 years (48 years for male, 51 years for female). The duration of rheumatoid in the majority of patients (36.1%) was falling between 2-5 years of diagnosis. The most common site of fracture is hip (36.9%) following by carpal bones (26.3%), then spinal vertebrae (10.5%).

Conclusion: 25% of RA patients experienced bone fractures because of falling the most common site of bone fractures in RA patients is hip bone. Physicians should know the association between RA, bone fractures, and corticosteroid use to decrease bone fracture incidence. Also, investigations such as bone loss measurement should be done routinely to any RA patient.

Keywords: Rheumatoid Arthritis • Bone fractures • Hip bone • Corticosteroids.

Introduction

Rheumatoid arthritis (RA) is the most common form of inflammatory arthritis in adults and is characterized by chronic, progressive, systemic inflammation leading to substantial pain, disability, and other morbidities [1]. The annual incidence of RA has been reported to be around 40 per 100,000, the disease prevalence is about 1% in Caucasian but varies between 0.1% in Rural Africa and 5% in (Pima, Chippewa, Blackfeet, Indian), Women are more affected two to three times more often than men [2] Rheumatoid arthritis is not only characterized by inflammation of the synovial tissue, but bone also is involved in the process of inflammation [3]. Accordingly, Patients with rheumatoid arthritis [RA] have an increased risk of osteoporosis [4] that considered to be one of the most well-known complications in these patients and was reported to be approximately twice as high as in the general population [5] that considered to be one of

the most well-known complications in these patients. Osteoporosis is a "silent" complication of rheumatoid arthritis, which may lead to fractures [6]. Also, young women with RA have an elevated fracture risk when compared to healthy controls [7]. Musculoskeletal disorders are among the principal causes of physical disability and expend a large number of health resources globally and considered as the second cause of healthy years lost to morbidity and adversely impact the quality of life. Early accurate diagnosis is vital to avoid inefficient use of resources, such as additional testing and unnecessary referrals [8].

Low bone mass and falls are important risk factors for fracture. Similarly to low bone mass, historical studies have shown an association between falls risk and RA [9,10]. Despite bone loss being one of the most deleterious consequences of the chronic inflammation seen in RA there are relatively few studies exploring if medications used to treat RA, such as corticosteroids, disease modifying anti-rheumatic drugs (DMARDs), and biologic drugs, have a role in bone protection and these studies have yielded conflicting results [11,12]. Cortisone, the first corticosteroid, was the first pharmacological agent used in the treatment of RA in 1949 and offered rapid symptomatic and disease-modifying effects. Corticosteroids remain an extremely effective means of dampening the inflammation associated with RA but are associated with serious long-term side-effects [13]. Due to their potent anti-inflammatory and immunosuppressive actions, Corticosteroids are added frequently to disease modifying antirheumatic drugs (DMARDs) in various arthritic diseases. However, their prolonged administration or administration at high doses is associated with adverse effects that may be quality of life-threatening, including osteoporosis, metabolic, gastrointestinal and cardiovascular side effects [14]. DMARDs are a group of medications which alter the course or outcome of inflammatory conditions and are most commonly used in RA. This group of drugs is recommended as the first-line treatment for RA and include methotrexate, leflunomide, sulfasalazine and hydroxychloroquine, gold (sodium aurothiomalate), azathioprine, ciclosporin and penicillamine [15].

During our study, we found that previous data on bone fractures in RA patients with were limited especially regarding the frequent site of fractures and the effect of Corticosteroids in bone fractures. Thus we conducted this research to estimate the frequent site of bone fracture and the common risk factors in RA patients. This study will provide a good Data to have a clue about which patient is at risk of bone fracture and thus provide avoidable methods to prevent the Disability.

Materials and Methods

A cross-sectional study, a health facility-based was conducted in police teaching hospital, Khartoum, Sudan from September 2018 to September 2019. We excluded patient with Rheumatologic disease other than Rheumatoid arthritis, Patients Who've come for the first time [not previously diagnosed), Rheumatoid arthritis patients who have fractures due to Road traffic accident-RTA, Other causes of osteoporosis : (Post-Menopausal, Diabetes mellitus, hyperthyroidism, Cushing's syndrome, hyperparathyroidism), and Patients whose Refuse to involve in the study.

Data collection: It was a self-designed questionnaire that developed based on the research question and objectives and then is reviewed by Rheumatologist and medical Officer to ensure its reliability. At least five questionnaires were used in a pilot study to test its validity.

We enrolled 72 patients, the cases were drawn from Sudanese patients above 18 years with rheumatoid arthritis who consecutively attend Police teaching hospital in rheumatology clinic in Khartoum state for routine follow up by Convenience sampling methods.

We explained the purpose of the study and ensure the confidentiality of the information to the participant, and written informed consent was taken from them. It was an interviewed questionnaire and permission was

taken from the participant to look in their follow up a file for information regarding the investigation and treatment. This type of method is the best way to answer questions concerning our research problem.

The questionnaire is in form of Multiple choice questions, Composed of Demographic information Regards their (age, sex, Occupation, and social habit), Information about the rheumatoid arthritis disease (duration, Risk factor, and investigation) information concerning Bone fracture (if there is any fracture, site, how it detected)

Data analysis

We examined age, sex, and duration of disease, risk factors, diagnostic tools, fracture duration and prevalence, common management used, and the main site of fracture.

Statistical significance was defined as P<0.05. Analyses were performed using SPSS, Version 20.0. (IBM, USA).

Results

Rheumatoid arthritis is a chronic autoimmune disease that affects female more common than male, A 72 rheumatic patients were involved in this cross-sectional study, 11 of them (15.3%) were males and 61 (84.7%) were females. The mean of age was 50.6 years (48 years for male, 51 years for female). The duration of rheumatoid in the majority of patients (36.1%) was falling between 2-5 years of diagnosis as in (Table 1).

A different common Risk factors was considered in this study included family history of Rheumatoid arthritis and osteoporosis, smoking, cancers (breast or prostate) and hypertension. Although 63.9% had no risk of that study was considered, 16.4% of patients were having a family history of osteoporosis, other 8.2% with a family history of rheumatoid arthritis, 6.6% were smokers, one case of breast cancer (1.6%), and 3.3% with hypertension (Table 1).

Clinical diagnosis of Rheumatic patients and management, 95.8%

Table 1. The Base-line character, risk factors, diagnosis and management of RA.

Characteristics	Values
Gender	
Male	11 (15.3%)
Female	61 (84.7)
Total mean of age	50.6 years
Mean for male	48 years
Mean for female	51 years
Durations of disease	
<2 years	14 (19.4%)
2-5 years	26 (36.1%)
5-10 years	13 (18.1%)
>10 years	19 (26.4%)
Risk factors	
Smoking	4 (6.6%)
Family history of osteoporosis	10 (16.4%)
Family history of RA	5 (8.2%)
Breast cancer	1 (1.6%)
Hypertension	2 (3.3%)
Clinical diagnosis	
Anti-CCP	69 (95.8%)
RF	56 (77.8%)
Blood picture	26 (36.1%)
Managements	
NSAIDs	9 (12.5%)
DMARDs	63 (87.5%)
Corticosteroid	53 (73.6%)
Immune suppressive	16 (22.2%)
Duration of management	
< 2 years	20 (27.8%)
2-5 years	19 (32.8%)
>10 years	19 (32.8%)

of RA patients in our study were positive for Anti-CCP and 77.8% for rheumatoid factor. Also, blood picture was done for 36.1% of patients to calculate baseline complete blood count with differential. In this study 4 major groups of medical drugs were identified including Non-Steroidal Anti-inflammatory Drugs (NSAIDs), Disease-Modifying Antirheumatic Drugs (DMARDs), Corticosteroids and Immune-Suppressive drugs. The majority of patients 88.7% were received DMARDs, 74.6% Corticosteroids, 22.5% Immune-Suppressive drugs and just 12.7% NSAIDs. Approximately one third of patients were used rheumatoid drugs less than two years, one third between 2-5 years and one third in more than 5 years (Table 1).

Table 2. The common sites of bone fracture in rheumatoid arthritis patients.

Fracture sites	Number (percentages)
Spinal vertebrae	2 (10.5%)
Hip (Femur)	7 (36.9%)
Carpal	5 (26.3%)
Tibia	1 (5.3%)
Talus	2 (10.5%)
Radius	1 (5.3%)
Humorous	1 (5.3%)

Table 3. The relation between corticosteroids use and incidence of bone fracture.

Duration of management with Corticosteroid	With fracture	Without fracture	Total
<2 years	4 (22.2%)	14 (77.8%)	18
2-5 years	5 (31.2%)	11 (68.8%)	16
>5 years	6 (33.3%)	12 (66.7%)	18

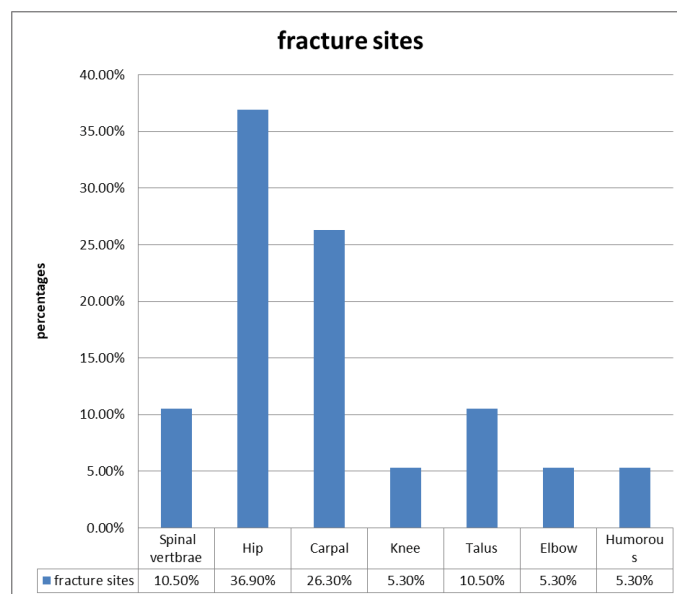


Figure 1. Shows a Bar chart showing common sites of bone fracture in rheumatoid arthritis patients.

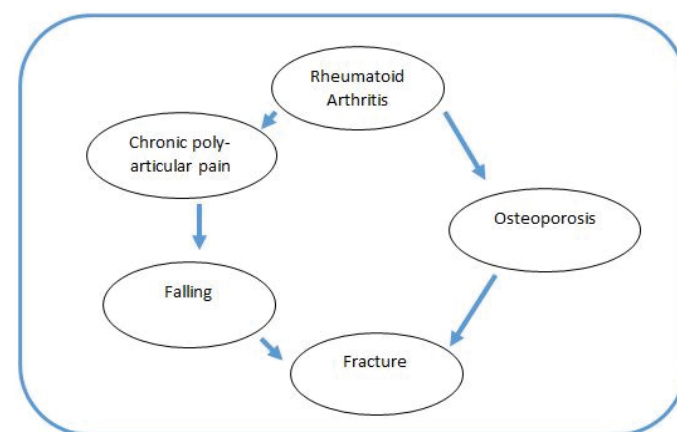


Figure 2. Shows the etiology of fracture in RA patients.

Osteoporosis and loss of bone mass were considered as one of the major RA complication, 25% of RA patients in this study experienced bone fracture because of falling down. However, duration of a bone fracture in one-third of patients falling in the interval of more than 10 years, 39% of patients in an interval of fewer than 2 years, and the rest of the 27.8% between 2-10 years as in (Table 1). As shown in (Table 2), femur following by carpal bones are the most common sites of bone fracture in RA patients, femur (36.9%), carpal bones (26.3%), then spinal vertebrae (10.5%) and talus bone (10.5%) (Figure 1).

Discussion

Rheumatoid arthritis is a systemic chronic inflammatory disabling autoimmune diseases that affect mainly joints, and bones, which ending with bone loss, joint deformities and, bone fractures [16]. Little is known about specific-site and prevalence of bone fracture, risk factors, clinical diagnosis and common drugs use in the management of rheumatoid arthritis patients in Sudan and our study tries to fill these gaps.

A lot of clinical studies emphasized that Osteoporosis incidence increased double-time among RA patients in comparison to non-RA patients [16,17]. Moreover, Aging and some prescribed RA's medication like corticosteroids also lead to osteoporosis [18]. Obviously, osteoporosis is the main risk factor of fracture in elderly patients with RA and uses Corticosteroids. Our study goes further more and try testing a family history of RA and osteoporosis, 16.4%, 8.2% of patients were having a family history of osteoporosis and RA respectively. This percentage of positive family history could be due to running of RA in a family or from familial idiopathic osteoporosis. Even when we studied breast cancer as risk factor one case found to be positive, osteolytic bone metastasis is one of the common patterns of breast cancer that decreases bone density and increases risk of osteoporosis [19].

The presences of Autoantibodies in autoimmune diseases like Rheumatoid arthritis are a characteristic usually used in diagnosis, some auto-antibodies are specific for Rheumatoid arthritis and play a role in disease pathogenesis such as Anti-citrullinated protein antibody (Anti-CCP) and other like rheumatoid factor is not specific and may be present in healthy older patients or in other diseases, such as hepatitis C. Meta-analysis done at 2007 about Anti-CCP Antibody and Rheumatoid Factor for Diagnosis of rheumatoid Arthritis show pooled sensitivity of RF and Anti-CCP are similar, but Anti-CCP is more specific than RF in the diagnosis of RA [20], Our result support meta-analysis evidence by found that 95.8% of RA patients were positive for Anti-CCP and 77.8% for rheumatoid factor.

Rheumatoid arthritis usually managed by specific drugs that diminish the symptoms when treatment begins in the early stages of the disease, but there is no apparent cure. 88.7% of RA patients were using DMARDs which decrease inflammation and temporally ease pain but alone aren't enough to treat RA symptoms. Drugs like NSAIDs used in less frequency and wasn't prescribed a lot (only 12.7% used NSAIDs) may because RA is chronic disease requires chronic treatment and if we use NSAIDs for a long time the annoying side effect and close monitoring of kidney function should be done.

RA is a risk factor for fracture in both male and female across all age group [21,16], decline quality of bone may result from The chronic effect of inflammation which associated with increased risk of fractures and deformities [22], Two main causes may explain why fracture is common in RA patients, firstly osteoporosis which reported to be more common in RA patients, and secondly chronic poly-articular pain is considered to be the main cause of falling [23]. Thus osteoporosis and increase a risk of falling usually associated with each other under RA disease [24 25] [Figure 2].

In our study, approximately a quarter (1/4) of rheumatoid arthritis patients experienced a bone fracture, more than 55% of them are just in the hip (femur) and carpal bones. Other studies that analyzed the data from Oslo registrar more than a decade ago detected that the overall prevalence of hip osteoporosis in pre- and Postmenopausal women with RA was around 15% [26]. Another study concludes that Hip fracture risk is approximately doubled amongst patients with rheumatoid arthritis and among those taking steroids. In Table 3 we can see that the percentages of patients who used corticosteroid are raised with extended of treatment durations. These risk increases are, to some extent, independent of each Other. In rheumatoid arthritis, the risk was most closely associated with functional Impairment, whereas steroid use did not appear to be confounded by this Variable [18].

A characteristic Loss of bone in the hip and the radius, and relatively preserve the axial bone are found in rheumatoid arthritis patients with osteoporosis unlike postmenopausal osteoporosis [23], thus, we can say especially hip and carpal bones are more prone to fracture in rheumatoid patients with osteoporosis. So appropriate early intervention to prevent hip fractures in RA patients is a critical issue in rheumatology care [27]. Regarding vertebral fractures, more new vertebral fractures were found in the new RA patients than in the controls and they were likely to be more severe in the patients [28].

Weight-bearing bones like hip (36.9%), carpal bones (26.3%), spinal vertebrae (10.5%), and talus bone (10.5%) are the most common 4 sites of fracture in rheumatoid arthritis patients, these sites with muscles in healthy individual absorb and distributes falling shocked and reduce fracture risk, but in osteoporotic rheumatoid patients bones lose their density and become more vulnerable to fracture.

The limitation of this study was the relatively small sample size of the study group, and the fact that the study was conducted in a single outpatient rheumatology clinic, so generalization cannot be ensured.

Conclusion

In our study, we found that a quarter of RA patients experienced a bone fracture by away of falling. Also, we demonstrated that RA patients have an increased risk of fractures at the hip, carpal, spinal vertebrae, talus, knee, elbow, and humerus. In addition, Corticosteroids are a risk factor for bone fracture. So Physicians should know the association between rheumatoid arthritis, fractures, and Corticosteroid use. Also, to decrease the fracture incidence investigations such as bone loss measurement should be done routinely to any rheumatoid arthritis patient.

Abbreviation

RA; Rheumatoid Arthritis, RF; Rheumatoid Factor

Ethical approval and consent to publish

The study design and data collection methods were approved by our institutional review board and ethical approval was obtained from the head of a rheumatology clinic at police teaching hospital, Khartoum, Sudan.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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Availability of data and materials

All the data used in the study are available from the first and corresponding author on reasonable request.

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