Prevalence of Hand Deformities and Factors that Influence it in Patients with Rheumatoid Arthritis

Diar Abdullah Abubaker *   Dashty A. Al-Bustany **

ABSTRACT

Background and Objectives: Hand deformity is a typical feature of the RA. Therefore it is crucial to find out the prevalence of hand deformity in RA and to identify factors associated with its presence.

Methods: A group of 100 patients with RA fulfilling the 1987 revised ACR criteria, were attending routine out patient clinics and physiotherapy unit in Rizgary Teaching hospital in Erbil, between 1st Oct. 2008 to 31st June 2009, are included, Patients who had congenital anomaly, history of trauma, patients below 16 years and other rheumatologic disease had been excluded.

Results: : Hand deformity was recorded in (57%) of cases .The frequency of deformities was as follow; ulnar deviation of the MCP joints (41%), palmer subluxation of the MCP joint (38%), Z deformity(13%), boutonniere deformity (27%) , swan neck deformity (35%), radial deviation of the wrist (24%) and subluxation of the wrist joint (16%). Female to male ratio was 5:1, 55% 0f patients were between 40-59 years of age. X-ray of both hand shows 60% of patients had bone erosion, RF was positive in 73% of patients, CRP was positive in 75%. Family history was positive in 30%. There was a significant correlation between development of deformities and disease duration, No. of joints involved, RF(Rheumatoid Factor) ,CRP(C-reactive protein) and ESR(Erythrocyte sedimentation rate), other factors that had been studied but had no significant correlation with development of deformities which were age, gender, occupation, residence, type of treatment.

Conclusions: Rheumatoid arthritis is a chronic rheumatologic disease that affects the hand and causes deformities, which mainly depend on the duration of disease, so early treatment and suppression of inflammation is necessary to delay or arrest the development of deformities.

Key words: Rheumatoid arthritis, Hand deformities, risk factors.

INTRODUCTION:

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease of unknown etiology that primarily targets synovial tissues[1]. It is the most common connective tissue disorder, with variable degree of severity and disability[2] that affects all ethnic groups throughout the world[3]. Female to male ratio is 3:1. The disorder has a peak onset between 40-60 years of age[4]. The overall prevalence of RA is 1% to 2%, and it steadily increases to 5% in women by the age of 70[4]. The average annual incidence of RA in the United States is 0.5 per 1000 Persons per year[5]. Hand deformity is a typical feature of the RA. The disease not only involves the synovial membrane of the joint but many other structures ,such as tendons, muscles, capsules ,and ligaments are involved[6]. The wrist is the most common joint involved in the upper extremity in RA[7]. Early in the disease there is a loss of extension. Late changes due to erosive damage lead to volar subluxation and radial drift of the carpus, resulting in increasing prominence of the ulnar styloid and lateral deviation[8]. Other deformities of the hand are ulnar deviation of the fingers and dorsal subluxation of the MCP joints[3].

* Senior house officer, M.B.CH.B
** Senior Lecturer in Medicine, M.B.CH.B, DM, FICMS,College of Medicine, Hawler Medical University

In the thumb there is (Z deformity) which is hyperextension of the first interphalangeal joint and flexion of the first MCP joint[9]. Flexion and extension contracture in the PIP and DIP joint of the fingers will result in characteristic swan-neck deformity (flexion contracture at the DIP joint and hyperextension at the PIP joint) or boutonniere deformity (flexion contracture at the PIP joint and hyperextension at the DIP joint)[3]. The objectives of this study were to find out the prevalence of hand deformities in rheumatoid arthritis and to identify factors associated with its

PATIENTS METHODS:

One hundred patients with rheumatoid arthritis fulfilling the 1987 revised ACR criteria (which includes: 1.Morning stiffness (>1hour).2. Arthritis of three or more joint areas.3. Arthritis of hand joints.4. Symmetrical arthritis.5. Rheumatoid nodules. 6. Rheumatoid factor.7. Radiological changes. Criteria: 1-4 should be present for 6-weeks or more. Diagnosis of RA made with four or more criteria) were included. Patients who had congenital anomaly, history of trauma, patients below 16 years and other rheumatologic disease were excluded. The patients were either have been admitted to the Rizgary teaching hospital or who attended out patient clinics and physiotherapy unit from 1st Oct. 2008 to 31st June. 2009. A detailed history was taken and full clinical examination was done by two rheumatologists for these patients. The hands were examined to detect the presence of ulnar deviation of the MCP joints, , subluxation of the MCP joints, Z deformity of the thumb, boutonniere , swan-neck deformity, radial deviation of the wrist joint and subluxation of the wrist joint both rheumatologists agreed on the presence of these deformities. X-ray of both hands in AP-view has been taken to identify bone erosion, Joint space narrowing and Periarticular osteopenia. All patients were investigated for: Rheumatoid factor by Qualitative

agglutination indicates a level of RF in the sample equal or >8.I.U./ml. (PLASMATEC, laboratory product Ltd ,UK). CRP (PLASMATEC, laboratory product Ltd ,UK). ESR, the widely used rule for calculating normal maximum ESR values in adults (98% confidence limit) is given by a formula devised in 1983 (Miller *et al*,1983): **ESR (mm/hr≤ Age(in years) + 10 (if female)/2**. Statistical analysis: The data were put into the Microsoft excels and then analyzed by using statistical package for social sciences (SPSS) version 15. Chi -square test was used to accept or reject hypotheses. For all these a P value less than 0.05 considered as significant while P value more than 0.05 was regarded as non significant.

RESULT:

The study involved 100 patients with RA. The mean age of 43.97 years ranging between: (20-77) years Std. Deviation was (12.06921). Table (1) shows types of hand deformity seen in RA patients.

Table 1: Types of hand deformity in RA patients

Type of Deformity	Present		Absent	
	Frequency	Percentage	Frequency	Percentage
Ulnar deviation of MCP joint	41	41	59	59
Palmar Subluxation of MCP joint	38	38	62	62
Swan neck deformity	35	35	65	65
Boutonniere deformity	27	27	73	73
Radial deviation of wrist joint	24	24	76	76
Subluxation of wrist joint	16	16	84	84
Z shape deformity of thumb	13	13	87	87

The distribution and frequency of joints of the hand involved in patients shown in (Table 2). The relation between the age and hand deformity in the patients shown in (Table 3). The male to female ratio in RA patients was 20% to 80% respectively.

Gender in the patients with hand deformities were found to be 55% males and 57.5% females. The difference in gender distribution was statistically not significant (P=0.839).The relation between the duration of RA and hand deformities shown in (Table 4)

Table 2: Distribution of joints involvement in inflammatory process in RA patients.

Joints	Involved		Not Involved		Total
	Frequency	Percentage	Frequency	Percentage	
Wrist joint	98	98	2	2	100
MCP joint	95	95	5	5	100
PIP joint	92	92	8	8	100
DIP joint	5	5	95	95	100

Table 3: Age distribution in those with and without deformities

Age	Hand Deformity		Total	X^2	P
	Present	Absent			
<40	16	19	35		
	45.7%	54.3%	100%		
40-59	35	20	55		
	63.6%	36.4%	100%	2.844	0.241
=>60	6	4	10		
	60%	40%	100%		
Total	57	43	100		
	57%	43%	100%		

Table 4:- Duration of disease in those with and without deformities

Duration of Disease	Hand Deformity		Total	X^2	P
	Present	Absent			
<5years	16	30	46		
	34.8%	65.2%	100%		
5-10 years	17	9	26		
	65.4%	34.6%	100%	19.428	<0.0001
>10years	24	4	28		
	85.7%	14.3%	100%		
Total	57	43	100		
	57.0%	43.0%	100%		

The ESR distribution of patients with RA and hand deformities shown in (Table 5). The distribution of C-reactive protein positive in patients with RA and hand deformities shown in (Table 6). The positive Rheumatoid factor in patients with RA and hand deformities shown in (Table 7).The type of treatment of the patients and it's relation to the hand deformities shown in (Table 8)

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Table 5: ESR distribution in those with and without deformities

| ESR | Hand Deformity | | Total | X^2 | P |
	Present	Absent			
High	44	24	68		
	64.7%	35.3%	100.0%	5.148	0.023
Normal	13	19	32		
	40.6%	59.4%	100.0%		
Total	57	43	100		
	57.0%	43.0%	100.0%		

Table 6: CRP distribution in those with and without deformities

| CRP | Hand Deformity | | Total | X^2 | P |
	Present	Absent			
Positive	49	26	75		
	65.3%	34.7%	100.0%	8.499	0.0035
Negative	8	17	25		
	32%	68%	100%		
Total	57	43	100		
	57%	43%	100%		

Table 7: RF distribution in those with and without deformities

| | Hand Deformity | | Total | X^2 | P |
	Present	Absent			
Positive	48	25	73		
	65.8%	34.2%	100.0%		
Negative	9	18	27	8.452	0.0036
	33.3%	66.7%	100.0%		
Total	57	43	100		
	57.0%	43.0%	100.0%		

Table 8: Type of treatment distribution in those with and without deformities

Type of treatment	Hand Deformity		Total	X^2	P
	Present	Absent			
Prednisolone	11	9	20		
	55%	45%	100%		
MTX+ prednisolone	33	20	53		
	62.3%	37.7%	100%		
HCQ+ prednisolone	2	1	3		
	66.7%	33.3%	100%		
Infliximab	0	1	1		
	.0%	100%	100%	5.763	0.45
SSZ+ prednisolone	3	1	4		
	75%	25%	100%		
Not on treatment	7	11	18		
	38.9%	61.1%	100%		
De pancillamine	1	0	1		
	100%	.0%	100%		
Total	57	43	100		
	57.0%	43.0%	100.0%		

DISCUSSION:

According to results of this study, 57% out of 100 patients had at least one type of hand deformities while 43% didn't has any type of deformity. Eberhardt *et al,* (1991) [6] who showed 31% out of 100 patients had hand deformities after 2 years of disease. This difference is mainly due to the duration of disease. The best explanation for this result is that the mean duration of the disease in our study was 8.25 years, (Std. Deviation =8.52). While in Eberhardt *et al,* (1991) [6] was 11.5 month. While in those who had disease less than 5 years, 34.8% of them had deformities which is nearly identical to (Eberhardt *et al,* 1991) [6], which describes that 31% of patients had hand deformities after 2 years of disease. The types of deformities have been reported in this study(Table-1) These results are nearly similar to results of the study done by Madenci and Gursoy (2003)

involved 87 patients with established RA reported the following ratio of deformities: ulnar deviation, Boutonniere deformity and Swan neck deformity are 39.5%, 29.8% and 27.5% respectively and (Laine *et al*,1957) [11] showed that the deformities occur in 33%, 36% and 16% respectively. Eberhardt *et al,* (1991) [6] reported that the ratio of deformities, ulnar deviation, Boutonniere deformity and Swan neck deformity are 13%, 16% and 8% respectively and Hatice *et al,* (2005) [12] reported that the ratio of these deformities are 10.5%, 8.6% and 10.5% respectively. These results are in disagreement to our result most probably due to difference in duration of the disease. Results in this study showed that 98% of patients had wrist joint involvement (Table-2). This result is in agreement with (Flatt, 1995) [7] and (Ilan and Rettig, 2003) [13] study in

joint is the most common joint involved in RA. This study showed that RA occur in all age groups between 20-77 years, but 55% of them are between 40 to 59 years of age. The result agreed with (Randall and King, 2009) [14] in which described that RA can occur at any age but tends to peak in the fourth and fifth decades of life. Hand deformities occur in all age groups and there is no difference in age distribution, P is not significant .This result is in agreement with (Eberhardt *et al*, 1991) [6] which described that there is no difference in age distribution. The explanation for this result is that joint destruction depends on activity of disease and duration of inflammation, which occur at any age (Table-3). Hand deformities was reported in 55% of male patients and 57.5% of females in this study (Table-4). This result is in agreement with (Eberhardt *et al*, 1991) [6] and (Madenci and Gursoy, 2003) [10] which describe that There was no difference in gender distribution with hand deformities. This result most likely due to that inflammatory process lead to bone and cartilage destruction, which occurs in both male and female. The duration of disease was longer in those who had hand deformities comparing with other patient that are with out deformities, the result shows that there is a significant correlation between hand deformity and duration of disease, P=<0.001 (Table-4). This result is comparable to (Madenci and Gursoy, 2003) [10] which describes that there is significant correlation between disease duration and development of hand deformity. The reason for this result is that joint deformities occur because of prolong inflammation and synovitis in the joint, which lead to destruction of cartilages and bones. The results of this study showed that there is significant correlation between hand deformities and number of joints affected by inflammatory process, the result is identical to (peter, 2005) [4]. In our study the results showed that high ESR and positive CRP, had significant correlation with hand deformities (table-5&6). This result is

and (Smolen *et al*, 2006) [17,] in which they describe that active RA leads to severe joint destruction, functional disability, and impaired health status. The explanation of association of high ESR and positive CRP with more deformities is that those patients with high ESR and positive CRP are in active state and this cause more inflammation and destruction of cartilage and bone so more deformities develop. RF was positive in 73% of patients (Table-7), this result is identical to (Vallbracht *et al*, 2004) [18] in which they described that RF can be found in 70-80% of RA patients. In addition, the result is nearly similar to Eberhardt *et al* (1990) [6] which involved 89 patients with RA, they described that 2/3rd were seropositive. Among those patients who had positive RF, 65.8% had hand deformities and there is a significant correlation between positive RF and hand deformities, this result agrees to (de Vries-Bouwstra *et al*, 2008) [19] which describe that there is a significant correlation between positive RF and hand deformities. This result is due to that those RF-positive patients with RA may experience more aggressive and erosive joint disease and extra articular manifestations than those who are RF-negative [20]. In present study 82% of patients were on treatment, 61% of them had deformities; there is no significant relation between treatment intake and hand deformities because most of patients were started the treatment late and developed deformities before starting treatment. Lee and Weinblatt (2001) [21] can explain this result, in which they describe that currently available DMARDs and anti cytokine agents can control synovitis and may slow, or even stop, radiographic progression supports an early aggressive

CONCLUSIONS:

There is strong relationship between hand deformities and duration of disease; the more prolong the disease is the more likelihood of developing deformities. Active disease which indicated by positive CRP and high ESR had

development of hand deformities. Hand deformities occur more commonly in seropositive patients. Regular treatment intake is important to suppress the inflammatory process and to delay the development of deformities. There is no significant relationship between hand deformities and age, gender, and type of

RECOMMENDATIONS:

Further study is needed to determine the factors that influence the development of rheumatoid arthritis in Kurdistan region. General advice and medical education is very important to prevent development of deformities. Further study is needed to determine the role of drugs in preventing development of hand deformities.

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