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PREVALENCE OF RHEUMATOID ARTHRITIS AMONG PATIENTS ATTENDING RHEUMATOLOGY CONSULTATION CLINICS IN MOSUL CITY

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ABSTRACT

A cross-sectional study of 250 patients in Mosul's general hospitals (Jan–June 2024) found a 0.58% prevalence of rheumatoid arthritis (RA) among rheumatology clinic attendees. RA was more common in females (0.40%), especially those over 40, married, overweight, housewives, and from rural areas. Family history (37.2%) and prior inflammatory disease (57.6%) were common. Clinically, 98% had gradual onset, 71% had morning stiffness, and most showed active disease on joint, serologic, and inflammation scales. Limited access to biologic therapies and DMARDs due to cost was a major barrier, despite RA's impact on quality of life.

KEYWORDS: Rheumatoid arthritis, Prevalence, Mosul, Iraq.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic autoimmune disease that primarily affects small joints—particularly those of the hands and wrists—causing pain, swelling, warmth, and stiffness that worsens after periods of rest. It can also involve other organs such as the eyes, skin, heart, lungs, and blood vessels, often leading to systemic symptoms like fatigue and fever. Although the exact cause remains unclear, RA is believed to result from an interplay of genetic and environmental factors, with the immune system attacking the joints and leading to inflammation, cartilage damage, and bone erosion. Diagnosis is clinical but supported by imaging and laboratory tests to exclude similar conditions like fibromyalgia and lupus. Treatment focuses on symptom control and maintaining function, using a combination of NSAIDs, corticosteroids, and DMARDs such as methotrexate and hydroxychloroquine. Biologic agents may be used in severe cases but carry a higher risk of adverse effects; surgery may be required in advanced stages. Globally, RA affected around 18 million people in 2019, with women comprising over 70% of cases, and more than half of patients being over 55 years old. Recent data show that RA can also impact younger populations, with about 1.3% of Americans under 25 affected. In Iraq—particularly in Mosul—the healthcare system has suffered since 2003, and reliable epidemiological data on RA is lacking, prompting the need for focused studies to understand its true burden.[1,2,3,4,5]

Signs & Symptoms

1. Joints

Symmetrical polyarthritis with pain, swelling, warmth, and morning stiffness >1 hour. Common in small joints (hands, feet); leads to deformities (e.g., swan neck, ulnar deviation, Z-thumb).

2. Skin

Rheumatoid nodules (in ~30%), vasculitis, ulcers, alopecia areata, and fragile skin.

3. Lungs

Interstitial lung disease, pleural effusions, and Caplan's syndrome. Methotrexate can cause lung toxicity.

4. Cardiovascular

Elevated risk of MI, stroke, pericarditis, and valvular disease.

5. Blood

Anemia of chronic disease, neutropenia (Felty's syndrome), thrombocytosis.

6. Kidneys

Renal amyloidosis from chronic inflammation.

7. Eyes

Dry eyes, scleritis, episcleritis, and keratitis.

8. Liver
Drug-induced or autoimmune-related liver disease**.**

9. Nervous System
Peripheral neuropathy, carpal tunnel syndrome, atlantoaxial subluxation.

10. Bones
Osteoporosis due to inflammation, immobility, and steroids**.**

11. General Symptoms
Fatigue, fever, weight loss, loss of appetite.

12. Cancer
Increased risk of lymphoma and non-melanoma skin cancer.

13. Oral Health
Common periodontitis and tooth loss.

14. Circadian Influence
Morning stiffness linked to early morning IL-6 surge.[6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22]

Risk Factors for RA
1. Genetic Factors (1.3.1)
RA affects ~1% of adults, mostly women aged 40–60.
Family history increases risk 3–5×.
Genetics account for ~40–65% of seropositive RA cases.
Key genetic association: HLA-DR4 (part of MHC).

2. Environmental Factors (1.3.2)
Smoking: Increases risk ~3×, especially in men and RF-positive individuals**.**
Silica exposure: Also linked to RA**.**
Moderate alcohol use: May have a protective effect.[23,24]

Aim of The Study
To estimate the prevalence of rheumatoid arthritis among patients in rheumatology consultation clinics at Mosul General Hospital.

Specific Objective
1. To describe sociodemographic characteristics of the study population according to their age, gender, marital status, occupation, and residency.

2. To describe the study population according to BMI, comorbid conditions, and history of drug use.

3. To classify the study population according to the presence or absence of an associated family history of rheumatoid arthritis.

4. Classify the disease according to the number of joints involved.

5. To classify the disease according to the duration of symptoms.

6. To classify the disease according to serology and acute phase reactant results.

7. To classify the disease according to the onset of symptoms.

PATIENTS AND METHODS

Study setting
The research was conducted at all of the specialized rheumatological consulting units in Nineveh governorate; Two of the specialized clinics were located on the left bank of Mosul (Ibn Sena and Al Salam teaching hospitals), and the third one was located on the Right bank of Mosul (Mosul General Hospital).

Study design
An observational, descriptive, cross-sectional study was adopted to achieve the present study's objectives.

Data was collected from the participants retrospectively using the non-randomized convenient technique. Verbal informed consent will be obtained, and a modified questionnaire will be used to assess the prevalence of rheumatoid arthritis in Mosul. retrospectively from the participants using a non-randomized convenient technique. A modified questionnaire was used to assess the important risk factors associated with osteoporosis.

Study Period
Data was collected over six months, from the 2nd of January 2024 to the 30th of June 2024.

Study sample
Two hundred and fifty participants.

RESULTS

3.1 Prevalence and sex distribution: The total population at risk is estimated to be 42490. As a result, the prevalence of RA in Mosul city was estimated to be (0.58 %); females were found to have (0.40%) more than males (0.18%). Table 3.1 shows the number of individuals affected and the prevalence ratio of each sex.

Table 3.1: Distribution of study population according to gender.

Gender	No.	%	Prevalence per 100
Female	172	68.8	0.40
Male	78	31.2	0.18
Total	250	100	0.58

*** Chi-square test was used**

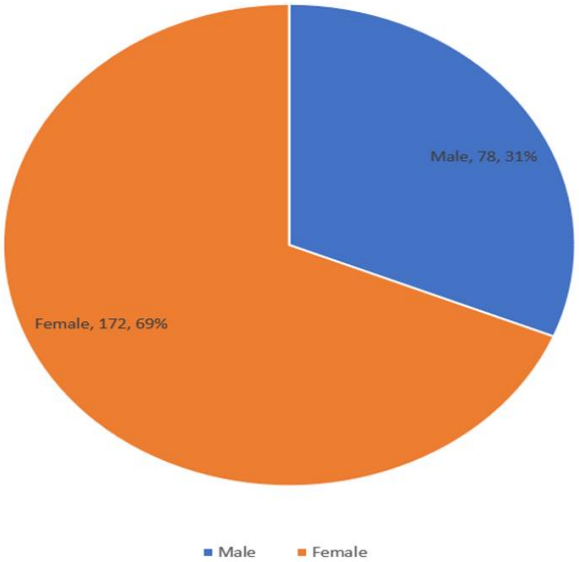

Figure 3.1: Distribution of patients according to gender.

Table 3.2 shows the prevalence of rheumatoid arthritis among different age groups. The age with the highest prevalence of rheumatoid arthritis was (40-49) years with (27.2%), followed by (50-59) with (24.4%), and (60 years & above) with (21.6%), which reveals rheumatoid arthritis is mostly prevalent in older age.

Table 3.2: Distribution of study sample according to age.

Gender	Age (Years)											
	10-19		20-29		30-39		40-49		50-59		60 and above	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Female	7	4.1	10	5.8	35	20.35	54	31.4	35	20.35	31	18.0
Male	3	3.85	6	7.7	6	7.7	14	17.95	26	33.3	23	29.5
Total	10	4.0	16	6.4	41	16.4	68	27.2	61	24.4	54	21.6

Table 3.3 shows the distribution of rheumatoid arthritis among different occupations; housewives were more prevalent among (41.2%), retired were prevalent among (24.4%), employed among (21.2%), and finally, workers among (13.2%).

Table 3.3: Distribution of study sample according to Occupation.

Occupation	Female		Male		Total	
	No.	%	No.	%	No.	%
Housewife	103	59.9	-----	-----	103	41.2
Employed	33	19.2	20	25.6	53	21.2
Worker	0	0	33	42.3	33	13.2
Retired	36	20.9	25	32.1	61	24.4

Table 3.4 shows the distribution of rheumatoid arthritis according to residence state. Rural residency was prevalent among 171 (68.4%), while urban residence was prevalent among 79 (31.6%) study population.

Table 3.4: Distribution of study sample according to residence state.

Residence	Female		Male		Total	
	No.	%	No.	%	No.	%
Rural	116	67.4	55	70.5	171	68.4
Urban	62	32.6	17	21.7	79	31.6

Table 3.5 explains the distribution of the study sample according to educational levels; primary education was prevalent among (31.6%) followed by secondary, illiterate, and high education with (26.4), (24.4), and (17.6), respectively.

Table 3.5: Distribution of study sample according to educational level.

Educational levels	Female		Male		Total	
	No.	%	No.	%	No.	%
Illiterate	39	22.7	22	28.2	61	24.4
Primary	52	30.2	27	34.6	79	31.6
Secondary	41	23.8	25	32.1	66	26.4
High education	40	23.3	4	5.1	44	17.6

Table 3.6 shows the distribution of rheumatoid arthritis among different BMI groups, with the highest being among the overweight group (37.2%), followed by the normal weight group (24%), and then grade 1 obesity (20.8%). Obesity grade 2 and grade 3 were distributed as (8.4%) and (7.6%) respectively. Moreover, underweight was prevalent among 5 (2%) of the study population.

Table 3.6: Distribution of study sample according to Body mass index.

BMI	Female		Male		Total	
	No.	%	No.	%	No.	%
Underweight	3	1.7	2	2.6	5	2
Normal	44	25.6	16	20.5	60	24
Overweight	69	40.1	24	30.8	93	37.2
Obesity grade1	33	19.2	19	24.4	52	20.8
Obesity grade 2	12	7.0	9	11.5	21	8.4
Obesity grade 3	11	6.4	8	10.2	19	7.6

Table 3.7 illustrates that being married was prevalent among 139 (55.6%), single was prevalent among 73 (29.2%), widow among 31 (12.4%), and divorce among 7 (2.8%). Moreover, a family history of rheumatoid arthritis was present among 93 (37.2%), and a medical history of inflammatory disease was present among 144 (57.6%). Smoking was present among 49 (19.6%) cases, with being a heavy smoker (> 20 cigs.) in 14 out of 49 and light (< 20 cigs) in 35 out of 49. Furthermore, biological agent was prescribed for 230 (92%) and methotrexate for 182 (72.8%) of the study population. Lastly, the median duration of treatment was 4 years.

Table 3.7: Distribution of demographic and family, medical, social, and drug history among the study population.

Parameter		Female		Male		Total	
		No.	%	No.	%	No.	%
Marital status	Divorce	6	3.5	1	1.3	7	2.8
	Married	91	52.9	48	61.5	139	55.6
	Single	47	27.3	26	33.3	73	29.2
	Widow	28	16.3	3	3.9	31	12.4
Family history of rheumatoid arthritis	Present	61	35.5	32	41.0	93	37.2
Medical history of inflammatory disease	Present	98	57.0	46	59.0	144	57.6
Smoking	Present	16	9.3	33	42.3	49	19.6
	Heavy (> 20 cigarettes/day)	3	1.7	9	11.5	14	5.6
	Light (< 20 cigarettes/day)	9	5.2	26	33.3	35	14.0
Drug used	Methotrexate	133	77.3	61	78.2	182	72.8
	Biological agent	141	82.0	59	75.6	230	92
Duration of treatment, Median (IQR)				4 (2-5) years			

All parameters expressed as n (%) except as indicated. IQR = interquartile range

Table 3.8 shows the distribution of patients with rheumatoid arthritis according to clinical manifestation. Gradual onset was prevalent among 245 (98%), versus sudden onset among 5 (2%), morning stiffness was prevalent among 178 (71.2%), Joint involvement scale was equal to five among 187 (74.8%), four among 46 (18.4%), three among 14 (5.6%), two among 2 (0.8%) and one among 1 (0.4%) participant. Moreover, the serology scale was two among 151 (60.4%), Zero among 90 (36%), and three among 9 (3.6%). The acute phase reactants scale was one among 194 (77.6%) and zero among 56 (22.4%). X-ray changes were observed in 78 (31.2%) participants.

Table 3.8: Distribution of the study population according to clinical manifestations and laboratory tests among subjects with rheumatoid arthritis, n=250.

Parameter		Female		Male		Total	
		No.	%	No.	%	No.	%
Onset of symptoms	Gradual	170	98.9	75	96.1	245	98
	Sudden	2	1.1	3	3.9	5	2
Morning stiffness	Present	123	71.5	55	70.5	178	71.2
Joints involvement scale	1	1	0.6	0	0	1	0.4
	2	1	0.6	1	1.3	2	0.8
	3	9	5.2	5	6.4	14	5.6
	4	31	18.0	15	19.2	46	18.4
	5	130	75.6	57	73.1	187	74.8
Serology scale	0	66	38.4	24	30.7	90	36
	2	100	58.1	51	65.4	151	60.4
	3	6	3.5	3	3.9	9	3.6
Acute phase reactants	0	34	19.8	22	28.2	56	22.4
	1	138	80.2	56	71.8	194	77.6
X-ray changes	Present	59	34.3	19	24.4	78	31.2

DISCUSSION

Rheumatoid arthritis (RA) is a chronic autoimmune disease that leads to joint inflammation, deformity, and disability. Its primary treatment involves disease-modifying anti-rheumatic drugs (DMARDs), and in more severe cases, biologics are used. The epidemiology of RA in the MENA region remains under-researched, although studies suggest a lower global prevalence compared to other regions. Despite treatment advances, RA remains incurable, significantly impacting quality of life, longevity (by ~10 years), and socioeconomic participation. Reliable data is critical for effective resource allocation and evaluating new therapeutic strategies.[25]

4.1 Prevalence of Rheumatoid Arthritis

In Mosul, RA prevalence was estimated at 0.58%, based on patients attending rheumatology clinics. In Baquba Teaching Hospital, the rate was higher at 0.96%. A 1975 Iraq-wide study found RA in 1% of individuals aged ≥16. These variations highlight potential underreporting or limited access to care in current settings. [26]

4.2 Age and Gender Distribution

Mean age of patients: 49.9 ± 14.1 years. Gender distribution: 68.8% female, 31.2% male, reflecting a well-known female predominance in RA. Age groups most affected: 40–49 years: 27.2%, 50–59 years: 24.4%, ≥60 years: 21.6%. This aligns with other studies (e.g., in the UAE and Ghana) showing that RA is most prevalent in middle-aged to older adults, particularly women.[27]

4.3 Occupational Distribution

Most common occupations among patients: Housewives: 41.2%, Retired: 24.4%, Employed: 21.2%, Workers: 13.2%. Similar patterns were reported in studies from Turkey and Malaysia, where housewives represented over 50% of RA cases, reflecting possible gender roles and healthcare access trends.[28]

4.4 Residency

Rural residents made up the majority of patients, with a 2:1 ratio compared to urban dwellers.

This may be influenced by referral patterns and rural reliance on public hospitals, while urban populations might seek care in private or specialized clinics. Comparable findings were noted in studies from Canada and other regions with similar healthcare disparities.[29]

4.5 Educational Level

Patients with primary-level education were most affected. This corresponds with studies linking lower educational attainment to higher RA prevalence, possibly due to reduced health literacy, healthcare access, or occupational exposures.[30]

4.6 Body Mass Index (BMI)

Only 2% were underweight. Normal and overweight categories were most prevalent. Obesity is known to correlate with increased disease activity, as shown in large cohorts from Germany and studies by Violetta Dubovyk et al., where baseline obesity predicted worse RA progression.[31]

4.7 Marital Status

56% of patients were married, and 29% were single. These findings were consistent with other hospital-based Iraqi studies. Marital status may influence psychosocial support and disease management.[32]

4.8 Family History

37.2% reported a positive family history of RA. This aligns with global genetic estimates of familial contribution between 40–50%, especially in seropositive RA. RA has strong genetic links, particularly with HLA-DRB1 alleles.[33]

4.9 Past Inflammatory Diseases
57.6% had a history of other inflammatory diseases. A similar rate (54.5%) was found in large cohort studies on RA multimorbidity, indicating common comorbid inflammatory conditions.[34]

4.10 Smoking History
28.6% were heavy smokers, and 21.4% were light smokers. Smoking is a well-established risk factor for RA, particularly seropositive RA, although evidence is mixed regarding passive smoke exposure. A French study found increased RA risk with passive smoking, while a Swedish study found no such association.[35]

4.11 Medications: Biologics and Methotrexate
92% of patients received biologic agents, and 72.8% received methotrexate. Median treatment duration: 4 years.

These high biologic use rates reflect the hospital-based nature of the study where biologics are more accessible, unlike the broader population where cost limits access.

4.12 Clinical Manifestations
98% had a gradual symptom onset, typical of middle-age RA onset. Morning stiffness >30 minutes occurred in 71.2% of patients. Joint involvement score of 5 reported in 74.8%, indicating moderate to severe disease.

These findings are consistent with international diagnostic criteria and observational studies.[36]

4.13 Laboratory Markers
60.4% were weakly positive for RF (Rheumatoid Factor) and ACPA. 77.6% had elevated ESR or CRP, key indicators of systemic inflammation. RF is associated with worse prognosis but also with better response to B-cell depletion therapies. These findings match regional and European studies on RA biomarkers.[37]

4.14 Radiographic Findings
31.2% had X-ray evidence of joint damage (e.g., joint space narrowing, erosions).

Progression rates in international studies show radiographic damage in: 25% at 1 year, 41% at 2 years, 60% at 5 years, 61% at 8 years, Imaging remains a crucial tool for diagnosis and tracking disease progression, although similar findings can also occur in other arthritides like gout.[38]

CONCLUSIONS

1. Rheumatoid arthritis prevalence can be considered to be rare in Mosul city.
2. More than two-thirds of rheumatoid arthritis were female.
3. Rheumatoid arthritis was more prevalent among those forty years and above.
4. Rheumatoid arthritis was more prevalent among housewives.
5. Overweight and obesity can be associated with rheumatoid arthritis more commonly than underweighted individuals.
6. A lot of rheumatoid arthritis patients had a positive history of rheumatoid arthritis among their families.
7. Rheumatoid arthritis is frequently linked to other inflammatory diseases.
8. Morning stiffness for over half an hour is a common symptom among rheumatoid arthritis patients.
9. Seropositive rheumatoid arthritis was found to be more prevalent than seronegative-type.
10. Acute phase reactants were found positive in about three-quarters of rheumatoid arthritis patients.
11. X-ray changes were not found in all patients with rheumatoid arthritis.
12. Smoking may indirectly worsen rheumatoid arthritis.

RECOMMENDATIONS

1. Early detection of rheumatoid arthritis and early starting of management are better for improving the disease prognosis.
2. Rheumatoid arthritis can affect many systems and the quality of patients' lives. Iraq's government should provide patients with financial support for rheumatoid arthritis through social welfare programs.
3. Many biological agents and DMARDs are expensive and unaffordable; providing such treatments can decrease many patients' suffering.
4. Further studies are needed to explore rheumatoid arthritis's overall prevalence among the Iraqi population.

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