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Prevalence of comorbidities among patients with rheumatoid arthritis in the UAE: a case–control study

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ABSTRACT

Objectives Data on the rate of comorbidities in Arab patients with rheumatoid arthritis (RA) are limited, and extrapolating the prevalence of comorbidities from international studies is challenging. This study aimed to investigate the prevalence of comorbidities in patients with RA, compare it with that in non-RA controls and explore the association between the body mass index of patients with RA and comorbidities.

Design This is a retrospective, case–control study.

Setting This study included patients receiving secondary care at the Rheumatology Department of a public hospital in the Emirate of Dubai. The controls were recruited from patients receiving primary and secondary care at the Dubai Academic Health Corporation in the fourth quarter of 2022.

Participants This study included all consecutive UAE national patients with RA who visited the rheumatology clinic. The study included 1756 participants in an age-matched and sex-matched control group and 439 patients with RA. Of these, 88.6% were female, and the median age was 55 years. Each RA case was randomly matched with four controls of the same age and sex. All relevant information, including case and control demographics and comorbidities, was retrieved from the electronic medical record.

Primary and secondary outcome measures The relative risk of comorbidities was compared between patients with RA and age-matched controls. The relationship between obesity in RA and the frequency of comorbidities was determined.

Results This study revealed that 188 (42.8%) patients with RA had at least one comorbidity, whereas only 636 (36.2%) individuals in the control group had at least one comorbidity (OR 1.3; 95% CI 1.1 to 1.6, p<0.01). Patients with RA were more likely to have ischaemic heart disease (OR 3.9; 95% CI 2.3 to 6.6, p<0.0001), fibromyalgia (OR 25; 95% CI 13 to 34, p<0.0001), cataract (OR 5.8; 95% CI 4 to 8.5, p<0.0001), osteoporosis (OR 6.8; 95% CI 4.6 to 10, p<0.0001) and knee osteoarthritis (OR 6.1; 95% CI 4.8 to 7.8, p<0.0001).

Conclusions Patients with RA were more likely to have cardiovascular, pulmonary and musculoskeletal comorbidities compared with the control group. Obese patients with RA had a higher incidence of comorbidity than non-obese patients with RA.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This is the first study to compare the prevalence of comorbidities in Arab patients with rheumatoid arthritis (RA) with that in age-matched and sex-matched controls and explore the association between body mass index and the occurrence of comorbidities in these patients.
⇒ We relied on public and private sector data for patients and controls to ensure the accuracy of comorbidity data.
⇒ The primary limitation of this study was its retrospective design, which prevented the development of causal or temporal relationships between RA and comorbidities.
⇒ Because of the study's design and the desire to avoid documentation bias, we did not collect disease activity and Health Assessment Questionnaire scores. Both factors affect the prevalence of comorbidities in patients with RA.
⇒ Furthermore, considering the limited extent of our study conducted in a single centre, performing additional studies to validate our findings among individuals of Arabic ethnicity is important.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic inflammatory disease frequently associated with one or more comorbidities.[1] Previous studies have revealed that up to 62% of patients with RA have at least one comorbidity, which is higher than that in age-matched and sex-matched controls.[2 3] Ischaemic heart disease (IHD), pulmonary disease, malignancy, infection, gastrointestinal disease and psychiatric disease are associated with RA.[1 4] Further, behavioural comorbidities are prominent in RA. A previous study revealed that excessive fatigue, depression and sleep difficulties are more prominent in patients with RA than in healthy individuals.[5]

Chronic inflammation in patients with RA, use of antirheumatic drugs, biomarkers associated with RA and C reactive protein (CRP) levels contribute to a higher prevalence of comorbidities in patients with RA than in the general population.[6 7] CRP is a reliable biomarker of RA disease activity and inflammation.[8] Several comorbidities, such as

metabolic syndrome, diabetes mellitus (DM), cardiovascular disease (CVD) and interstitial lung diseases (ILD), are also linked to biomarkers found in abundance in RA, including CRP, interleukin 6 (IL-6) and interleukin 1β (IL-1β).[9] However, the association between systemic inflammation in RA, CRP (commonly measured biomarker in RA) and comorbidities in patients with RA is complex, and predicting the influence of CRP level changes on the risk of comorbidity development or progression in patients with RA is difficult.[10]

Comorbidities in patients with RA are frequently associated with poor patient-reported outcomes and unsuccessful clinical therapeutic targets.[11 12] Additionally, comorbidities adversely affect physical abilities[13] and increase morbidity and mortality in patients with RA.[12 14 15] Furthermore, comorbidities, such as heart failure, malignancy and active liver disease, usually influence the selection of treatment for patients with RA.[16]

Comparing patients with RA with the general population, several studies have demonstrated that comorbidities are more prominent in RA.[17–19] The reported prevalence of comorbidities in patients with RA considerably varies among different ethnic groups,[20] and data on the frequency of comorbidities in patients with RA of Arabic heritage are limited. Consequently, this study aimed to compare the prevalence of comorbidity between patients with RA and a control group that were matched by sex and age and to investigate the association between the body mass index (BMI) of patients with RA and the presence of comorbidities.

METHODS

Study design

This retrospective, case–control study conducted in the fourth-quarter of 2022 at the Dubai Academic Health Corporation (DAHC) included all consecutive UAE national patients diagnosed with RA who received secondary care at the Rheumatology Department of a public hospital in the Emirate of Dubai. Controls were patients receiving primary and secondary care at the DAHC during the fourth quarter of 2022.

Patient recruitment

Every individual diagnosed with RA in the Dubai Arthritis Registry was evaluated. We recruited those with active follow-up in our facility from 1 January 2022, and who met the inclusion criteria, including adult patients aged ≥18 years and ≤85 years of Arabic ethnicity, UAE nationals, who met the 2010 RA classification criteria of the European Alliance of Associations for Rheumatology (EULAR) and the American College of Rheumatology (ACR),[21] and have authorised the review of their medical records by signing hospital general consent. We excluded patients with RA with coexisting immune-mediated rheumatic diseases, patients aged <18 years or >86 years, non-Arabs, and those who did not consent to use their data anonymously.

Matched control recruitment

We recruited the control group from the pool of patients attending the DAHC. Of the 5 571 663 registered patients in the electronic medical record (EMR), 371 740 were Arabs aged 18–85 years with no history of immune-mediated rheumatic diseases or use of disease-modifying antirheumatic drugs (DMARDs) at the time of the study. Using Excel's RAND function, a random number was generated to identify age and sex matches for the patients. Each RA case was randomly matched with four controls of the same age and sex.

Data collection from medical records

We retrieved all relevant information, including case and control demographics, disease history and comorbidities, from the participant's EMR. We reviewed the unified medical records for private hospitals, Network and Analysis Backbone for Integrated Dubai Health (NABIDH), for the existence of comorbidities in cases and matched controls with no registered comorbidities in the public hospital EMR.

For cases and controls, we collected the following data:

1. Age, which was further subcategorised according to individual age on 31 December 2022, into three age groups 18–40, 41–65 and 66–85 years.
2. Age at RA diagnosis.
3. Sex.
4. BMI <18.5 kg/m^2 was considered underweight, 18.5 to <25 kg/m^2 as healthy weight, 25 to <30 kg/m^2 as overweight and >30 kg/m^2 as obese.
5. Diagnosis of osteoporosis, which is defined as a T-score of under −2.5 on dual X-ray absorptiometry performed within the last 24 months, via recorded fragility fracture during hospital stay or encounters with outpatients.
6. Fibromyalgia is diagnosed according to the 1990 ACR classification criteria for fibromyalgia.
7. Knee osteoarthritis based on X-ray findings and clinical diagnosis.
8. Total knee replacement documented in EMR.
9. Diagnosis of significant hyperlipidaemia that is defined as total cholesterol ≥240 mg/dL.
10. Hypothyroidism is documented in EMR.
11. Identification of DM based on glycated haemoglobin (Hb) >6.5% or fasting plasma glucose ≥126 mg/dL.
12. Diagnosis of hypertension, IHD, heart failure, arrhythmia or cerebrovascular accident.
13. Primary site malignancy.
14. Asthma±chronic obstructive pulmonary disease (COPD) or ILD.
15. Chronic kidney disease stages 3A–5.
16. Diagnosis of tuberculosis (TB) includes radiographic, bacteriological or clinical evidence of active TB at the time of diagnosis. Active TB is defined as a positive culture for *Mycobacterium tuberculosis* or a positive reaction to the Mantoux tuberculin skin test (TST) or interferon-gamma release assay (IGRA). We also included latent TB in the data collection, which is

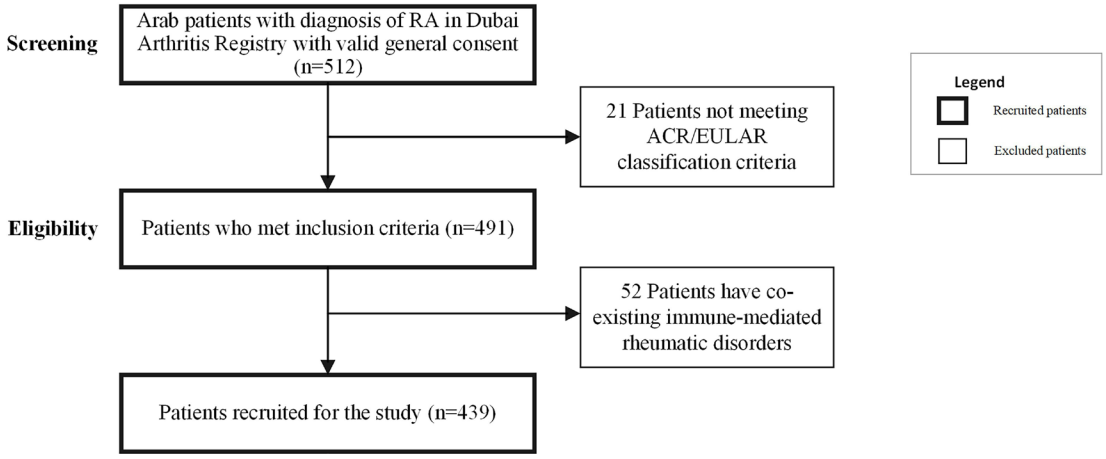

Figure 1 Flow chart showing the selection of rheumatoid arthritis (RA) cases. ACR, American College of Rheumatology; EULAR, European Alliance of Associations for Rheumatology.

defined as having a history of TB, aberrant but stable radiographic abnormalities, or a positive TST or IGRA result, and negative bacteriological investigations (culturing and smears), with no current radiological or clinical indication for active TB.[22]

17. Previous encounters with herpes zoster.
18. Confirmed clinical and serological diagnosis of hepatitis B and C.
19. Anaemia, further characterised as life-threatening anaemia (Hb of <65 g/L), moderate anaemia (Hb of 80–99 g/L), severe anaemia (Hb of 65–79 g/L) or mild anaemia (Hb of 100–120 g/L in women and 135 g/L in men). Mild anaemia was excluded from the overall prevalence of comorbidities in both groups, as it is quite prevalent in the general population and often not linked to morbidity or mortality.[23]
20. We classified the comorbidities into several categories, such as cardiovascular, pulmonary, musculoskeletal, infectious and miscellaneous.
21. Additionally, we confirmed the status of biological DMARDs, conventional DMARDs, previous or current use of steroids, rheumatoid factor and anticitrullinated protein antibodies.

Statistical analysis

When applicable, descriptive statistics, the median and IQR of demographic data, and clinical characteristics were provided. The prevalence of comorbidities was expressed as a percentage of cases and controls. The overall relationship between comorbidity and RA was evaluated by computing OR and 95% CI using two-by-two contingency tables. A contingency matrix was created to cross-tabulate the occurrence of comorbidities in the case and control groups. Similarly, OR and CI were recalculated for the three age categories (18–40, 41–65 and 66–85 years). We compared patients with RA who were underweight, overweight and obese with individuals with a healthy weight to determine the association between BMI subclasses and comorbidity. Groups were compared using Student's t-test, Mann-Whitney U test or Fisher's exact test. A $p<0.05$ was considered statistically significant. GraphPad Prism V.6 (GraphPad Software, San Diego, California, USA) was used for all statistical analyses.

RESULTS

We identified 512 patients with RA in our registry who have been followed up since 1 January 2022. We excluded 21 patients because their RA did not fulfil the ACR/EULAR categorisation criteria. Further, 52 individuals were excluded because of the presence of concurrent immune-mediated rheumatic disorders (33 patients had Sjogren's syndrome, 14 had systemic lupus erythematosus and 5 had mixed connective tissue diseases) (figure 1). Thus, the RA group finally comprised 439 patients. The median disease duration for patients with RA was 10.5 (IQR=4–14) years.

Table 1 Baseline characteristics of cases and controls

Variables	RA (n=439)	Controls (n=1756)	OR	95% CI	P value
Age, median (IQR) years	55 (45–63)	55 (45–63)	–	–	0.86
Female, n (%)	389 (88.6)	1556 (88.6)	1	0.72 to 1.4	1
Smoking, n (%)	40 (9.1)	80 (4.6)	2.1	1.4 to 3.1	0.0003*
BMI, median (IQR) years	30.6 (27.2–35.5)	29.9 (26.1–34.1)	–	–	0.24

*Statistically significant at p<0.05.
BMI, body mass index; RA, rheumatoid arthritis.

Table 2 Prevalence of comorbidities in cases and controls

Comorbidities	RA (n=439)	Controls (n=1756)	OR	95% CI	P value
Cardiovascular diseases					
IHD, n (%)	29 (6.6)	31 (1.8)	3.9	2.3 to 6.6	0.0001*
Cerebrovascular accident, n (%)	19 (4.3)	25 (1.4)	3.1	1.7 to 5.7	0.0001*
Heart failure, n (%)	7 (1.6)	11 (0.6)	2.6	0.99 to 6.7	0.04*
Arrhythmia, n (%)	11 (2.5)	10 (0.56)	4.5	1.9 to 11	0.0006*
Cardiovascular risk factors					
Diabetes mellitus, n (%)	117 (26.7)	357 (20.3)	1.4	1.1 to 1.8	0.004*
Hypertension, n (%)	112 (25.5)	332 (18.9)	1.5	1.1 to 1.9	0.002*
Hyperlipidaemia, n (%)	81 (18.5)	212 (12.1)	1.6	1.2 to 2.2	0.0004*
Pulmonary					
Asthma±COPD, n (%)	42 (9.6)	82 (4.7)	2.2	1.5 to 3.2	0.0001*
Interstitial lung diseases, n (%)	15 (3.4)	4 (0.2)	15	5.1 to 47	0.0001*
Musculoskeletal					
Osteoporosis, n (%)	67 (15.3)	45 (2.6)	6.8	4.6 to 10	0.0001*
Fragility fracture, n (%)	25 (5.7)	26 (1.5)	4	2.3 to 7.0	0.0001*
Fracture sites					
Vertebral fracture, n (%)	11 (2.5)	10 (0.6)	4.5	1.9 to 11	0.0002*
Metatarsal, n (%)	7 (1.6)	6 (0.34)	4.7	1.6 to 14	0.007*
Hip, n (%)	4 (1.14)	3 (0.17)	5.4	1.2 to 24	0.03*
Other fractures, n (%)	2 (0.46)	14 (0.8)	1	0.13 to 2.5	1
Fibromyalgia, n (%)	68 (15.5)	13 (0.7)	25	13 to 45	0.0001*
Knee OA, n (%)	184 (41.9)	185 (10.5)	6.1	4.8 to 7.8	0.0001*
Total knee replacement, n (%)	28 (6.4)	27 (1.5)	4.4	2.5 to 7.5	0.0001*
Infectious comorbidities					
Tuberculosis, n (%)	8 (1.8)	4 (0.2)	8.1	2.4 to 27	0.0006*
Active TB, n (%)	3 (0.7)	3 (0.2)	4	0.81 to 20	0.09
Latent TB, n (%)	5 (1.1)	1 (0.06)	20	2.4 to 174	0.002*
Hepatitis B, n (%)*	3 (0.7)	3 (0.17)	4	0.81 to 20	0.09
Hepatitis C, n (%)	2 (0.5)	3 (0.2)	2.7	0.45 to 16	0.2
Herpes Zoster, n (%)	6 (1.4)	24 (1.4)	1	0.41 to 2.5	1.00
Miscellaneous					
Anaemia, n (%)	235 (53.5)	248 (14.1)	7	5.5 to 8.8	0.0001*
Cataract, n (%)	66 (15)	52 (3.0)	5.8	4.0 to 8.5	0.0001*
CKD, n (%)	9 (2.1)	28 (1.6)	1.3	0.60 to 2.8	0.50
Depression, n (%)	32 (7.3)	46 (2.6)	2.9	1.8 to 4.6	0.0001*
Hypothyroidism, n (%)	54 (12.3)	119 (6.8)	1.9	1.4 to 2.7	0.0001*
Malignancy, n (%)	14 (3.2)	27 (1.54)	2.1	1.1 to 4.1	0.04*

*Statistically significant at p<0.05.
CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; IHD, ischaemic heart disease; OA, osteoarthritis; TB, tuberculosis; Tuberculosis, active and latent.

The control group included 1756 age-matched and sex-matched individuals. Of these, 88.6% were female, and the median age was 55 (IQR=45–63) years. Table 1 presents the baseline characteristics of cases and controls. Online supplemental table S1 demonstrates the clinical and paraclinical features of patients with RA.

Comorbidities

We classified the comorbidities into several categories, including cardiovascular, pulmonary, musculoskeletal, infectious and miscellaneous. Tables 2 and 3 present a summary of the occurrence rates of comorbidities in patients with RA and controls. We found that 188 (42.8%)

Table 3 Number of comorbidities in cases and controls

Number of comorbidities	RA (n=439)	Controls (n=1756)	OR	95% CI	P value
One comorbidity, n (%)	188 (42.8)	636 (36.2)	1.3	1.1 to 1.6	0.012*
Two comorbidities, n (%)	43 (9.8)	164 (9.3)	1.1	0.74 to 1.5	0.84
Three comorbidities, n (%)	123 (28.0)	123 (7.0)	1.3	0.92 to 1.9	0.1602
Four or more comorbidities, n (%)	58 (13.2)	95 (5.4)	2.7	1.9 to 3.8	<0.0001*

*Statistically significant at p<0.05.
RA, rheumatoid arthritis.

patients with RA had at least one comorbidity (excluding mild anaemia), whereas only 636 (36.2%) individuals in the control group had one of the listed comorbidities (OR 1.3, 95% CI 1.1 to 1.6, p<0.01).

Cardiovascular comorbidities

The main cardiovascular comorbidity in patients with RA was IHD (6.6%), which occurred at a substantially higher rate than that in controls (1.8%), OR 9.8 (95% CI 2.3 to 6.6, p<0.0001). This was true for all three age groups. Online supplemental table S2 summarises the prevalence of comorbidities according to age group. Analysis of data revealed that patients with RA had much higher rates of smoking, severe hyperlipidaemia, hypertension and DM than the controls, considering the occurrence of established risk factors for IHD.

Pulmonary comorbidities

The overall prevalences of obstructive lung disease (asthma±COPD) and ILD were higher in RA cases than in controls, with ORs of 2.2 (95% CI 1.5 to 3.2, p<0.0001) and 15 (95% CI 5.1 to 47, p<0.0001), respectively. Compared with controls, patients with RA demonstrated a higher prevalence of ILD and obstructive lung diseases in the age range of 41–65 years. Only the rate of ILD was substantially higher in older patients with RA than in controls.

Musculoskeletal comorbidities

Knee osteoarthritis was the most common musculoskeletal comorbidity in patients with RA at a rate of 41.9% compared with that of 10.5% in the control group (OR 6.1, 95% CI 4.8 to 7.8, p=0.0001). A subanalysis based on age groups of 41–65 and 66–85 years demonstrated the same result. The OR for the former group was 5.6 (95% CI 4.1 to 7.6, p<0.0001), whereas the latter group had an OR of 20 (95% CI 11 to 37, p<0.0001). Similarly, our study revealed a significantly higher prevalence of fibromyalgia, osteoporosis, fragility fracture and total knee joint replacement among patients with RA compared with sex-matched and age-matched controls.

Infections

The rate of latent TB in patients with RA was 1.1%, which was greater than that in controls (0.06%) (OR 20, 95% CI 2.4 to 174, p=0.0016). In contrast, patients with RA and controls had comparable rates of active TB, herpes zoster, hepatitis B and hepatitis C.

Miscellaneous comorbidities

In total, 53.5% of patients with RA had anaemia vs 14.1% of controls (OR 7, 95% CI 5.5 to 8.8, p=0.0001). Additionally, 49.2%, 3.9% and 0.5% of patients with RA had mild, moderate and severe anaemia, respectively, and 46.5% had normal Hb levels. The prevalence of hypothyroidism, malignancy, cataracts and depression was higher in individuals with RA than in controls.

Correlation between BMI and comorbidities in Arab patients with RA

Our cohort indicated that patients with RA who were categorised as obese had a higher prevalence of at least one comorbidity (103 patients) than those who had a healthy weight (26 patients) (OR 1.8, 95% CI 1.0 to 3.1, p=0.034). Table 4 classifies patients with RA according to weight and presence of at least one comorbidity. The prevalence of comorbidity in underweight and overweight patients with RA was comparable to that in individuals of normal weight. The prevalence of hypertension, hyperlipidaemia and asthma was higher among obese patients with RA

Table 4 Weight classification of patients with RA with at least one comorbidity and those without any comorbidity

Weight classification	Patients with at least one comorbidity	Patients without comorbidity	OR	95% CI	P value
Healthy weight, n (%)	26 (5.9)	52 (11.8)	–	–	–
Obese, n (%)	103 (23.5)	115 (26.2)	1.8	1.0 to 3.1	0.034*
Underweight, n (%)	2 (0.45)	4 (0.9)	1	0.17 to 5.8	1
Overweight, n (%)	57 (12.9)	80 (18.2)	1.4	0.80 to 2.5	0.25

Underweight, overweight and obese patients were compared with healthy patients.
*Statistically significant at p<0.05.
RA, rheumatoid arthritis.

than among those with a healthy weight. Online supplemental table S3 demonstrates the prevalence of specific comorbidities in obese and healthy patients.

DISCUSSION

This study compared comorbidity prevalence in Arab patients with RA with that in a control group of age-matched and sex-matched Arabs from the general community, as well as investigating the relationship between BMI and comorbidity prevalence in these patients. Our results revealed that compared with the control group, Arab patients with RA demonstrated a higher prevalence of comorbidities.

In our cohort, CVDs, including IHD and cerebral vascular diseases, were the most prevalent comorbidities among patients with RA compared with the control group. This result is consistent with the results of previous studies.[24 25] These observations can be attributed to the high prevalence of DM, hypertension and hyperlipidaemia among those patients, as shown in this and other relevant studies.[14 26 27] This finding is of particular concern because CVD is one of the leading causes of mortality in patients with RA and is largely preventable.[28] Therefore, our results emphasise the importance of screening and managing cardiovascular hazards in Arab patients with RA.

Furthermore, our study revealed that individuals with RA had higher rates of respiratory conditions, such as ILD, asthma and/or COPD, compared with the general population. This result is consistent with previous studies showing an association between RA and increased susceptibility to lung diseases.[29–31] The prevalence of smoking was considerably higher in the RA group than in the control group, which may be attributed to the higher rate of COPD in patients with RA. Our study emphasises the need for careful monitoring of respiratory symptoms and appropriate screening to prevent pulmonary complications in Arab patients with RA.

Additionally, the findings from our cohort correlate with those of earlier studies, revealing that patients with RA have a higher incidence of knee osteoarthritis than the control group.[32] Patients with osteoarthritis and RA are associated with greater disability and chronic discomfort[33]; thus, detecting and managing their condition is important to reduce their disability.

Bone loss and increased risk of fractures are associated with RA.[34 35] Our results confirmed similar observations in Arabs. Interestingly, in line with a previous study, our study revealed that vertebral, hip, and metatarsal fractures were more prominent in patients with RA than in the control population, particularly in the older adult population.[36 37] Despite the use of biologics and synthetic DMARDs to control disease activity in almost two-thirds of patients, patients with RA were at higher risk of osteoporosis and fracture. These findings are consistent with those of a Spanish case–control study including 330 postmenopausal women with RA. Similar to our cohort, 40% of the participants in this study received at least one biological therapy. The Spanish study also reported that the HR for fracture was 2.6.[38] Therefore, assessing bone mineral density regularly and estimating fracture risk using a validated tool in the Arab population is crucial for the early detection and management of osteoporosis in patients with RA.[39]

According to a meta-analysis, the overall prevalence of concurrent fibromyalgia in patients with RA is 21%, with a range of 4.9%–52.4%.[40] In our study, 15.5% of patients with RA had fibromyalgia. The coexistence of fibromyalgia in patients with RA can influence disease activity evaluation, therapy effectiveness and the overall impact of RA on patients' quality of life. This is primarily due to the reliance on subjective patient input in these assessments.[41] Hence, screening for fibromyalgia in patients with RA and providing counselling to those with both conditions are important to establish treatment objectives.

Data on the prevalence of cataracts in RA are limited and are frequently attributed to the use of steroids.[42] The results of our study indicate that compared with the control group, patients with RA aged >41 years had a significantly higher frequency of cataracts. The significance of routine ophthalmological examinations is underscored by these results, particularly for patients with RA who were treated with moderate-dose steroids over an extended period.

A previous study described the association between RA and hypothyroidism.[43] We revealed a higher rate of hypothyroidism in patients with RA than in controls. The significance of these results stems from the previously described correlation between hypothyroidism and disease activity and an increased tender joint count in patients with RA.[44] Therefore, rheumatologists should be aware of the thyroid status of patients in their daily practice.

Previous reports on the relationship between sex and the prevalence of comorbidities in RA are contradictory. While some studies have reported that female patients are at a higher risk of CVD,[45] others have found that male patients are at higher risk than females.[46] Our study revealed that female patients with RA exhibited an increased risk of anaemia and fibromyalgia compared with that male patients with RA. However, male patients with RA were more likely to develop IHD than female patients with RA. Online supplemental table S4 presents these comorbidities according to sex.

Our study significantly differs from other published studies in that we observed lower rates of malignancy and depression in patients with RA than those reported in the literature. RA is associated with an overall higher risk of malignancy.[47] A meta-analysis revealed that patients with RA were less likely to experience breast or colon cancer but more likely to develop lymphoma and lung cancer.[48] Our study demonstrated an association between RA and malignancy in general. However, we could not identify the same association after adjusting for age and neoplasia type because of the limited number of cases.

A significant number of patients with RA experience depression.[49] Our study demonstrated a lower prevalence of depression than that reported in previous studies, but it was higher in the control group. This result can be attributed to the difference in methodology. We relied on the documentation of depression diagnosed by a psychiatrist, whereas others relied on validated screening tools. In particular, a considerable number of patients with RA have variable features of depression that go undetected in clinical practice. Depression in patients with RA significantly affects their general health and quality of life.

Disease activity in patients with RA was associated with an increased risk of comorbidities, such as cardiovascular disease, ILD and depression, in patients with RA.[50–52] Because of the limitations related to study design that we have discussed in the limitations section, we did not collect disease activity data. Similarly, disease duration was associated with the likelihood of developing CVD in patients with RA.[53] However, we could not demonstrate a similar association in our cohort because most of the patients were classified as patients with established RA.

Higher HAQ scores indicate a higher level of physical disability in patients with RA, which can lead to various consequences, such as the development and/or exacerbation of comorbidities. For example, impaired physical function and mobility can impede an individual's ability to engage in regular exercise, leading to a sedentary lifestyle, weight gain and increased risk of conditions such as diabetes and CVD. Previous studies have established a correlation between elevated HAQ scores in patients with RA and an increased risk of CVD.[54] Although we did not examine the relationship between HAQ scores and comorbidities because of the retrospective nature of this study, we are aware that the presence of comorbidities may influence HAQ scores in patients with RA.[55]

Several studies have revealed the high prevalence of obesity in patients with RA and its association with comorbidities in these patients.[56 57] Our cohort has demonstrated similar findings. Longitudinal studies have reported that obesity is associated with worse RA disease outcomes and a higher prevalence of comorbidities,[56] which is consistent with our findings. Obesity in patients with RA is also associated with physical disability independent of age, sex, ethnicity, smoking, disease duration and comorbidities.[58] A cross-sectional study involving 513 patients with RA metabolic dysfunction-associated fatty liver disease (MAFLD), which was defined by hepatic steatosis and one or more of several criteria (ie, overweight or obesity, type 2 diabetes and metabolic abnormalities), revealed an association between MAFLD and increased CVD risk in patients with RA.[59] The correlation between MAFLD and increased CVD risk highlights the need for personalised strategies to manage CVD risk in patients with RA. Additionally, it emphasises the association between metabolic health, liver disease and cardiovascular outcomes in RA, thereby presenting additional research and clinical intervention opportunities. Interestingly, overweight and obese individuals account for 80.8% of our RA cohort. Weight management should, therefore, be part of the overall management plan of patients with RA in our region, particularly those who are overweight and obese, to prevent the occurrence of comorbidities in such patients.

Our study provides compelling evidence that Arab patients with RA reported more comorbidities than age-matched and sex-matched controls. Musculoskeletal, cardiovascular, pulmonary and metabolic disorders were the most prominent comorbidities found in our study. Additionally, we revealed a correlation between obesity and comorbidities in Arab patients with RA. Our results have crucial clinical implications for rheumatologists. Regular screening for patients at risk is important for the early detection and management of coexisting comorbidities. Differentiating joint pain in patients with RA, whether it is caused by active RA or other common comorbidities coexisting with RA, including fibromyalgia, osteoarthritis, hypothyroidism and depression. Preventing unnecessary use of 'relatively expensive' treatments without addressing patients' crucial needs is important. Rheumatologists must consider these results when designing management plans and collaborating with other medical professionals to address the physical and mental needs of patients with RA. Additionally, the significance of our results extends to policy-makers, thereby reinforcing the need to develop policies that improve outcomes and quality of life for patients with RA and its associated comorbidities. Policy-makers should facilitate the development of healthcare programmes that improve the overall health and outcomes of patients with RA by addressing RA's complex comorbidity profile. Currently, published guidelines for managing comorbidities in patients with RA are unavailable. Most rheumatologists in the region have adopted the ACR and EULAR recommendations. Hence, the development of local guidelines to standardise screening, early detection, effective management and comorbidity prevention in patients with RA is an urgent need.[60]

Our study's strength lies in using meticulous public and private sector data for patients and controls, thereby ensuring the accuracy of comorbidity data. We minimised potential confounding variables by comparing patients with RA and controls from the same ethnic background. However, the retrospective design limits our ability to establish causal correlations. Our study is the first in the region to compare the prevalence of comorbidities between patients with RA and age-matched and sex-matched controls, thereby filling a crucial gap in the literature. However, our approach did not involve obtaining disease activity scores or HAQ data because of the study's design limitations and to minimise documentation bias. Previous studies have indicated that these variables significantly affect the occurrence of comorbidities in patients with RA. Furthermore, a notable weakness is the inability to account for confounding factors, such as cumulative disease severity, treatment regimen changes and previous lifestyle changes, which affect the development and progression of both RA and its comorbidities.

Additionally, the limitation of the study is its single-centre design, as opposed to national data, which introduces the possibility of left-censorship bias for patients and controls who received healthcare outside of the Emirate of Dubai and were not included in the validation process.

The limitations of this study emphasise the need for more comprehensive longitudinal studies and registries to better elucidate the complex interplay between RA and its associated comorbidities in the Middle East. Furthermore, it will investigate the effect of cumulative disease activity and the disability index on the occurrence of comorbidities in patients with RA; will investigate whether the comorbidity profile at the onset of RA determines RA progression, disability and incurred cost and will help in developing effective strategies for their prevention and management.

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Contributors JAA-S, NAK, NZ, HA and WR contributed to the study design, data collection, cross-validation and result interpretation. JAA-S screened eligible patients to be included in the study and matched them with control in terms of age and sex. JAA-S and WR performed the analysis of the study population. JAA-S drafted the manuscript; all authors participated in critically revising the manuscript and approved the final version to be published. JAA-S takes full responsibility for the integrity of the work as a whole, from inception to the published paper. JAA-S accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish (guarantor).

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The study adhered to the ethical guidelines outlined in the Declaration of Helsinki. The Institutional Review Board of the Dubai Scientific Research Ethics Committee (DSREC), which is governed by the Dubai Health Authority, approved the study (approval number DSREC-02/2023_18). Additionally, all patients involved in the study provided written informed consent for data collection and its anonymous use in research.

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Data availability statement Data are available on reasonable request. Data are available on reasonable request from the corresponding author with permission from DAHC. Prevalence of comorbidities among patients with rheumatoid arthritis in the UAE 2024 by Jamal Al-Saleh is licensed under Attribution-Non-Commercial 4.0 International. To view a copy of this licence, please visit http://creativecommons.org/licenses/by-nc/4.0/. This is an open-access article distributed in accordance with the Creative Commons Attribution Non-Commercial (CC BY-NC 4.0) licence, which permits others to distribute, remix, adapt, build on this work non-commercially and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

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