Journal of Pioneering Medical Sciences
Received Janauary 30, 2024 Accept April 06, 2024 Publish June 30, 2024.
Volume 13, Issue 3, Pages 27-29

DOI https://doi.org/10.61091/jpms202413305

Prevalence of Diabetic Hyperglycemia Among Patients With Rheumatoid Arthritis

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Abstract **Introduction:** Rheumatoid arthritis (RA) is one of the most prevalent systemic inflammatory diseases worldwide. Cardiac complications present the most common mortality cause among RA patients. One of the most important comorbid conditions with RA is diabetic hyperglycemia mainly type 2 diabetes mellitus (T2DM). **Aim of the study:** The present study was conducted to assess prevalence of T2DM among patients diagnosed with RA from Iraq. **Methodology:** We included a randomly selected 100 rheumatoid arthritis. All included patients were subjected to anthropometric measurements, diabetic profile assessment and ESR, CRP and rheumatoid factor measurement. **Results:** Among the included RA patients, 28 patients were diagnosed with new-onset DM. Our results showed that RA female patients, having obesity, HTN or hyperlipidemia exhibited higher risk for diabetic hyperglycemia. **Conclusion:** This current study revealed a statistically significant association between diabetic hyperglycemia incidence and comorbid RA.

Key Words DM, rheumatoid arthritis, cardiovascular

1. Introduction

Rheumatoid arthritis (RA) is a systemic chronic inflammatory disease of undefined cause presenting in at least one percent of the general population [1]. One of the leading mortality causes among RA patients is coronary artery attacks. Unfortunately, it was reported that many RA patients exhibit co-morbid status as increased arterial blood pressure and increased prevalence of diabetic hyperglycemia mainly type 2 (T2DM). These two comorbid conditions especially raise the risk of coronary artery attacks several folds [2].

On the other hand, rheumatoid pro-inflammatory status contributes to the development of these comorbidities. Several RA inflammatory cytokines for example interleukin-1β (IL-1β), IL-6, and tumor necrosis factor (TNF), play a pivotal role in atherosclerosis development and disturbance of glucose homeostasis [3]. In patients with T2DM, these inflammatory mediators exhibit a strategic role in beta-cell autoimmune deterioration. Moreover, inflammatory cytokines exhibit an important role in the pathophysiology of insulin resistance [4].

Several previous studies were conducted to assess the coexistence of RA and type 2 DM [5]–[7]. However, conclusive results are yet to be obtained. The exact risk of comorbid RA and type 2 DM is still to be elucidated. Different factors participate in determining this risk, including geographical distribution, economic status, overall demographic characteristics and ethnic variations [8].

That why, we conducted the current study to assess association of T2DM among rheumatoid arthritis patients from Iraq.

2. Patients and Methodology

A. Patients

One hundred previously diagnosed RA patients were enrolled in our study aged 45-79 years of both sexes. They were living in Baghdad-Iraq. The study was conducted in a cross-sectional design and done over 4 months from December 2022 to May 2023. Each patient was thoroughly described the target of the study, and informed consent was acquired. Confidentiality of data was maintained.

Patients with established diagnosis of RA according to previously stated in American College of Rheumatology were included. The following were included as exclusion criteria: pregnant and breastfeeding females, coronary artery disease, kidney function abnormalities, liver function abnormalities, diagnosis with malignant tumor.

B. Laboratory measurements

Included patients were subjected to total history taking, anthropometric assessment (including height and weight) with concomitant body mass index (BMI) calculation then laboratory assessment of serum glucose and HbA1c. Venous blood samples were collected from overnight fasting patients to measure fasting plasma sugar. Another three mL of venous blood was withdrawn for measurement of postprandial blood glucose. Markers of rheumatoid arthritis were measured including erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), rheumatoid factor (RF) and cyclic citrullinated peptide antibodies (CCP).

C. Statistical analysis

The SPSS program version 25.0 (SPSS, USA) was accounted for analysis of the data gathered. Using the chi-square test, categorical data between groups were analyzed. All p-values were considered significant for all tests when below 0.05.

3. Results

All data of the enrolled patients are presented in the following Tables 1 and 2. The current study included 100 RA patients (30 males and 70 females).

In the current study, mean age of included patients was 47.5 ± 7.1, mean duration of pre-diagnosed diabetes was 7.8 ± 2.3 years while mean duration of rheumatoid arthritis in affected patients was 3.2 ± 1.1 years.

4. Discussion

In the current study, we assessed prevalence of prevalence of T2DM among rheumatoid arthritis patients from Iraq. One hundred previously diagnosed RA patients were enrolled. Mean age of included patients was 47.5 ± 7.1, in addition, mean duration of RA was 7.8 ± 2.3 years while mean duration of DM in affected patients was 3.9 ± 2.3 years.

When compared to other studies from other countries, we found a higher number of RA patients with concomitant T2D. Diabetes mellitus was found in 28% of the population, contrary to the estimated population incidence of 2% to 4% [9]. In the absence of glucose tolerance tests and fasting specimens, determining the prevalence of impaired glucose tolerance and, as a result, prediabetic status in included individuals is problematic. In the patients diagnosed with DM there was positive family history of DM in only 8 patients thus excluding the role of familial inheritance of DM.

The association between DM and rheumatic arthritis attracts much attention. Inflammation showed a striking role in the pathogenesis of insulin resistance and consequently metabolic syndrome. While several studies reported and focused on insulin resistance, relatively few articles focusing on the risk of diabetic hyperglycemia in RA have been published. A previous study of subjects with RA was assembled in a retrospective manner. Contradicting to our study, the authors found no increase in the risk of new onset DM [10].

Cardiovascular illnesses and coronary artery attacks are the leading causes of mortality for RA patients [11]. Along with DM, hyperlipidemia and HTN are recognized risk factors for CVD [12]. Patients must manage these risk factors in order to lower CVD-related mortality and increase patient survival. Our findings indicated that important risk factors for diabetic hyperglycemia in RA patients were being female, being obese, having HTN, or having hyperlipidemia. The risk of diabetic hyperglycemia rises in RA patients who have both diseases. These lifestyle variables are connected. A high body mass index might be the result of a sedentary lifestyle and a diet heavy in calories and fat [13].

Based on our prior research, we recommend regular screening for glucose intolerance in RA patients even in absence of positive family history or significant symptoms.

Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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Age (years)	57.5 ± 7.1
Gender	Female (70%), Male (30%)
BMI	28.90 ± 3.5
Duration of diabetes (years)	3.9 ± 2.3
Established DM diagnosis	28 %
Duration of rheumatoid arthritis (years)	7.8 ± 2.3
FBS (mg/dl)	127.4 ± 20.7
PPBS (mg/dl)	224.5 ± 17.8
HbA1c (%)	6.8 ± 0.72
ESR	20.7 ± 5.0
CRP	19.80 ± 15.49
RF/Anti CCP positive	89 (89%)
Collected data were presented as mean values and standard deviation or number and percentage. BMI, body mass index; HbA1c, glycated hemoglobin, ESR: erythrocyte-sedimentation-rate, CRP: C-reactive protein, RF: Rheumatoid-factor, CCP: cyclic-citrullinated peptide-antibodies.	

Table 1: Demographics and clinical profile of patients

	Diabetic RA patients	Non-diabetic RA patients	Significance
Age (years)	50.87 ± 6.5	53.4 ± 4.9	NS
Gender	20 females 8 males	50 females 22 males	S (p<0.05)
BMI	29.2 ± 5.9	26.8 ± 4.8	S (p<0.05)
FBS (mg/dl)	145 ± 45	89 ± 12	HS (p<0.001)
PPBS (mg/dl)	298 ± 110	150 ± 41	HS (p<0.001)
HbA1c (%)	6.8 ± 2.2	5.1 ± 1.4	HS (p<0.001)
ESR	22.8 ± 4.9	21.2 ± 5.6	NS
CRP	23.8 ± 14.5	24.9 ± 11.9	NS
Serum cholesterol	211 ± 98	170 ± 49	S (p<0.05)
Serum TAG	254 ± 105	155 ± 59	S (p<0.05)
Serum LDL	140 ± 70	95 ± 21	S (p<0.05)
Serum HDL	35 ± 12	39 ± 14	NS
BMI, body-mass-index; HbA1c, glycated-hemoglobin, ESR: erythrocyte-sedimentation-rate, CRP: C-reactive protein, TAG: triacylglycerol, LDL: low-density-lipoprotein, HDL: high-density-lipoprotein.			

Table 2: Comparison between diabetic and non-diabetic RA patients