

## Original Research Article

# Prevalence of type 2 diabetes association with rheumatoid arthritis among different obese and non-obese populations of Patna, India

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**Received:** 25 January 2019

**Accepted:** 04 February 2019

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## ABSTRACT

**Background:** Type 2 Diabetes mellitus (T2DM) is the most common non-communicable chronic diseases in developed and developing countries around the world. The study reported the prevalence of diabetes association with rheumatoid arthritis (RA) among different obese and non-obese populations of Patna, India.

**Methods:** This clinic based descriptive study was conducted in Patna city from 1<sup>st</sup> August 2017 to 30<sup>th</sup> September 2018. A total 250 patients with diagnosed RA were enrolled. DM was defined according to the ADA recommendations as FBS  $\geq 126$ mg/dl or oral glucose tolerance test OGTT2  $\geq 200$ mg/dl and HbA1c  $\geq 6.5$ . On the basis of the BMI calculated, patients were categorized either as obese or non-obese. Random diabetic detection was done to detect T2DM and followed by proper investigation at clinical laboratories. Patients also asked for hyperglycemic events during initial counselling.

**Results:** Mean BMI in obese was found to be  $29.22 \pm 3.22$  and in non-obese it was  $22.99 \pm 1.38$  ( $p < 0.001$ ). Most of the patients had been type 2 diabetes for more than 5 years duration. In both genders, an increasing trend was observed in the prevalence of type 2 diabetes with increasing BMI. Among these, a total of 198 (79.2%) were found to have diabetes, 115 (58.08%) of these were obese and 83 (41.91%) non-obese ( $p = 0.003$ ).

**Conclusions:** BMI is directly correlated to type 2 diabetes, as T2DM was significantly more common in obese patients with RA compared to non-obese patients with RA. Obese patients with RA had significantly more frequent diabetes.

**Keywords:** Body Mass Index, Obesity, Rheumatoid arthritis, Type 2 diabetes

## INTRODUCTION

Type 2 diabetes mellitus (DM) and Hypertension (HT) are among the most common chronic non-communicable diseases and multifactorial disorders affecting both developed and developing countries and occur at a higher prevalence in the older age group and result from both genetic and environmental etiological factors.<sup>1-3</sup> They are the main preventable risk factors for coronary heart

disease, stroke, end-stage renal failure, disability and increased health-care costs. Although DM and HT are not among the top leading causes of death, such as cancer and stroke, these two diseases draw attention from the public due to their increasing trends, while cancer and stroke are declining.<sup>4</sup> Epidemiological and clinical studies have shown that these diseases often cluster in individuals and in families and are collectively known as Syndrome X.<sup>5</sup>

DM is a chronic disease increasing in explosive pattern in India.<sup>6</sup> The term DM describes a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion or insulin action or both. It continues to increase in numbers and significance, as changing lifestyles lead to reduced physical activity and increased obesity.<sup>7-9</sup> DM is a disease of insidious onset and the symptoms, when they eventually appear, do not warrant immediate attention and thus remain undiagnosed at onset and even when diagnosed is often ignored by persons afflicted by it.<sup>10</sup> A strong genetic basis, environmental factors and lifestyle changes have been implicated in the etiology of type 2 DM.<sup>11</sup>

Rheumatoid arthritis (RA) is a chronic inflammatory disease characterized by an excess of cardiovascular disease (CVD) risk, estimated to be at least 50% greater when compared to the general population.<sup>12</sup> Cardiovascular disease has been recognized as the main cause of mortality in established RA patients but recent data confirm this trend also in earlier stages of the disease.<sup>13,14</sup> Several factors have been evoked as determinants of this additional risk but the most consolidated theory attributes this phenomenon to the interplay between chronic high-grade inflammation and elevated prevalence of “classical” cardiovascular risk factors including diabetes.<sup>15,16</sup>

Furthermore, patients with RA may suffer from different concurrent comorbidities. These comorbidities should be considered when treating RA patients, as they are closely related to treatment response and long-term prognosis.<sup>17</sup> Earlier studies were in favor of increased prevalence of diabetes mellitus (DM) among RA patients, however, the association of RA disease characteristic and DM has not previously been evaluated.<sup>18</sup> Considering the prevalence of DM in India, patients with RA are at higher risk of DM, possibly due to autoimmunity and RA treatment e.g. steroids.

A number of studies support that insulin resistance is increased in RA. While there seems to be broad agreement about the relation between RA and insulin resistance, only two prior studies have focused on the risk of diabetes mellitus (DM) in RA.

The study was conducted to assess the prevalence of diabetes association with rheumatoid arthritis among different obese and non-obese populations of Patna, India.

## METHODS

This clinic based descriptive study was conducted in Patna city from 1<sup>st</sup> August 2017 to 30<sup>th</sup> September 2018. A total 250 patients with diagnosed diabetes were enrolled. Informed consent was obtained from all the patients and approval of the local ethical committee

sought and research carried out on humans is compliance with the Helsinki Declaration. A detailed history was obtained, and physical examination was done, especially recording the BP, height, weight, hip circumference and waist circumference. BMI was calculated for all patients as weight in Kg divided by height<sup>2</sup> in m. Based on the BMI calculated, patients were categorized either as obese or non-obese. In accordance with the WHO expert consultation on appropriate BMI for Asian population, patients with BMI  $\leq 24.9 \text{ kg/m}^2$  were classified into the non-obese group, while those with BMI  $\geq 25 \text{ kg/m}^2$  into obese group.<sup>7</sup>

DM was defined according to the ADA recommendations as FBS  $\geq 126 \text{ mg/dl}$  or oral glucose tolerance test OGTT2  $\geq 200 \text{ mg/dl}$  and HbA1c  $\geq 6.5$ . Random diabetic detection was done to detect T2DM and followed by proper investigation at clinical laboratories. Patients also asked for hyperglycemic events during initial counselling.

All continuous variables were expressed as mean $\pm$ SD and analysed with independent t-test. Discrete variables were expressed as percentages and analysed by Chi-square test. A p-value  $< 0.05$  was considered as statistically significant. Calculations were performed with SPSS-13.

## RESULTS

A total of 250 patients were enrolled, 125 were obese and 125 were non-obese. In both groups, there were more male patients as compared to female. The baseline characteristics of the patients are shown in (Table 1).

**Table 1: Baseline characteristics of patients.**

Characteristics	Obese n=125	Non-obese n=125
<b>Gender</b>		
Male	89	85
Female	36	40
<b>Age (years)</b>		
<25	0	1
25-40	21	23
41-60	78	65
>60	26	36
Mean waist circumference (inch)	38 $\pm$ 4	33 $\pm$ 3
Mean hip circumference (inch)	41 $\pm$ 4	35 $\pm$ 3
Mean BMI (kg/m <sup>2</sup> )	29.22 $\pm$ 3.22	22.99 $\pm$ 1.38

Mean BMI in obese was found to be 29.22 $\pm$ 3.22 and in non-obese it was 22.99 $\pm$ 1.38 ( $p < 0.001$ ). Most of the patients had been type 2 diabetes for more than 5 years duration. In both genders, an increasing trend was observed in the prevalence of type 2 diabetes with increasing BMI. Among these, a total of 198 (79.2%) were found to have diabetes, 115 (58.08%) of these were obese and 83 (41.91%) non-obese ( $p = 0.003$ ) (Table 2).

**Table 2: Type 2 diabetes profile.**

Variables	Obese n=125	Non-obese n=125	P value
Total number of Type 2 diabetic patients (n=198)	115 (58.08)	83 (41.91)	0.003
Duration of Type 2 diabetes (months)			
<6	6 (5.21%)	5 (6.02%)	
6-12	28 (24.35%)	10 (12.04%)	
13-60	31 (26.96%)	24 (28.92%)	
60-120	41 (35.66%)	28 (33.74%)	
>120	9 (7.82%)	16 (19.28%)	

## DISCUSSION

In a country where resource availability is scarce, a better option is prevention. Time, money and efforts spent on this preventive strategy in patients and population are rewarding. Inflammation plays an important role in driving insulin resistance and metabolic syndrome.<sup>19</sup> While substantial literature supports the relationship between insulin resistance and rheumatic diseases, there are surprisingly few data regarding rheumatic diseases and DM. Present study supports the hypothesis of a significant short-term risk of T2D in RA patients and of a close association between uncontrolled disease activity and glucose metabolism derangement. The above studies of RA patients with high prevalence of T2DM described a clarified relation between the systemic inflammatory state and abnormal glucose metabolism.

The prevalence of diabetes in patients with RA is high and is associated with known socio demographic factors. More than 40% of patients with RA and diabetes were not under rheumatological care even though they reported a high disease burden, were frequently hospitalized and often presented with further comorbidities.<sup>20</sup> In a study, which consists of 48,718 cases of RA patients and 40,346 cases of non-rheumatic subjects, the incidence of RA patients with DM was 0.86% higher than the 0.58% in the control group which were observed and DM risk was 1.5-fold in RA patients when compared with control group.<sup>21</sup> The findings of this study also matches with the data as in this case the prevalence of T2DM in RA patients was 79.2%.

Most of the patients in this study had T2DM for more than 5 years of duration. In this study, the prevalence of T2DM increased with BMI in both genders. In this study, the prevalence of T2DM increased with BMI in both genders.

In present study, the mean BMI in obese patients was  $29.22 \pm 3.22$  and in non-obese it was  $22.99 \pm 1.38$  with significant statistical difference. In India, average BMI of people aged 15 and above was estimated to be  $23.24 \text{ kg/m}^2$  for females and  $18-22.9 \text{ kg/m}^2$  for males.<sup>22</sup> South-Asian populations now show a rapid increase in life-expectancy, changes in life style, decrease physical

activity, all of which lead to obesity and obesity in turn leads to multiple problems.<sup>23</sup>

The analyses need to be replicated, especially in RA cohorts. The current epidemiologic analyses add important context to this ongoing area of study. As these association become better defined, regular DM screening may be called for among these rheumatic disease populations.

## CONCLUSION

BMI is directly correlated to type 2 diabetes, as T2DM was significantly more common in obese patients with RA compared to non-obese patients with RA. Obese patients with RA had significantly more frequent diabetes.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Amrendra Prasad Singh. Prevalence of type 2 diabetes association with rheumatoid arthritis among different obese and non-obese populations of Patna, India. *Int J Res Med Sci* 2019;7:730-3.