

IMPACT OF RHEUMATOID ARTHRITIS AND OSTEOARTHRITIS ON THE BMI OF WOMEN PATIENTS RANGING IN AGE FROM 45-65 YEARS

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Abstract: The present study has been done to find out impact of rheumatoid arthritis and osteoarthritis on the BMI of women patients from urban and rural areas of Punjab by emphasizing on age group 45-65 years. The prime objective of the present study was to estimate body mass index among female subjects. By using standard anthropometric techniques height and weight of female subjects is measured. BMI is calculated for each individual. The mean values of BMI for the OA group were computed to be 29.16 ± 5.02 , where as that of RA group was computed to be 26.13 ± 4.61 . Test values of t was computed to be 3.146 at 98 degrees of freedom, which happened to be statistically highly significant ($p=0.0022$). We could thus conclude that on an average, BMI of RA group patients was highly significantly lower than that of OA group patients. Subjects were further categorized under normal, underweight, overweight and obese category according to International Classification of adult underweight, overweight and obesity according to BMI stated by WHO.

Keywords: Rheumatoid arthritis, Osteoarthritis, BMI, obesity.

I. INTRODUCTION

Rheumatoid arthritis and Osteoarthritis are widely spread disease which affects millions of people all over the world. Rheumatoid arthritis (RA) is an autoimmune disorder characterized by destruction and inflammation of joints that affects approximately 0.5 to 1% of the adult population [1], [2], [3]. Osteoarthritis is a common joint disease that results in joint pain, stiffness and damage of articular cartilage [4], [5]. Osteoarthritis is characterized further into two types Primary and secondary osteoarthritis. Primary osteoarthritis is age related and affects joints that are weight bearing whereas secondary OA is secondary to joint pathology e.g. Diabetes mellitus and infection [6].

Many studies have shown association between excess body weight and autoimmune diseases [7]. Body mass index (BMI) measures excess body weight that corresponds to adipose tissue accumulation in the body [8]. Earlier research shows BMI is closely associated with osteoarthritis [9]. One of the most common risk factors for osteoarthritis is obesity [10]. Knee, hip and hand osteoarthritis is mainly associated with being overweight and results in increased BMI [11]. NIH guidelines declared 20% of men and 25% of women in United states are obese and BMI was found to be 30kg/m^2 or more. However, this figure has increased 50% in past 15 years [12].

Previous study has shown positive association of obesity and rheumatoid arthritis. Non obese individuals had 24% risk for development of RA however obese individuals had 31% of increased risk and in individuals of normal weight risk of

development of RA disease was 15% respectively [3]. The research of recent studies concluded that role of obesity, adipose tissue and body composition has increased in pathophysiology of rheumatoid arthritis. Change in body composition, followed by fat mass increased or lean mass decreased in early RA disease is associated with body mass index increased or maintained. This condition in RA is believed to accelerates rate of mortality and morbidity in population [13], [14].

Cardiovascular death risk in patients having low BMI is 3-fold more than non-RA individuals [15]. On the other hand, cardiovascular risk is independently related to increased BMI [16]. Kaufmann et al studied impact of BMI on joint and concluded that raised BMI protects joint destruction. Therefore, patients with BMI < 27 kg/m² had more progressive joint destruction in comparison to patients with early RA having BMI ≥27 kg/m² [17]. Past literature well documented that osteoporosis prevalence is significantly more among males and females with a low BMI than in overweight individuals [18], [19]. For reduced bone mineral density (BMD) and trauma fractures body mass index (BMI) is proved to be the statistically notable risk factor [20]. Raised levels of inflammatory markers i.e. C-reactive protein (CRP) is associated to severity of joint destruction and in the breakdown of bone proinflammatory cytokines i.e. TNFα and IL1 are implicated [21]. Obesity is main risk factor for rheumatoid arthritis which is directly associated with BMI. Individuals having normal BMI were less prone to suffer from RA than women and seronegative population. Increase in BMI is positively associated with developing of RA. Obesity promotes autoimmunity including adipokines secretion through various mechanism [7].

It is apparent that there is direct association between BMI and OA as also discussed in previous studies. In adulthood preventing being over weight limits prevalence of osteoarthritis [22], [23] therefore for management of OA weight management is crucial step [24], [25]. Although a lot of prior research has confirmed association between RA and BMI [7]. However, there are several researches which do not confirm this association. Therefore, this study tries to explore the relationship between two.

II. MATERIAL AND METHODS

Study Area and Subjects:

The prime objective of present study is to see impact of rheumatoid arthritis and osteoarthritis on women patients ranging from 45-65 years of age. The cross-sectional study comprised female population from urban and rural areas of Punjab. The number of samples were 50 rheumatoid arthritis and 50 osteoarthritis patients. The diagnosis of rheumatoid arthritis was confirmed using the classification criteria of the American College of Rheumatology by Arnett et al. 1988 [26].

Height and weight of subjects was measured using standard anthropometric techniques. Anthropometric rod and portable weighing machine were used to measure height and weight of individual. Body Mass Index was calculated as weight in kgs divided by height in meter (kg/m²). Subjects were further categorized under normal, underweight, overweight and obese category according to International Classification of adult underweight, overweight and obesity according to BMI stated by WHO.

III. RESULTS

Table No.1 describes trends in mean, SD and SE_m of height, weight and BMI of RA and OA subjects.

Table 1: Mean, Standard deviation (SD) and Standard error of mean (SE_m) for height, weight and Body Mass Index

Parameter	Group								
	Height (cm)			Weight (kg)			BMI		
	Mean	SD	SE _m	Mean	SD	SE _m	Mean	SD	SE _m
OA	157.7	7.75	1.09	72.33	12.49	1.76	29.16	5.02	0.71
RA	158.3	7.30	1.03	65.62	12.64	1.78	26.13	4.61	0.65

The mean values of height for OA group was computed to be 157.7±7.75, whereas mean values for weight was 72.33±12.49. However, in RA group the mean values of height were computed to be 158.3±7.30 and mean values for weight was 65.62±12.64. In comparison of mean height between OA and RA group mean is more of RA group as compared to mean height of OA group. However mean weight is higher in OA group than RA group.

From the available set of data, the mean values of BMI for the OA group was computed to be 29.16±5.02, where as that of RA group was computed to be 26.13±4.61 (Table 1).

For the purpose of testing whether mean values of BMI for two groups were significantly different from each other or not, the data were subjected to unpaired t test.

As per the test values of t was computed to be 3.146 at 98 degrees of freedom (Table 2), which happened to be statistically highly significant (p=0.0022)

Table 2: Test of Significance (t-Value): Comparison between OA and RA

Groups	Size of Sample-I	Size of Sample-II	Mean-1	Mean-2	Mean Diff	t-Val for Mean Diff	D.F.	p-Val for t	Remark
OA vs RA	50	50	29.169	26.131	3.038	3.146	98	0.0022	**

As per the test values of t was computed to be 3.146 at 98 degrees of freedom, which happened to be statistically highly significant (p=0.0022). We could thus conclude that on an average, BMI of RA group patients was highly significantly lower than that of OA group patients.

Table 3 describes maximum no. RA patients fall under normal range i.e. 44% of patients, 2% of patients of RA group were severe thin, 2% were mild thin whereas rest of patients were under obese category i.e. 28% were pre- obese and 24% falls in obese class I category.

Table 3: International Classification of underweight, overweight and obesity according to body mass index (BMI) of subjects in osteoarthritis and rheumatoid arthritis patients.

BMI (kg/m ²)			
WHO Classification	Principal cut-off points	No. of patients=50 (RA)	No. of patients=50 OA
Underweight	<18.50	0 (0%)	0 (0%)
Severe thinness	<16.00	1 (2%)	0 (0%)
Moderate thinness	16.00 - 16.99	0 (0%)	0 (0%)
Mild thinness	17.00 - 18.49	1 (2%)	0 (0%)
Normal range	18.50 - 24.99	22(44%)	11(22%)
Overweight	≥25.00	0 (0%)	0 (0%)
Pre-obese	25.00 - 29.99	14(28%)	18(36%)
Obese	≥30.00	0 (0%)	0 (0%)
Obese class I	30.00 - 34.99	12(24%)	14(28%)
Obese class II	35.00 - 39.99	0 (0%)	7(14%)
Obese class III	≥40.00	0 (0%)	0 (0%)

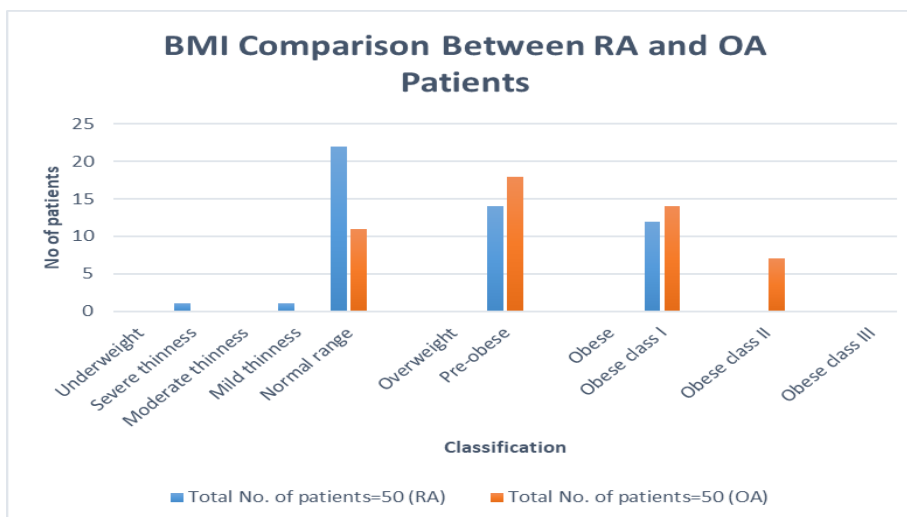


Fig no. 1 BMI comparison between RA and OA group patients

IV. DISCUSSION

Obesity is main risk factor for rheumatoid arthritis which is directly associated with BMI. Individuals having normal BMI were less prone to suffer from RA than women and seronegative population. Increase in BMI is positively associated with developing of RA. Obesity promotes autoimmunity including adipokines secretion through various mechanism [7].

Several previous studies also observed association between BMI and risk of RA, suggesting main risk factor is obesity [27], [28].

Global health problem is mainly associated with obesity [29] along with risk of coronary diseases. Many studies have conflicting reports of the impact of obesity on the risk of RA, but positive association is shown by majority of studies [30], [31], [32], [33].

The principal findings of our study confirmed that RA shows linear association with BMI. Maximum number of subjects fall under obese category. (Table -3)

Previous studies showed significant relationship of OA with increased BMI. Al-Arfaj found a strong association between obesity and OA. He concluded that in Saudi population obesity was closely associated with OA in females [34]. Increased BMI is in parallel relationship with incidence of hand osteoarthritis, hip and knee. Greatest BMI was diagnosed in patients having knee OA [11].

Study done by Sudo concluded that high BMI, old age, female sex, high bone mass density shows a linear relationship with increased risk of knee osteoarthritis [35].

Another study in Germany conducted on 1250 patients has concluded that factors such as social network, BMI, physical limitation of lower limb, and duration of disease were associated with OA [36]. However, another study done by Ouedraogao reported that risk factor for OA were previous knee injury (19.5%), menopause in women (66.7%), obesity (42.4%) and history of OA (43.2%) [37].

Similarly supporting the above facts, in the present study maximum number of subjects is found to be under obese category. However, results of our study also showed a strong significant association of OA with obesity and increased BMI.

V. CONCLUSION

In the present study it is evaluated that BMI of osteoarthritis patients was either in the normal range or in the obese category. But majority of subjects were under obese category Also in case of rheumatoid arthritis patients most of them fell in normal range and in obese category. However 2 out of 50 patients were in the underweight category. From the result of the study we can conclude that there is direct relationship between OA and BMI. RA also shows a strong association with BMI.

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