Original article:

Study of Correlation of Body Mass Index (BMI) with Knee Pain of Osteoarthritis Patients at a Tertiary care Hospital

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ABSTRACT

Background: Osteoarthritis (OA) of the knee is particularly common in older adults. Many population studies to date have found a cross-sectional association between obesity and OA of the tibiofemoral joint of the knee. Hence, the present study was undertaken for evaluating the correlation of body mass index (BMI) with knee pain of OA patients.

Materials & Methods: A total of 50 OA of knee patients with presence of knee pain and a total of 50 OA of knee patients with absence of knee pain were included in the present study. Complete demographic and clinical details of all the patients were obtained. A separate Performa was made and complete clinical profile of all the patients was recorded. Weight, height and waist circumference of all the patients was measured and BMI of all the patients was calculated. Correlation of BMI and occurrence of knee was assessed. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

Results: Mean BMI of the patients with and without BMI was found to be 31.6 Kg/m^2 and 27.1 Kg/m^2 respectively. Out of 50 patients with knee pain, 6 percent of the patients had BMI within normal range. Among the remaining 47 patients, 38 percent of the patients were overweight while the remaining 56 percent of the patients were obese. While analysing statistically, it was seen that obese patients were accompanied by significantly higher incidence of knee pain.

Conclusion: Significant positive correlation between BMI and knee pain in OA of knee patients was observed.

Key words: Knee Pain, Osteoarthritis, Body Mass Index.

INTRODUCTION

Osteoarthritis (OA) of the knee is particularly common in older adults, with one survey finding radiographic evidence of knee OA in 33% of subjects aged 63 – 93 years. Case–control studies have consistently demonstrated a strong association between knee osteoarthritis and obesity, and in the Framingham longitudinal study high body mass index (BMI) predicted development of the disease in later life. Furthermore, analysis of women in the same cohort has shown that incidence is lower in obese women who lose weight than in those who do not; these data suggest that controlling obesity can reduce risk.[1- 5]

Many population studies to date have found a cross-sectional association between obesity and OA of the tibiofemoral joint of the knee. Radiographic knee OA is increased 4-fold in obese women, with a range of odds ratios between 2 and 9 in different studies.[6, 7] Mechanical loading on the knees is thought to play a major role in the cause of knee osteoarthritis. This idea follows the 'wear and tear' theory of osteoarthritis development and is

supported by studies showing that occupational workload increases the risk of knee osteoarthritis. However, the odds ratios linking obesity with knee osteoarthritis are several times higher than for those associated with occupational factors. Osteoarthritis in joints other than the knee has also been related to obesity. The occurrence of hand osteoarthritis is especially difficult to fit into the mechanical load theory.[4-7] Hence; the present study was undertaken for evaluating the correlation of body mass index (BMI) with knee pain of OA patients.

MATERIALS & METHODS

The present study was conducted with the aim of evaluating the correlation of body mass index (BMI) with knee pain of OA patients. A total of 50 OA of knee patients with presence of knee pain and a total of 50 OA of knee patients with absence of knee pain were included in the present study. Complete demographic and clinical details of all the patients were obtained. A separate Performa was made and complete clinical profile of all the patients was recorded. Weight, height, and waist circumference of all the patients was measured and BMI of all the patients was calculated. Correlation of BMI and occurrence of knee was assessed. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi-square test and student t test were used for evaluation of level of significance.

RESULTS

In the present study, a total of 50 OA patients without knee pain and 50 OA patients with presence of knee pain were enrolled. Mean age of the patients with and without knee pain was 65.6 years and 66.2 years respectively. Mean BMI of the patients with and without knee pain was found to be 31.6 Kg/m^2 and 27.1 Kg/m^2 respectively. Out of 50 patients with knee pain, 6 percent of the patients had BMI within normal range. Among the remaining 47 patients, 38 percent of the patients were overweight while the remaining 56 percent of the patients were obese. While analysing statistically, it was seen that obese patients were accompanied by significantly higher incidence of knee pain.

Table 1: Demographic and clinical profile

Variable	Knee pain (n=50)		No knee pain (n=50)		p- value
	n	%	n	%	
Mean age (years)	65.6		66.2		0.11
Males	12	24	15	30	0.84
Females	38	76	35	70	
Mean BMI (Kg/m^2)	31.6		27.1		0.00 (Significant)
Diabetes	3	6	5	10	0.37
Hypertension	8	16	11	22	0.28

Table 2: Correlation of knee pain and BMI

Variable	Knee pain patients	
	n	%
Normal BMI (less than 25 Kg/m^2)	3	6
Overweight (25 to 29.9 Kg/m^2)	19	38
Obese (≥ 30 Kg/^{2})	28	56
p- value	0.00 (Significant)	

DISCUSSION

Osteoarthritis (OA) is a multifactorial disease with both genetic and environmental determinants. Obesity is most strongly linked to OA at the knee joint. Symptomatic knee OA is a major cause of physical disability afflicting older persons, due to pain, stiffness, and joint instability. While the cause of radiographic knee OA (RKOA) remains unclear, it has been associated with various risk factors, such as advancing age, female gender, genetic predisposition, prior knee injury, certain occupations, biomechanical gait and alignment defects, and obesity. Of these, obesity is perhaps the most important risk factor associated with the incidence of RKOA.[6-9] Hence, the present study was undertaken for evaluating the correlation of body mass index (BMI) with knee pain of OA patients.

In the present study, a total of 50 OA patients without knee pain and 50 OA patients with presence of knee pain were enrolled. Mean age of the patients with and without knee pain was 65.6 years and 66.2 years respectively. Mean BMI of the patients with and without knee pain was found to be 31.6 Kg/m^2 and 27.1 Kg/m^2 respectively. Rogers MW et al explored the relationship between BMI and knee pain among persons with RKOA. Pain subjects presented with a higher mean BMI (30.4 kg/m^2) compared with No Pain subjects (27.5 kg/m^2) ($p < 0.0001$). Unadjusted and adjusted odds ratios demonstrated a positive association between BMI group and pain for each successive elevated BMI category. Adjusted odds ratios ranged from 1.6 for the Pre-obese group ($p < 0.05$) to 7.5 for the Obese III group ($p < 0.0001$). Among subjects with RKOA, those presenting with an elevated BMI had a greater likelihood of knee pain compared to subjects with a normal BMI, and this chance rose with each successive elevated BMI category.[10] Coggon D et al assessed the risk of knee osteoarthritis (OA) attributable to obesity, and the interactions between obesity and other established causes of the disorder. A total of 525 men and women aged 45 y and over, consecutively listed for surgical treatment of primary knee OA, were compared with 525 controls matched by age, sex and family practitioner. Relative to a body mass index (BMI) of 24.0-24.9 kg/m^2, the risk of knee OA increased progressively from 0.1 (95% CI 0.0-0.5) for a BMI<20 kg/m^2 to 13.6 (95% CI 5.1-36.2) for a BMI of 36 kg/m^2 or higher. If all overweight and obese people reduced their weight by 5 kg or until their BMI was within the recommended normal range, 24% of surgical cases of knee OA (95% CI 19-27%) might be avoided. Their findings gave strong support to public health initiatives aimed at reducing the burden of knee OA by controlling obesity.[11]

In the present study, out of 50 patients with knee pain, 6 percent of the patients had BMI within normal range. Among the remaining 47 patients, 38 percent of the patients were overweight while the remaining 56 percent of the patients were obese. While analysing statistically, it was seen that obese patients were accompanied by

significantly higher incidence of knee pain. Marks R identified the prevalence of overweight among community-dwelling adults diagnosed as having knee osteoarthritis (OA) and the relationship between the weight status of these individuals, selected disease-related outcomes, and disease progression. The BMIs of 82 women and 18 men with unilateral or bilateral knee OA were examined on a single occasion along with data on physical comorbidities, pain, and function and subjected to correlation analyses. At least 80% of all present cohorts were overweight or obese. Those with higher BMIs reported more pain than those with lower BMIs ($p<0.05$) and pain was related to perceived physical exertion ($p<0.05$). Body mass indices were not significantly correlated with generic gait measures, but an inverse trend toward the time spent in the gait cycle that may impact the disease process was identified. A high body mass was present in most adults with knee OA.[12]

CONCLUSION

Significant positive correlation between BMI and knee pain in OA of knee patients was observed.

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