

A Study on Osteoarthritis in Relation to Body Mass Index in a Tertiary Care Hospital

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ABSTRACT

BACKGROUND

It is known that a person with higher body mass index is more likely than persons with normal BMI to report idiopathic knee pain and accompanying disability. How obesity causes osteoarthritis (OA) at the knee joint has been the subject of considerable debate as OA involves non weight bearing joints too e.g. distal phalanges. Still it seems to be a fact that elevated BMI is associated with knee OA, but at the same time relatively little research has been conducted seeking direct association between these two, and then there exist some other factors also into play. This study has been undertaken to determine if any such association exists and to suggest recommendations based on the findings. Further association has also been sought in terms of laterality and extent of knee joint involvement.

METHODS

It is a hospital based cross sectional study. Data was collected in a preformed pre-tested questionnaire. Study was conducted for a period of 12 months from 1st July 2015 to June 31st 2016 at Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta, Assam. A total of 150 cases of OA has been included in this study.

RESULTS

In the present study, it was found that 84% of the OA cases were overweight or obese. Higher age group people are significantly associated with knee osteoarthritis as compared to lower age group. Regarding type of osteoarthritis, unicompartamental OA was found to be the commoner variant among both sexes and it tends to appear in form of unilateral involvement of knee joint more commonly (72.6%). However, global type OA tends to involve both knees in most cases.

CONCLUSIONS

To delay and halt the progression of the disease, it is necessary to provide specific information regarding importance of regular exercise, weight control and dietary measures. Screening of onset of disease should be practiced routinely in the elderly, particularly in those with risk factors (age, sex and BMI, as per the current study).

KEYWORDS

Osteoarthritis, BMI, Obesity

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BACKGROUND

Osteoarthritis (OA) is a disease with truly formidable impact. As the most common form of arthritis, it accounts for more dependency in walking, stair climbing, and other lower extremity tasks than any other disease; especially in the elderly.¹ Musculoskeletal health is often overlooked on the public health agenda. However thanks to campaign headlines such as “the silent epidemic”, there is now greater awareness of the burden of illness caused by two of the most prevalent musculoskeletal disorders viz back pain and osteoarthritis. Whole journals, meetings, and learned societies are devoted to the study of these two conditions and major progress has been made towards understanding their cause and appropriate management.² It is known that person with higher body mass indexes are more likely than persons with normal BMI to report idiopathic knee pain and accompanying disability.^{3,4,5} How obesity causes OA at the knee joint has been the subject of considerable debate. Two major theories have been proposed to explain this association: Biomechanical^{6,7,8} and Systemic/Metabolic⁹ mechanism. The biomechanical theory concludes that obesity leads to repetitive application of increased axial loading at the knee joint with consequent degeneration of articular cartilage and sclerosis of subchondral bone. However, obesity is not consistently associated with an excess of hip OA. Further, OA of non-weight bearing joints (distal interphalangeal joints of hands) does not support this mechanical theory. The metabolic theory proposes that some metabolic factor, or factors, correlated with obesity adversely affect cartilage and other joint structures, suggesting that obesity acts indirectly to increase the risk of knee osteoarthritis. There is considerable evidence indicating that genetic factors play an important role in determination of OA.

Thus it seems to be a fact that elevated BMI is associated with knee osteoarthritis, but at the same time relatively little research has been conducted seeking direct association between these two, and then there exist some other factors also into play. Therefore this study has been undertaken to access the strength of such association if exist; also in terms of laterality and extent of knee joint involvement.

The aim of this study was to investigate the risk of different form of osteoarthritis for men and women in relation to in body mass index (BMI). Further we will try to give recommendations based on the findings.

METHODS

A hospital based cross sectional study was carried out for a period of 12 months from 1st July 2015 to June 31st 2016 at Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta, Assam.

Inclusion Criteria

All patients above 40 yrs. of age attending to orthopaedics OPD were confirmed clinically plus radiologically for Osteoarthritis and thereby included in this study.

Exclusion Criteria

Patients presenting with major trauma to knee, acute infection, multiple joint involvement and patients with knee pain referred from other joint were excluded from this study. BMI were categorised according to WHO (normal weight: BMI of 18.5-24.9 Kg/m²; overweight/pre-obese 25-29.9 Kg/m² BMI; Obese: Over 30.0 Kg/m²).¹⁰

A total of 150 OA cases were included in this study. Written informed consent was obtained from each of them prior to initiation of this study. Information was collected in a preformed pretested questionnaire in local language (Assamese).

Statistical Analysis

Microsoft Excel and SPSS 17.0 software packages were used for data entry and analysis. Chi square test was applied to observe the significance of association.

RESULTS

Type of Osteoarthritis	Laterality of OA Cases		Total
	Unilateral	Bilateral	
Unicompartmental OA	90 (72.6)	34 (27.4)	124
Global knee OA	8 (30.8)	18 (69.2)	26
Total			150

Table 1. Distribution According to Type and Laterality of OA

Numbers in parenthesis represents row wise percentages.
(X² =16.59, DF=1, p<0.0001)

Type of Osteoarthritis	No. of Cases			
	Male	%	Female	%
Unicompartmental OA	48	83	76	83
Global knee OA	10	17	16	17
Total	58	100	92	100

Table 2. Sex Wise Distribution of Osteoarthritis

Age Group	No. of Cases			
	Male	%	Female	%
40-49	6	4	16	10.5
50-59	29	19.5	27	18
60-69	21	14	43	28.5
>70	2	1.5	6	4
Total	58	39	92	61

Table 3. Age Wise Distribution of Osteoarthritis

Body Mass Index	No. of Cases				Total
	Male		Female		
	Uni-Compartmental	Global	Uni-Compartmental	Global	
Normal range	9	0	14	1	24
Overweight	23	7	61	13	104
Obese	16	3	1	2	22
Total	48	10	76	16	150

Table 4. Distribution of Osteoarthritis Cases According to BMI

On analysis of collected data it has been revealed that majority of OA cases (61.33%) were females. Most (46.7%) of the female OA cases were of 60-69 years age group. While majority (50%) of male OA cases were in 50 – 59 years age group. Regarding type of osteoarthritis Unicompartmental osteoarthritis was found to be the commoner variant among

both sexes. The ratio (83: 17) between Unicompartmental and global type OA was similar in both.

On further analysis it has been noted that 84% of the OA cases were overweight or obese. Or in other words only 16% of OA cases were having normal BMI. ($X^2 = 25.35$, $DF=2$, $p<0.0001$)

Regarding laterality of either type of OA it has been noted that Unicompartmental OA tends to appear in form of unilateral involvement of knee joint more commonly (72.6%). However, the global type OA tends to involve both knees in most cases (69.2%). ($X^2 = 16.59$, $DF=1$, $p<0.0001$).

DISCUSSION

In present study, it was found that individuals in 60 - 69 years age group were having significantly higher prevalence (28.5%) of knee osteoarthritis as compared to other age groups. Out of 150 affected participants 126 were overweight or obese and remaining participants were having normal or BMI less than ≤ 18.5 . Being overweight is a significant risk factor for knee osteoarthritis as 84% of the OA cases were overweight or obese. Further it has been noted that majority of OA cases were females (61.33%). Overall Unicompartmental OA (82.67%) was found to be the commonest variant of OA. As per laterality of OA is concerned majority of Global knee OA (69.2%) cases were bilateral (involved both the knees). Whereas majority (72.6%) of Unicompartmental OA cases were unilateral ($X^2 = 16.59$, $DF=1$, $p<0.0001$). When compared with the other studies conducted in different parts of the country following observations were found, Study conducted by Sharma et al¹¹ in Chandigarh UT, prevalence of OA was found to be 56.6%, and in urban area prevalence was 60.3% compared with rural area in which prevalence was found to be 32.6%. In the same study it was observed that increased BMI was significantly associated with the osteoarthritis. Another study conducted by Radha et al¹² in Mysore city prevalence among females was found to be 63.33%, same study has shown that overweight and obese patients constituted a major proportion of OA cases. According to one study conducted in rural Maharashtra by Kamble et al¹³, 24.1% participants in study reported knee osteoarthritis and among them 29% females were having knee osteoarthritis. Study conducted by Bhandarkar et al¹⁴ in community healthcare setup in Mumbai it was observed that prevalence among females was 63% which was more compare to males 37%. Another study by Ganvir et al¹⁵, it was found that female sex and age are the risk factors for knee osteoarthritis along with obesity and physically demanding job.

CONCLUSIONS

In the present study, it was found that 84% of the OA cases were overweight or obese. Higher age group individuals are

significantly associated with knee osteoarthritis compared to lower age group individuals. BMI > 25 is a risk factor for OA as participants with such BMI are significantly associated with knee osteoarthritis compared to less BMI. Now, gradually due to increase in life expectancy in India, osteoarthritis will become one of the commonest diseases of the elderly with large burden on public health services, the lack of which will result in recurrent expenditure by the suffering individual. In the absence of definitive treatment, and high cost of surgical interventions, it is necessary to promote preventive measures to reduce burden of the disease.

Bringing about awareness among the community regarding onset of osteoarthritis is necessary with screening of onset of disease in the elderly, particularly those with risk factors (age, sex and BMI, as per the current study). To delay and halt the progression of the disease it is necessary to provide the specific information regarding importance of regular exercise, weight control that includes dietary measures. These simple measures will go a long way in reducing the disability adjusted life years and in reducing economic burden on the society as a whole.

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