ASSOCIATION OF OBESITY WITH OSTEOARTHRITIS OF KNEE JOINT IN FEMALES

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ABSTRACT: Introduction: Osteoarthritis is a common degenerative disease of knee joints ¹. Knee osteoarthritis is the most common type. Obesity is the main preventive risk factor that has been identified in large joint osteoarthritis ^{2, 3}. Other risk factors are aging, family history, menopause.

OBJECTIVE: The main objective was to assess whether obesity and menopause explain the trend in knee pain and osteoarthritis in females. **METHODOLOGY:** Observational study was conducted at Department of Orthopaedics, Navodaya Medical College Raichur. 100 females between age of 45 and 65 yrs completed a questionnaire regarding their knee joint, joint swelling, crepitus, and stiffness.

RESULTS: Result showed that out 100 females, 96% of the obese females developed symptomatic osteoarthritis of knee. Highest percentage we found for bilateral knee. Chi-square test showed significant association of increased BMI and osteoarthritis of knee (p=0.001).

KEY WORDS: OA (Osteoarthritis), BMI (Body Mass Index), Knee, Obesity, Menopause.

INTRODUCTION: Osteoarthritis is a degenerative joint disease of multifactorial origin⁴. It is estimated that prevalence range from 4 -30% depending on the age, sex and disease definition⁵. Risk factors including obesity, previous knee injury, physical activities, age.

Obesity, defined by either increased weight (kg) or BMI, is a powerful risk factor for development of knee OA², with one twin study finding, 9-13% increased risk for the onset of the disease with every kg increase in body weight⁶. In addition, obesity is also a risk factor for the progression of the radiological OA^{7, 8}. Two major theories have been proposed to explain this association (systemic/metabolic mechanisms⁹). The biochemical theory suggests that obesity increases axial loading with consequence degeneration of articular cartilage, whereas metabolic theory proposes that some metabolic factors adversely affect cartilage¹⁰.

The purpose of the present study was to assess whether obesity and menopause explain the trend in knee pain and osteoarthritis in females.

METHODOLOGY:

Study Design: Observational Study (Cross sectional survey)

Sample Size: 100 patients were included.

Duration of the study: 1year (June 2012 – June 2013)

Study Group: Females 45-65 years of age.

Data was collected from Dept of Orthopaedics, Navodaya Medical College, Raichur.

Inclusion Criteria: Females aged 45-65 years.

Exclusion criteria: Individuals with any evidence of secondary OA, inflammatory arthritis, and those with neurological conditions were excluded.

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Ethical approval for the study was granted by the institutional ethical committee. The written consent was taken from all the subjects for participation in the study.

A) Detailed History including

- Onset of pain
- Aggravating and relieving factor
- Other joints affected by OA
- Family history of OA
- Physical activity
- History of menopause

B) Physical examination for OA of the knee joint was done to assess any swelling and note any various movements which may bring on pain.

BMI was calculated using formula

$$\text{BMI} = \text{Weight in kg} / \text{Height in cm}^2$$

CRITERIA USED TO DIAGNOSE OA OF KNEE JOINT

- 1) Knee pain for most days of the month
- 2) Crepitus on active joint motion
- 3) Morning stiffness more
- 4) Age >35yrs
- 5) Bony enlargement of the knee on examination.

Data Collection Tools: Structural questionnaire guide was used to collect data.

STATISTICAL ANALYSIS: Using SPSS 17 the data was analyzed. The continuous variables were expressed as mean SD where as categorized variable were expressed in the form of frequency table and percentage. Chi square test was applied to determine any association between the variables. P value less than 0.05 was taken as significant.

RESULTS: This observational study was based on 1 year time period and data was collected from 100 females between the ages of 45-65yrs.

	Mean $\pm$ SD
Age	53.2 $\pm$ 6.501
Height	1.61 $\pm$ 0.91
Weight	86.69 $\pm$ 15.48

Mean age:- 53.2 $\pm$ 6.501

Mean height:- 1.61 $\pm$ 0.91

Mean weight:- 86.69 $\pm$ 15.48

=> **Among 100 females,**

65% females were obese.

24% females were overweight

11% females had normal BMI

=> **80% of subjects were diagnosed as OA of knee**

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	Frequency	Percentage of females with OA
Right	31	39
Left	7	9
Bilateral	42	52
	80	100

VARIABLES	FREQUENCY		PERCENTAGE	
	NO	YES	NO	YES
Family h/o OA	04	76	05	95
Menopause	14	66	17.5	82.5
Pain in knee joint	00	80	00	100
Morning Stiffness	00	80	00	100
Joint Swelling	08	72	10	90
Radiating Pain	21	59	26.3	73.7
Crepitus	00	80	00	100
Difficulty in climbing stairs	00	80	00	100
Weak quadriceps	16	64	20	80
Deformity in knee joint	41	39	51.25	48.75
FREQUENCY OF VARIABLES IN DISEASED PATIENTS				

Frequency of variables showed that 76% had a positive family history, 66% females were post-menopausal and almost everyone had pain, crepitus and joint swelling.

BMI	Osteoarthritis		Total
	Yes	No	
Normal	3	8	11
Overweight	16	8	24
Obese	61	4	65
Total	80	20	100
ASSOCIATION BETWEEN BMI AND OA			

Significant association ($p=0.001$) was found between increased BMI and osteoarthritis of knee.

Menopause	Osteoarthritis		Total
	Yes	No	
Yes	12	66	78
No	08	14	22
Total	20	80	100
ASSOCIATION BETWEEN MENOPAUSE AND OA			

DISCUSSION: The purpose of the present study was to assess whether obesity (described in terms of increased BMI) and menopause explain the trend in knee pain and osteoarthritis in females.

This study showed that 94% of the obese females developed symptomatic OA of knee and obesity is strongly associated with OA. Although the association between obesity and large joint OA is probably mediated by biochemical component, it is unlikely to be the sole means by which obesity contributes to the pathogenesis of OA.

Several studies have identified a genetic predisposition towards OA^{11, 12}. Only one study showed that the offsprings of people with medial tibio-femoral OA walked with a less than normal degree of foot rotation, which may ultimately predate disease.

Given that obesity is associated with the onset and progression of OA, weight loss represents an important preventive strategy. The Framingham Study showed that weight control significantly affected the risk of developing knee OA. The women who reduced their BMI by 2 units or more, reduced the odds for developing OA by >50%.

CONCLUSION: The Study concludes that: Obesity is strongly associated with the development of secondary OA of knee in both pre and post menopausal females.

BIBLIOGRAPHY:

1. Felson DT, Naimark A, Anderson J, et al. The prevalence of knee osteoarthritis in the elderly. The Framingham Osteoarthritis Study. *Arthritis Rheum* 1987; 30:914–18.
2. Felson DT, Anderson JJ, Naimark A, et al. Obesity and knee osteoarthritis. The Framingham Study. *Ann Intern Med* 1988;109:18–24
3. Hart DJ, Spector TD. The relationship of obesity, fat distribution and osteoarthritis in women in the general population: the Chingford Study. *J Rheumatol*1993;20:331–5
4. Felson DT, Lawrence RC, Dieppe PA, Helmick CG, Jordan JM, Kington RS, et al. Osteoarthritis: new insights. Part 1: the disease and its risk factors. *Ann Intern Med.* 2000; 133:635-46.
5. Lanyon P, O'Reilly S, Jones A, Doherty M. Radiographic assessment of symptomatic knee osteoarthritis in the community: definitions and normal joint space. *Ann Rheum Dis.* 1998;57:595-601, doi: 10.1136/ard. 57.10.595.
6. Cicuttini FM, Baker JR, Spector TD. The association of obesity with osteoarthritis of the hand and knee in women: a twin study. *J Rheumatol*1996; 23:1221–6.
7. Cooper C , Snow S, McAlindon TE, et al. Risk factors for the incidence and progression of radiographic knee osteoarthritis. *Arthritis Rheum* 2000; 43:995–1000.
8. Schouten JS, van den Ouweland FA, Valkenburg HA. A 12 year follows up study in the general population on prognostic factors of cartilage loss in osteoarthritis of the knee. *Ann Rheum Dis*1992;51:932–7
9. Van Saase JL, Vandenbroucke JP, van Romunde LK, Valkenburg HA. Osteoarthritis and obesity in the general population: a relationship calling for an explanation. *J Rheumatol.* 1988; 15:1152–8.
10. Hartz AJ, Fischer ME, Bril G, Kelber S, Rupley D Jr, Oken B, et al. The association of obesity with joint pain and osteoarthritis in the HANES data. *J Chronic Dis.* 1986; 39:311–9, doi: 10.1016/0021-9681(86)90053-6.
11. Spector TD, Cicuttini F, Baker J, et al. Genetic influences on osteoarthritis in women: a twin study. *BMJ* 1996;312 (7036) :940–3

12. Keen RW, Hart DJ, Lanchbury JS, et al. Association of early osteoarthritis of the knee with a Taq I polymorphism of the vitamin D receptor gene. *Arthritis Rheum* 1997; 40:1444-9.
13. Felson DT, Zhang Y, Anthony JM, et al. Weight loss reduces the risk for symptomatic knee osteoarthritis in women. The Framingham Study [see comments]. *Ann Intern Med* 1992; 116:535-9.
14. Toda Y, Segal N, Toda T, Kato A, Toda F. A decline in lower extremity lean body mass per body weight is characteristic of women with early phase osteoarthritis of the knee. *J Rheumatol.* 200; 27:2449-54.
15. Slemenda C, Brandt KD, Heilman DK, Mazzuca S, Braunstein EM, Katz BP, et al. Quadriceps weakness and osteoarthritis of the knee. *Ann Intern Med.* 1997;127:97-104
16. Slemenda C, Heilman DK, Brandt KD, Katz BP, Mazzuca SA, Braunstein EM, ET AL. Reduced quadriceps strength relative to body weight: a risk factor for knee osteoarthritis in women? *Arthritis Rheum* 1998; 41:1951-9, doi: 10.1002/1529-0131(199811)41:11<1951: AID-ART9>3.0.CO; 2-9.

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