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INCIDENCE OF KNEE OSTEOARTHRITIS IN OBESE ADULTS

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ABSTRACT

Background: Obesity is considered as significant independent risk factor for knee osteoarthritis. It is estimated that force of nearly 3 to 6 times one's body weight is exerted across knee joint. Waist Hip Ratio is the good indicator of visceral fat, the waist hip ratio greater than 0.9 in females and greater than 0.8 in male's increases excessive load on the knee joint which alters the Q-angle. The Western Ontario And McMaster Universities Osteoarthritis Index scale was used as an outcome measure to assess pain, stiffness, and physical function in patients with hip and knee osteoarthritis. **Objective:** To find out the early osteoarthritis knee in obese adults and effect of high hip waist ratio on Q-angle and its relation with osteoarthritis knee. **Method:** 50 subjects including male and female were included in this study with age between 35-45 years and classified into into 2 groups symptomatic and non-symptomatic Patients were clinically assessed for functional status by using Western Ontario And McMaster Universities Osteoarthritis Index scale. **Result:** The incidence of Osteoarthritis knee was found more in age group ranging from 41-45years and was greater in female population. The symptomatic patients were greater in obese class 2 and 3 with mean of 33.36±4.038. Q-angle was taken with mean deviation of 15.9±2.119 for male and 19.9±2.119 for female. Out of 30 symptomatic patients, 17 patients presented with WOMAC score between 20-40%.**Conclusion:** In this study, we concluded that incidence of osteoarthritis knee was found greater between age group 41-45years with female population more than male population.

KEYWORDS: hip-waist ratio, knee osteoarthritis, obese adults, q-angle.

INTRODUCTION

Obesity increases likelihood of various diseases and conditions, particularly cardiovascular diseases, type 2 diabetes, obstructive sleep apnea, certain types of cancer, OA, depression.[1] The most significant impact of obesity on musculoskeletal system is associated with OA, a disabling degenerative joint disorder characterized by pain, decreased mobility and negative impact on quality of life. OA pathogenesis relates to both excessive joint loading and altered biomechanics pattern together with hormonal and cytokine dysregulation. Obesity is associated with incidence and progression of OA of both weight bearing and non-weight bearing joint. Weight loss in OA can impact clinically significant improvement in pain and delay progression of joint structural damage.[2] Evidence suggest that regional adiposity is an important predictor of chronic disease risk independent of total adiposity.[3]

Knee OA as considered as wear and tear condition, it is now recognized that knee OA exists in highly metabolic and inflammatory environments of adiposity. Cytokines associated with adipose tissue including leptin, adiponectin, resistin, may influence OA through direct joint degradation or control of local inflammatory processes.[4]

Obesity loads may be detected by mechanoreceptors on chondrocyte surface triggering intracellular signaling cascade of cytokines, growth factors, metalloproteniases. Being overweight increases load placed on joints such as knee which increases stress and could possibly breakdown of cartilage.[5] Obesity and joint injury have been found to be strongly associated with OA. It is estimated that force of nearly 3 to 6 times one's body weight is exerted across knee while walking, an increase in body weight increases the force by this amount.[6]

Being overweight is associated with increase in cartilage turnover biomarkers. Cartilage oligomeric matrix protein and collagen type 2 degradation products were increased in those with high BMI.[7]

Chronic patellofemoral joint pain is common in adults and occurs more in women.[8]

The Q angle is the angle formed between a line connecting the anterior superior iliac spine to midpoint of patella and line connecting tibial tuberosity and midpoint of patella.[9] The Q-angle gives an idea how the thigh muscles functions to move the knee cap (patella) in the groove of the knee joint. A normal knee cap should move up and down within the groove with flexion and extension of knee. When Q-angle is excessive, the knee cap tends to track out of alignment and hence causes wear and tear (degeneration) of the cartilage behind the knee cap.[5]

Some authors have found that, in comparison to the lateral tibiofemoral cartilage, the thickness of medial tibiofemoral and patellofemoral articular cartilages in healthy individuals with normally aligned knees is thinner. This is likely due to differences in distribution of loads over medial and lateral compartments. Although an altered distribution between medial and lateral compartments of joint may be demonstrated in individuals with varus or valgus knee.[10]

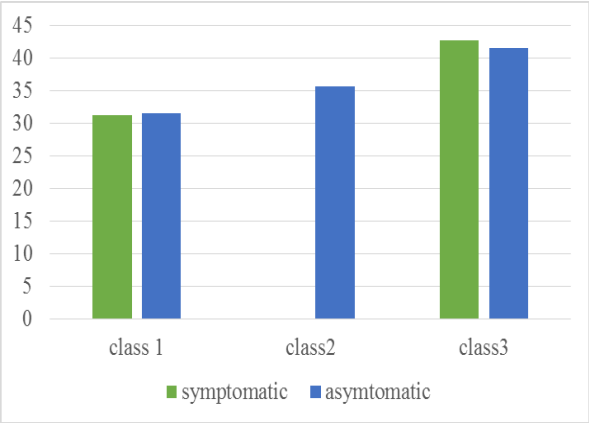
Procedure

The study design was survey based. Samples were taken according to convenience. The study duration was 6 months. My study included obese subjects with high hip waist ratio. Total 50 samples were taken including both male and female with the age ranging from 35-45 year (mean age 37.18±2.108 to 43.96±1.688). The samples were screened according to inclusion and exclusion criteria. Subjects were assured that their identity will be preserved and a written informed consent was taken. The procedure was explained to the subjects. BMI was taken according to formula weight in kg / height in m^2. The waist hip ratio was taken with the measuring tape, the waist circumference was taken at the midpoint from the lower border of last rib and top of iliac crest and hip circumference was taken around the widest portion of the buttocks. The Clarke's and McConnell's test was performed to assess for the knee pain from osteoarthritic changes. The Clarke's test was performed in supine position, patient was asked to perform quadriceps contraction while therapist's hand exerts pressure on superior pole of patella, so trying to prevent the proximal movement of patella. The McConnell's test was performed in high sitting position, the patient was asked to perform the resisted quadriceps contraction at various angles with the femur externally rotated and the painful angle was noted. The patient was asked to perform the quadriceps contraction while gliding the patella medially at same angle again and the disappearance of apprehension was noted. The Q-angle was taken in supine position from ASIS to midpoint of patella and from midpoint of patella to tibial tuberosity with the goniometer. The WOMAC scale was taken to assess pain, stiffness, and physical functions of the patients.

RESULT

Table 1: Distribution according to classification of obesity.

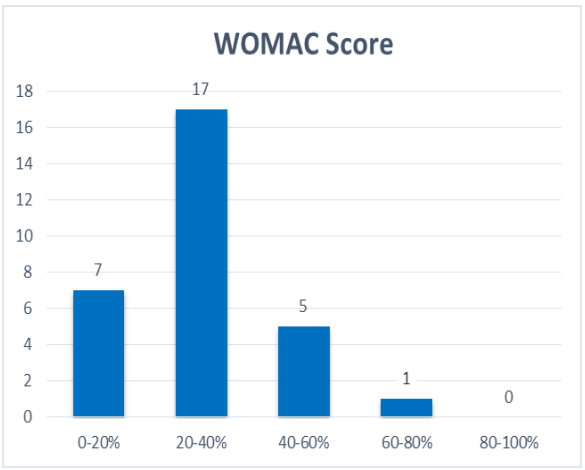
	Mean±SD
Asymptomatic Subjects	34.435±4.180
Symptomatic Subjects	33.36±4.038



Graph 1: Shows that the mean value for symptomatic and asymptomatic class 1 obese was 30, the mean value for asymptomatic obese class 2 was 35 and that for symptomatic were not found, the mean value for symptomatic obese. class 3 was 42.7 and that for asymptomatic was 41.5.

Table 2: Distribution according to WOMAC score.

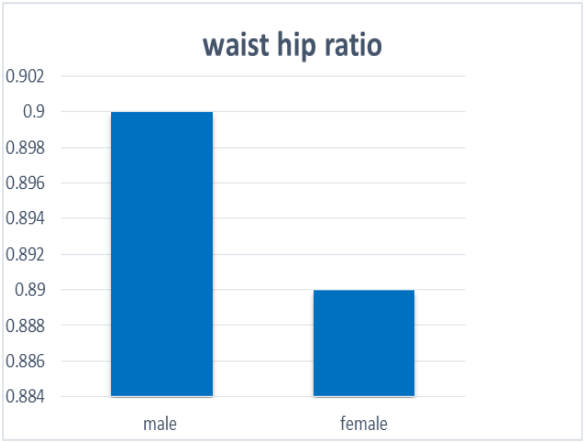
	Mean±SD
WOMAC Score	31.6±14.90



Graph 2 shows that out of 30 symptomatic subjects, the WOMAC score for 7 subjects was between 0-20%, the WOMAC score for 17 subjects was between 20-40%, the WOMAC score for 5 subjects was between 40-60%, the WOMAC score for 1 subject was between 60-80%, the WOMAC score for 9 subjects was between 80-100%.

Table 3: Distribution according to waist hip ratio.

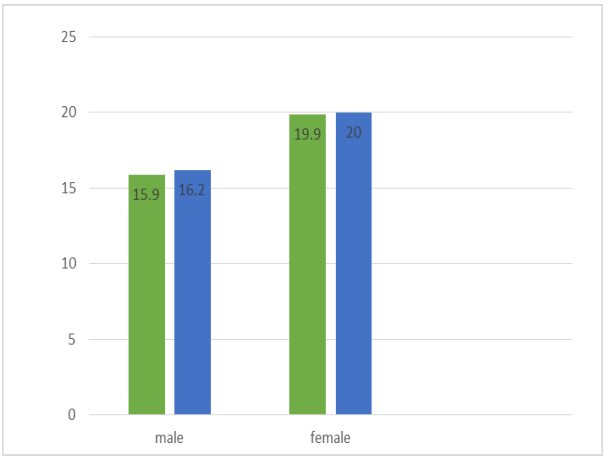
Gender	Mean±SD
Male	0.994±0.1063
Female	0.89±0.0652



Graph 3 shows that out of total 50 subjects, the mean value of WHR for male subjects is 0.9 and the mean value of WHR for female patient is 0.8.

Table 4: Distribution of participants according to Q angle.

Q angle	Male Mean±SD	Female Mean±SD
Right	15.9±2.119	19.9±1.495
Left	16.2±2.370	20±2.378



Graph 4 shows that out of total 50 subjects, the mean value of Q angle for right and left is 15.9 and 16.2 respectively for male subjects and the mean value of Q angle for right and left is19.9 and 20 respectively for female subjects.

DISCUSSION

Our study found that Q-angle was significantly deviated in obese symptomatic as well as asymptomatic subjects. Out of total 50 subjects, 30 subjects were symptomatic whereas 20 subjects were asymptomatic. Out of 30 symptomatic subjects, 5 subjects were men and 25 subjects were females. Hence the result shows a significant incidence of OA knee in females as compared to men. The incidence of knee osteoarthritis was greater in age group between 41-45 years as compared to the incidence found in the age group between 35-40 years. The graph 1 shows comparison between symptomatic and asymptomatic subjects. The mean value of symptomatic patients was greater than asymptomatic patients for class 3 obese groups. This graph also shows no significant difference between symptomatic and asymptomatic group of obese class 1. Hence graph 1 interprets that OA knee was significant for class 3 obese subjects. Graph 2 in our study showed the result of WOMAC scale. In our study WOMAC score ranges from 0-100%, out of which 7 subjects had pain between 0-20%, 17 subjects had pain in 60-80%, and 9 subjects had pain between 80-100%.This suggest that maximum subjects had pain between 20-40%. This interprets that there is moderate amount of pain in symptomatic obese subjects. Graph 4 interprets that there is increase in Q-angle for both symptomatic as well as asymptomatic group which suggest that obesity changes the alignment of knee joint which can predispose the early symptoms of OA knee. There is evidence suggesting significant increase in the Q-angle in obese patients with OA knee which supports graph 4.

One study, by Rampliya Nikita T et.al.[11] Recently found the evidence of increased Q-angle in obese and overweight patients diagnosed with OA knee. The comparison of Q-angle was done between the patients having normal BMI and those with overweight patients. The mean of Q-angle for normal patients was ±19.5 and that for overweight patients was ±20 suggesting increase Q-angle in overweight patients. Similar comparison was done between the normal and obese patients which showed the mean value of Q-angle for normal and obese was ±19.5 and ±21.5.

Above study also found the evidence suggesting the difference in WOMAC scale between normal and obese patients with osteoarthritis. The study found that WOMAC score was highly significant in obese patients as compared to normal weight patients. The mean of WOMAC score for normal weight patients was ±39.8 whereas for obese patients the mean was ±42.5.

Adae O .Amoako and Guntur A. Pujalte et.al.[12] concluded that OA is a constellation of structural changes that leads to pain and functional impairment. There are several risk factors associated with OA. In young individual or athlete, injury, occupational activities and obesity are the main factors that contribute to OA.

S.P. Messier, M. Pateret all[13], underwent the study to check the influence of obesity on the alignment of knee joint in osteoarthritic patients. Their study concluded that obesity is associated with knee joint forces and is more closely associated with knee adduction moment, an indication of asymmetry or imbalance of load across the medial and lateral compartment. They also found that external knee adduction moment is a valuable surrogate measure of medial compartment joint loading. Class 2 obese group exerted a peak knee compressive force per step that was 8%.

Greater than the class 1 obesity group [(2993N-2772N) / 2772N *100= 8%)] and 24% greater (582N) than participants in the overweight group.

Ayse Aydemir EKIM, Halice HAMARAT et al[14]; evaluated the association between the Q-angle and clinical features and radiologic/ultrasonographic findings of patient with knee OA. According to their result it was found that HQ angle measurement were positively correlated with cartilage grading by US and KL grading and were negatively correlated with medial femoral condyle.

Mizuno et al.[15] have shown in a biomechanical study on cadaveric knees that an increased Q angle may shift the patella laterally when the knee is between 20 and 60 degree of flexion leading to lateral patellar dislocation or increased lateral patellofemoral contact pressure.

Thus our study shows the relation between the obesity and Q-angle therefore its association with knee OA.

CONCLUSION

In this study, we concluded that incidence of osteoarthritis knee was found greater between age group 41-45years with female population more than male population.

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CONFLICT OF INTEREST: Nil.

SOURCE OF SUPPORT: None.

LIMITATION

Small sample size.
Obesity class was not considered.
Occupation was not considered.

FUTURE SCOPE OF STUDY

Can be done with large sample size.
Can be done with radiological investigations.

REFERENCES

1. Luppino, FS, De Wit, Bovy, Pennix, Zitma. Overweight, Obesity, and depression: A systematic review and meta- analysis of longitudinal studies. American journal of public health research, 2015; 3(6): 221-228.
2. Lauren K. King, Lyn March, and Ananthila. Study of Obesity and osteoarthritis. Indian J Med Res., Aug, 2013; 138(2): 185-193. PMCID:PMC3788203.
3. Marie E Thoma, Mary L. Hedig comparing apples and pears: Women's perceptions of their body size and shape, Journal of women's health, Oct, 2012; 21(10): 1074-1081.
4. Mary Fran R, Karvonen-Gutierrez The evolving role of obesity in knee osteoarthritis, curropinRheumat10ol, Sep, 2010; 22(5): 533-537.
5. Creamer P, Hochberg MC, Lancet, August 16, 1997; 350(9076): 503-8. Osteoarthritis
6. Cicuttini FM, Baker JR, Spector TD etal. J Rheumatol, 1996 July; 23(7): 1221. The association of obesity with osteoarthritis of the hand and knee in women: twin study.
7. Maria Gerhardssonde Verdier Incidence of severe knee and hip OA in relation to different measures of body mass. Annals of rheumatic disease, june 2008.
8. Rana SJonathan Lentzons Bill vicenzino Is patellofemoral osteoarthritis common in middle aged people with chronic, August 2014.
9. Karen Hayes, Jing Song Study for Varus –Valgus alignment in progression of patellofemoral osteoarthritis. ARTHRITIS & RHEUMATISM, July 2004; 50(7): 2184 -2190.
10. Ayse Aydemir EKIM, Hatice HAMARAT Study of relationship between Q angle and articular cartilage in female patients with symptomatic knee osteoarthritis:Ultrasonographic and Radiologic evaluation . Arch Rheumatol, 2017; 347-352. doi:10.5606/ ArchRheumatol.2017.6145
11. Ramoliya Nikita T, Rangan Dixita H Study to compare Q-angle and WOMAC scale in overweight and obese patients with OA knee patients, 12sptpt11070, Rajkot, July 2015.
12. Adae. O. Amoako and George Guntur A. Pujalte Osteoarthritis in young, active and athletic individuals, Clinical Medicine Insight: Arthritis and musculoskeletal Disorders, April, 2014; 7 27-32.
13. S.P. Messier, M. Pater, D.P. Beavers Study of influence of alignment and obesity on knee joint loading in osteoarthritic gait. Osteoarthritis and cartilage, 2014; 22: 912-917.
14. AyseAydemir EKIM, Hatice HAMARAT Study of relationship between Q angle and articular cartilage in female patients with symptomatic knee osteoarthritis:Ultrasonographic and Radiologic evaluation . Arch Rheumatol, 2017; 347-352. doi:10.5606/ ArchRheumatol.2017.6145
15. Mizuno Y, Kumagai M, Mattessich SM. Q angle influences tibiofemoral and patellafemoral kinematics. J Orthop Res., 2001; 19: 834-40.