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A Comparative Study of Radiological Changes in Knee Joint Morpholgy in Obese Male And Female

KEYWORDS: Femur,Tibia,Patella,Fibula,knee osteoarthritis,osteophytes,hyline cartilage, Subchondarl sclerosis and cyst, Subluxation, triceps, suprailium

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ABSTRACT

Aim-To correlate effects of obesity on knee joint morphology with age and sex.

Material &Methods-100 subjects of both sexaged between 30 yrs to 50 yrs and above were selected.Measurements were taken by slim guide skinfold caliper.Calculation ofpercentage of body fat and Grading of obesity was done by the help of standard tables given in caliper booklet. Total 100 radiograms of knee joints in anterioposterior view in standing position were obtained . The radiograph were carefully analysed. Correlation between percentage of body fat and changes in radiological morphology of knee joint was done in both sex in various groups. Statistics(t' test) was applied.

Results-84 % obese female and 40% obese male in all age groups were affected by knee joint osteoarthritisthat difference was highly significant statistically (P <0.01).

Conclusion-Obese female have high risk of knee joint osteoarthritis in comparison to obese male.

Introduction-

Obesity is defined as an abnormal growth of the adipose tissue due to an enlargement of fat cell size (hypertrophic) or an increase in fat cell number (hyper plastic) or a combination of both [1] . Obesity is defined as a chronic disease characterized by an excessively high amount of body fat in relation to lean body mass [2].Obesity is most commonly caused by a combination of excessive dietary calories, lack of physical activity, and genetic susceptibility, endocrine disorders, medications or psychiatric illness. Body fat can be classified in to two categories essential fat and storage fat. Essential fat is needed for normal physiological function without it we cannot be healthy. Storage fat is the fat stored in adipose tissue, mostly beneath the skin i.e. subcutaneous and around major organ of the body, waist hip, and thigh. This storage fat may be hazardous to the body if it is more than normal limit. It may cause hypertension gall stone, gout diabetes, cancer. Obese person always have some problem in his/her knee joints. Knee joint is the main weight bearing joint in our body which is mostly affected by person's weight. The effect of obesity is on knee joints is well known i.e. osteoarthritis or osteoarthrosis but correlation between obesity and osteoarthritis of knee joints is controversial[3].The present study is designed to correlate the percentage of body fat and changes in radiological morphology of knee joints and an attempt to create awareness about hazards of obesity in both sex and various age groups.

MATERIAL AND METHODS-

The present study was conducted on 100 subjects in both sex. Subjects were divided into 2 groups out of which 50 were obese male and 50 were obese female. The cases were selected from the department of orthopedic of M.Y. hospital Indore.

INCLUSIVE CRITERIA

Obese subjects with and without any complaints of knee joints. Obese subjects with positive clinical history of joint pain, difficulty in walking , joint deformity and clicking sound in knee joint movements.

EXCLUSIVE CRITERIA-

Obese subjects due to any metabolic disease (diabetes mellitus, Thyroid disorder) ,having infection of knee joints (tuberculosis, sepsis),having knee joint injury and fracture, Rheumatic disease, congenital malformation of knee joint was excluded.

Each group of both sex under study were divided into 3 subgroups of age ranging from 30 years to 50 years and above (subgroup I- 30 to 39 years, II- 40 to 49 years and and III - 50 years and above).Detailed history was taken regarding the complaints of knee joints. Careful clinical examination was done and Signs were recorded. Skin fold thickness was measured in millimeter (mm) by the help of slim guide skin fold caliper (figure no. 1) at three standard anatomical sites i.e. Suprailium, thigh, triceps in female and paraumblical, thigh, chest in male (figure no. 2).The skin was pinched to raise a double layer of skin and adipose tissue, but not the muscle. The caliper was applied 1 cm below and at right angle to the pinch and reading in millimeter was taken . Percentage of body fat was calculated by using Standard Tables from HOEGER w. k. & HOEGER s. 1999, Baseline skin fold caliper booklet by Indiana state university Deptt, of physical education. The sum of 3 skin folds was utilized to calculate the percentage of body fat and Grading of obesity was done by using standard Tables from same Baseline skin fold caliper booklet (table no 1 & 2).

X-ray in standing Anterioposterior view of both knee joints was taken and assessed for radiological changes like Joint space narrowing, osteophytes, Subchondarl sclerosis and cyst, Total loss of joint space and Subluxation (figure 3&4). All observations were recorded .Association between

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obesity and radiological finding was analysed in all age groups of both sex .For statistical analysis SPSS software was used. For comparison of different parameters small samples 't' test was used.

RESULTS -- 84 % obese female in all age groups showed more radiological changes in knee joints while only 40 % obese male were affected that difference was highly significant statistically (P <0.01). To analyse radiological findings a comparison was done in both sex in all age groups. In I age group 71.1% obese female subject presented with positive radiological findings as compared to only 28.57% obese male subjects presented with positive radiological findings (p value <0.01), which is significant. In age group II 90.90% obese female subject presented with positive radiological findings as compared to 45.45% obese male showed positive findings (p value <0.01), which is highly significant. In age group III 85.71 % obese female subject presented with positive radiological findings as compared to 42.85% obese male showed positive findings (p value <0.01), which is highly significant.(Table no.3)

DISSCUSION-

The present study is to ensure the effect of obesity on knee joint morphology in both sex in various age groups. This study and studies all over the world have shown that obese female are more affected by knee joint osteoarthritis than male.

Ray Marks et al [4] studied on 82 women and 80 men with unilateral or bilateral knee OA were examined . 80% of obese woman were affected by knee joint osteoarthritis while only 22% obese male were affected.

Devid T. Felson et al[5] found a definitive association between weight and knee osteoarthritis . According to there study this association was stronger in female than male.

Changhai Ding et al [6] reported that obese female had significantly higher knee joint defects than nonobese female as well as obese male.

Hochberg MC et al[7] studied the association of body fat distribution with knee osteoarthritis. That study concluded that body weight is associated with bilateral knee osteoarthritis in specially obese female .

CONCLUSION—

The study concluded that Obese women have specially high risk of knee joint osteoarthritis where as obese man has marginally higher risk. Obesity can be modified by simple measures like weight loss, correction of diet pattern and exercise. Hence creating awareness towards hazards of obesity is an important step towards reducing the incidence of osteoarthritis and making quality of life better.

Table No.1 –
Body composition classification according to percentage of body fat for male

Age(yrs)	Percentage Of Body Fat				
	Excellent	Good	Moder-ate	Over-weight	Obese
30-39	14	14.1-19	19.1-24	24.1-29	>29.1
40-49	15	15.1-20	20.1-25	25.1-30	>30.1
>50	16	16.1-21.5	21.1-26.5	26.1-31	>31.1

Table No. 2
Body composition classification according to percentage of body fat for female

Age(yrs)	Percentage Of Body Fat				
	Excellent	Good	Moder-ate	Over-weight	Obese
30 - 39	19	19.1 – 24	24.1 – 29	29.1 – 34	>34.1
40 - 49	20	20.1 - 25	25.1 - 30	30.1 - 35	>35.1
> 50	21	21.1 - 26.5	26.1 – 31	31.1 – 36	>36.1

Table No. 3
Comparison of positive radiological findings in study group Female versus Male

Age Groups in years	Study group of female		Study group of male		P value	Significance
	Total no. of subject	Total no. of subject showing positive radiological finding	Total no. of subject	Total no. of subject showing positive radiological finding		
Group I	14	10	14	4	< .01	Highly significant
Group II	22	20	22	10	<.01	Highly significant
Group III	14	12	14	6	<.01	Highly significant

Figure 1 : Slim guide skinfold caliper

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Figure 2 : Measurement taken by skinfold caliper

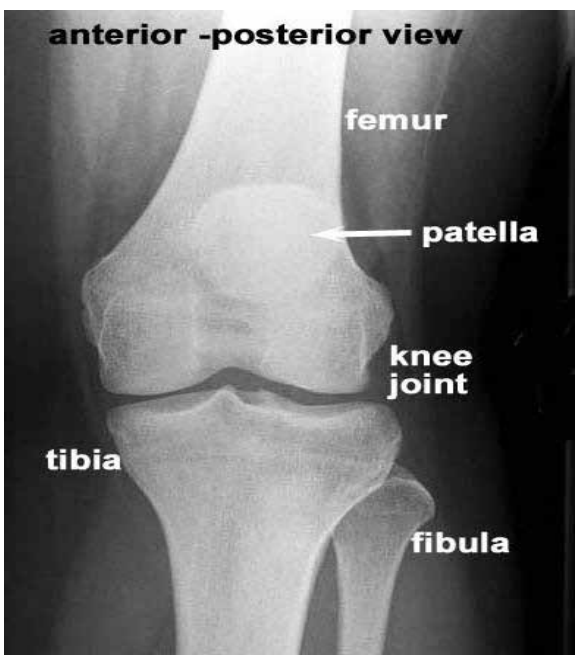

Fig. 3- X ray of normal knee joint (anterio posterior view)

Fig.4- X ray of knee joint osteoarthritis (anterio posterior view)

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