Abstract:

Objective: To identify the risk factors for primary early knee osteoarthritis (EOA) in a young to middle-aged population (age<50 years) with sub-acute knee complaints.

Design: A hospital based cross sectional study was carried out in a tertiary care centre to study the risk factors of early osteoarthritis of knee among the patients attending Orthopaedics OPD. A total of 100 patients of <50 years of age were included in the study. EOA knee patients were identified on basis of clinical and radiological findings fulfilling the newly advised ACR criteria. Eight risk factors like age, gender, obesity, family history, squatting habits, malalignment, vitamin D levels and socioeconomic status were analyzed and evaluated statistically.

Results: 100 patients completed the study. The mean age of the study population was 41.24 years (range 24-50 years, SD 5.99). Maximum number of patients (48%) were seen in the age group of 34-44 years. The female-male ratio in overall study population was 2:1:1. The mean BMI of the study patients was 28.297 (SD 3.93) with majority of patients (76%) had BMI >25 kg/m2. 78% patients had positive family history. 59% had varus malalignment and 68% patients had suboptimal vit D levels. We found that age, obesity, female sex, family history, varus malalignment and vit D as significant and squatting habits, socioeconomic class as non significant risk factors for early OA knee.

Conclusions: Risk factors are prevalent in this relatively young cross sectional study. Squatting habits and socioeconomic class emerged as non significant risk factors. These data offer insights for awareness and risk interventions among younger persons at risk for knee OA. There is need to spread awareness among people to adopt preventive measures at an earlier age along with healthy lifestyle to reduce the body weight and hence the risk of OA.

Keywords: Osteoarthritis, knee, middle age.
Introduction

Musculoskeletal disorders and diseases are the leading cause of disability. OA accounts as most prevalent musculoskeletal disease among the world, and is most common reasons of joint disability in approximately 100 million people among world having age over 45 years, which is approximately 15% of all musculoskeletal disorders (National Collaborating Centre for Chronic Conditions, 2008). Osteoarthritis (OA) is the most common joint disease, causing disability and reduction of quality of life and participation in social activity. It usually affects the hand and large weight bearing joints, often the knee and the hip. The most common joint site for OA in lower extremity is the knee.

In Indian impact, nearly 80% of population shows OA among the patient who claimed for knee pain, out of which approximately 20% reported incapability in daily activities and around 11% need peculiar care. The incidence of knee OA increase 10 folds amongst the ages of 30 and 65 years. A survey based study reveals that, “India is predicted as chronic disease capital by 2025 have 60 million people with arthritis”.5

Recently, national and international scientific societies have demonstrated great interest in ‘early osteoarthritis’ (EOA). There is an increasing awareness on the importance of identifying early phases of the degenerative processes in knee osteoarthritis (OA), the period of the disease when there might still be some regenerative ability of the articular cartilage, which is permanently lost in the advanced disease stages. Early osteoarthritis knee is defined as clinical recurrence of pain and discomfort of the knee, short periods of stiffness, with in between long periods of very little clinical manifestations, probably due to spontaneous adaption of the patient, that sets the stage to perform additional investigations such as radiographs, ultrasound, MRI or arthroscopy. Early events in the disease involve the disruption of the articular chondrocyte pericellular matrix, linked to an abnormal activation of cell surface receptors.

Mechanical knee pain is very often the first true sign of EOA. Overall, mechanical knee pain is a pain that is initiated or increased with knee activity/exercise and finished or decreased with knee resting without morning stiffness or usually along with morning stiffness of less than 30 minutes. It is an intermittent diffuse joint pain typically worsening with mild swelling after excessive stress (e.g. sport), light crepitation, and/or an angle-dependent load pain shown in fig 1.

Illustration of the functional loss in relation to the symptoms in the various stages of OA. The correlation between the degree of OA and clinical symptoms is not always seen in clinical practice.

Signs and symptoms foreruns radiographic knee OA at least of 2–3 years. Kellgren and Lawrence (K&L) grade 0 or 1 or 2 (osteoarthritides only) in standing weight bearing X-Ray may help to define radiologically early OA knee. Imaging with MRI has a higher sensitivity for early OA than radiographs, where the disease is visible in a relatively late stage suggesting it as most sensitive imaging during early phase.

Indisputably the risk factors in high risk population include female gender, old age, family history, overweight, malalignment and knee injuries. Although OA occurs all over the world, the prevalence and the pattern of the disease vary depending on the geographical distribution which in turn can provide valuable clues about the potential etiological factors. A hospital based study was carried out with a purpose to assess the sociodemographic and risk factors of OA among the study population.

Materials and Methods

A hospital based cross sectional study was carried out at SGRD Charitable hospital of Sri Guru Ram Das Institute of Medical Sciences and Research, Sri Amritsar. 100 patients below the age of 50 years, who were confirmed both clinically and radiologically for EOA knee attending SGRDIMSR Orthopaedics OPD were included in the study considering the inclusion and exclusion criteria. Inclusion criteria was <50 years of age and exclusion criteria had the patients with any significant comorbidity (heart disease, chronic respiratory conditions, diabetes, stroke), any trauma patients (sports injury, RSA), patients with history of knee surgery and clinical history of inflammatory arthritis (RA, SLE, Psoriatic). 2016 revised criteria for EOA knee was used to diagnose patients which includes:

Entry Criteria:
- Knee pain / knee bony tenderness
- Absence of exclusion criteria

Domain I:
- Mechanical knee pain 1p
• Knee bony tenderness 1p
• Crepitus on knee motion 1p
• Compatible synovial fluid 1p

**Domain**

- Age at onset < 50 yrs 1p
- Age at onset > 50 yrs old 2p
- Knee bony enlargement 1p
- Osteophyte in knee X-Ray 2p
- or compatible knee MRI

a. In the presence of 3 points out of 10 with at least 1 point from Domain II along with all entry criteria, the diagnosis of knee OA can be established

b. Exclusion criteria are including:
   (1) Patients with any significant comorbidity (heart disease, chronic respiratory conditions, diabetes, stroke)
   (2) Any trauma patients (sports injury, RSA)
   (3) Patients with history of knee surgery
   (4) Clinical history of inflammatory arthritis (RA, SLE, Psoriatic)
   c. Knee pain that is initiated or increased with knee activity/exercise and finished or decreased with knee resting
d. Clear fluid with normal viscosity accompanied by WBC count less than 2000/mm3 with less than 25% PMN
e. It must be ignored in the presence of osteophyte in knee X-Ray

Age, gender, BMI, family history, squatting habits, malalignment, Vit D levels and socioeconomic class of these patients were analyzed after obtaining informed consent. Patients were interviewed and data was recorded on a standardized predesigned and a pre-tested questionnaire. Questionnaire focussed on Socio-demographic profile and assessment of possible risk factors (age, family history, obesity, physical activity and occupational knee bending). Measurements like height, weight and body mass index (BMI) were recorded. The results were analysed using SPSS software version 20. Chi square test, ratios and proportions were used.

BMI was characterized according to WHO classification which includes normal BMI (18.5-24.99), Overweight (25-29.99), Obesity (>30). Malalignment was checked after screening of all the patients and confirmation was done by checking the mechanical axis of lower extremity though radiographs. The malalignment test is used when there is mechanical axis deviation. The normal mechanical axis passes 10 mm medial to the centre of knee joint (normal range is 3-17 mm medial). The lateral distal femoral angle (LDFA) and medial proximal tibial angle (MPTA) have a mean of 87.5 degrees and a normal range of 85-90 degrees. Deviation from the normal range are diagnostic of malalignment and identifies site of malalignment. 11 Vit D levels were characterized into normal (>30 ng/ml) and suboptimal (<30ng/ml). Socioeconomic status of patients was determined using the modified kuppuswamy socioeconomic scale for year 2018. 12 For convenience, we have described kupuswamy class I & II as upper class, class III as middle class and class IV,V as lower class.

Knee radiographs: To develop a radiological score for the individual knee compartments, radiographs in an anteroposterior weight-bearing view with the knee in full extension (anteroposterior;AP) and an AP weightbearing view with the knee flexed at 45° (Schuss) may be helpful. The height of the affected compartment could be measured in its centre and be normalised with respect to its width. Kellgren and Lawrence (K&L) grade 0 or 1 or 2 (osteophytes only) in standing weight bearing X-Ray is used to identify patients of primary early osteoarthritis knee.13

To check malalignment, anteroposterior standing radiographs were taken with the patient standing with patella facing forward in a bipedal stance in front of the long film cassette. The film cassette should be long enough (51 inch) to include the hips, knees and ankles. The X-Ray beam should be centered on the knee joint.

**Results**

A total of one hundred patients were enrolled in the study of whom 32 (32%) were males and 68 (68%) were females with female to male ratio of 2:1. The mean age of the study population was 41.24 years with range (24-50 years) and Standard deviation of 5.99. Maximum number of patients (48%) were seen in the age group of 34-44 years. Number of patients increased with age as 64 of the patients were older than 40 years. The mean BMI of the study patients was 28.297 with standard deviation of 3.93. Majority of patients (76%) had BMI >25 and these were in 3rd and 4th decade of their life. A family history of OA was present in 78 patients (78%).56 patients (56%) had squatting habits of >5 hours/day and 44 (44%) had squatting habits of <5 hours/day. Out of 100, majority of EOA knee patients (59%) have varus malalignment. 68 % patients had suboptimal Vit D levels. Majority of patients were seen in upper (40 patients) and middle class(42 patients).

Patient wise distribution of risk factors is shown in table1-8.
# Discussion

In our study it was observed that the percentage of people with osteoarthritis increased as the age increases. 64 patients were older than 40 years of age with maximum number of patients (48%) in the age group of 34-44 years. Data thus suggested that age is a significant risk factor for early osteoarthritis knee.

Number of female patients was twice to that of males, suggesting it as significant risk factor.

Majority of patients (76%) had abnormal BMI (BMI>25kg/m²) including overweight and obese patients and were in 3rd and 4th decade of their life. These patients had early osteoarthritis of knee at levels less than the usual definition of obesity. Thus suggesting that even modest to moderate levels of overweight convey an increased risk of knee osteoarthritis.

Majority of patients had positive family history (78%) and suboptimal 25(D) (68%) suggesting them as significant risk factor.

59% patients had varus malalignment calculated via long standing radiographs. Below is X-Ray and long standing hip to ankle radiograph of varus knee.

Socioeconomic and squatting habits didn’t show any statistical significance in study group. These results were similar with that of Parikh.
TK et al and they concluded that these Indian habits of regular cross legged sitting and squatting were not associated with anterior knee pain rather they have protective effect due to increase in contact surface area.14

Conclusion

Although OA occurs all over the world, the prevalence and the pattern of the disease vary depending on the geographical distribution which in turn can provide valuable clues about the potential etiological factors. In our study we observed that there is relationship between age, sex and BMI, family history, vit D and malalignment with EOA knee. Occupational knee bending and socioeconomic class burden were non significant in our study. The number of people with OA increased as the age increased. The data reported here offer insights into the awareness of younger persons at risk for knee OA and suggest directions for public health educational efforts.

References