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Prevalence of the Knee Osteoarthritis Risk Factors Among Young Adult Population - An Observational Study

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ABSTRACT

Background: India has higher worldwide proliferative osteoarthritis (OA) rate and prevalence of knee osteoarthritis in India is 22-39%. Many risk factors have been through playing a significant role in triggering osteoarthritis. Such risk factors can be classified as modifiable and non-modifiable. There are very fewer preventive strategies for modifiable risk factors. Because the prevalence rate is increasing very high especially in Asian population – if prevent the modifiable risk factors of knee OA, then prevalence will automatically reduce.
Objectives: To find out the prevalence of risk factors of knee OA present in young adult population and to determine ranking and categorize the modifiable and non-modifiable risk factors.
Methodology: An observational study was conducted in Ashok & Rita Patel Institute of Physiotherapy (ARIP), Changa. Depending on the selection criteria, participants were selected and informed consent was signed. The respondents were then requested to offer their demographic information. Assessment of risk factors in young adults was completed. The data was analyzed using SPSS version 23.0. Descriptive analysis was performed which includes frequency, mean and standard deviation.
Result: Highest frequency of risk factor which present in subject was malalignment (69.62%), followed by physical activity (66.66%), muscle strength (64.56%), BMI (32.06%), socioeconomic status (10.55%), proprioception (8.02%), history of knee injury (7.59%), risk factor related footwear (1.68%) and history of surgery in knee (0.42%).
Conclusion: The prevalence of modifiable risk factors was high in this group. Effective preventive strategy must take to minimize the burden of the disease.

Keywords: Knee osteoarthritis, Prevalence, modifiable & non modifiable risk factor, Guidelines, young adult.

INTRODUCTION

Osteoarthritis is the most prevalent widespread musculoskeletal disease in the county and it is most severe joint disorder with a prevalence of 22-30% in India.[1] Knee Osteoarthritis is much more prevalent in India than the west countries and it is most common cause for the joint dysfunction. There is multifactorial cause for OA. Age, female sex, obesity, physical labor, occupational knee bending, family history, joint damage, vitamin D deficiency are significant risk factors for Osteoarthritis. This has been exacerbated by stress, poor posture, infectious diseases, and lifestyle disorders such as diabetes. Such issues are made more difficult in peri-menopausal age group females who gain

weight, lack of estrogen, and become less ambulant and active.[2]

There are many guidelines for knee OA treatments includes "National Institute for Health and Care Excellence" (NIHC), "Academy for Orthopedic surgeons" (AAOS), "American College of Rheumatology" (ACR), "Osteoarthritis Research Society International" (OARSI). These all guidelines for symptomatic OA. There are very fewer preventive strategies for modifiable risk factors.

The burden of OA is high in India, which may be leading cause of disability. Thus is a serious musculoskeletal disorder to be addressed in the field of medical science. In addition to treating symptoms, also it is necessary to address the risk factors and their prevention strategies. Because the prevalence rate is increases very high in especially Asian population – if prevent the modifiable risk factors of knee OA, then knee OA prevalence will automatically reduce. To prevent OA, we need to find out the risk factors associated with it. There is less prevalence of OA in young population, compared to older ones. Thus, in young adults, it is easy to identify the risk factors which are modifiable, which in turn will help us to prevent the occurrence of OA. The current guidelines should be referred to check if any of the risk factor prevention is addressed or not. If not, the factors can lead to development of protocol which can be implemented on young adults to prevent OA thus reducing the burden and overall prevalence after few years.

The study, therefore, aimed to find out the prevalence of risk factors present in young adult population. To determine ranking and categorize the modifiable and non-modifiable risk factors.

MATERIALS AND METHODOLOGY

The study was conducted on a sample of 234 participants through convenience sampling, including both males and females, and age between 18-35 years. Those with any congenital deformity of lower limb, any neurological diseases which affecting lower limb and who has knee OA (unilateral/ bilateral) were excluded. Nature and purpose of study was explained to the participants and informed written consent was obtained.

For measuring risk factors, weight and height were assessed in order to confirm BMI. IPAQ questionnaire was used for the checked physical activity. For socioeconomic status; Kuppuswamy scale was used. For alignment, checked genu recurvatum, genu varum/ valgum and supination/pronation of foot. For genu recurvatum measurement participants were instructed to extend the knee in a standing position. The angle formed by the femur in the sagittal plane and the shank was measured.[3]

The subjects were instructed to stand in such a position for Genu varum and Genu valgum assessment, so that the patella facing forward and the medial aspect of the knees and medial malleoli of the both legs remain almost as near as possible. A distance of 9 to 10 cm (3.5 to 4 inches) between the ankles considered as a "Genu Valgum". And if two or more fingers remain 4 cm (1.6 inches) fit between the knees while the ankles together, "Genu Varum" was considered. For the supination and pronation of foot assessment and marked with a skin marker pen. There were (1) the calcaneus base, (2) the attachment of Achilles tendon, (3) the Achilles tendon center at the medial malleoli height and (4) the center of posterior aspect of the calf 15 cm above three markers. With a goniometer; the rear foot angle (RFA) was measured. The Goniometer's arm must be aligned with the line connecting marker 1 and 2 (line 1) and the other arm was with the lines linking marker 3 and 4 (line 2). RFA was measured as the acute angle between the line 1 and 2. If RFA >= 5^0valgus, then it was considered as a "Pronated foot", 4^0 of valgus to 4^0varus was considered "neutral foot" and 5^0varus was considered as a "supinated foot".

For the limb length evaluation, true length (ASIS to medial malleolus) was measured.[4] Participants were instructed to sit with legs

hanging for proprioception assessment, electro goniometer was placed on the lateral side of the knee joint with two belts, one over the thigh and the other under the knee. After the person involved was instructed to extend the leg somewhat gradually to the predetermined eye- open position, the position must be maintained for 5 seconds. The same process was performed three times, with two second of pause (resting time) given in between. After those individuals were told to relax and gradually allow their leg back to its initial point. They were told to repeat the test procedure also with eye closed and recorded the angle. 3 repetitions with the same process were performed for measurement of joint position error.

The Leg press machine was utilized for evaluating muscle strength. For that we have to choose a weight similar to subject's "one repetition maximum" load and perform as many leg presses as possible without failing. If the number of leg press were more than twelve, then gave rest for fifteen minutes, then increased the weight and restarted the test.[5] Equation, was: "weight/ (1.0278-(0.0278* number of repetitions))" That score for the leg press test was rated as per the age of the person. Obtained score was classified into: "excellent", "good", "average", "fair", "poor". These criteria will differ gender wise.

RESULTS

Statistical analysis was done using SPSS version 23. Frequency, mean, and standard deviation were analyzed. Descriptive statistics of participants is shown in table 1. Figure 3 depicts percentage of risk factors present in the participants.

Table 1: Demographics of participants:

		Mean	SD
Age (in years)		20.95	±2
Height (in cm)		162.86	±9.32
Weight (in kg)		61.56	±16.70
		Frequency	**%**
Gender	Female	174	73.41
	Male	63	26.58
Occupation	Students	227	95.78
	Job	10	4.21

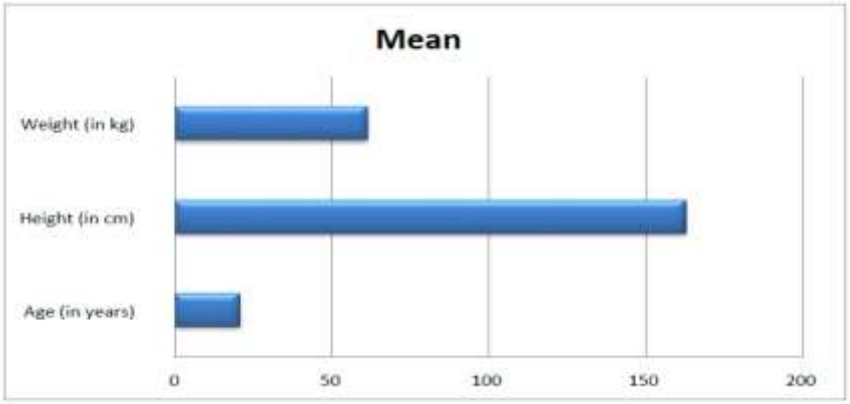

Figure: 1: shows Mean and SD of Weight, Height, and Age.

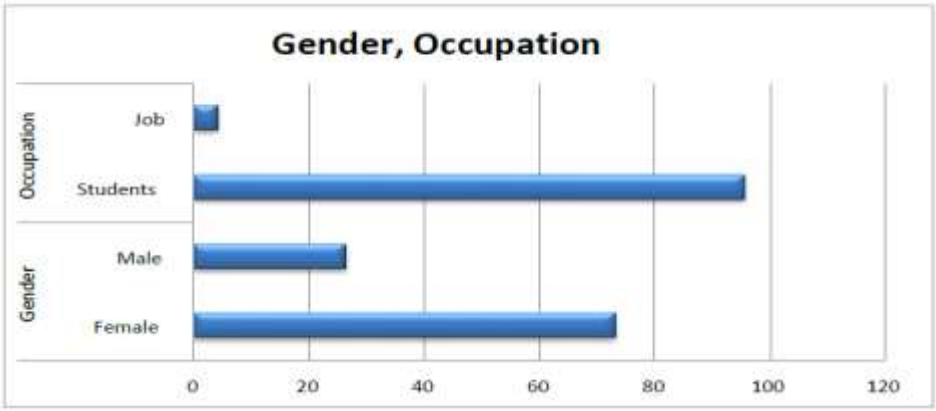

Figure: 2: shows Percentage of occupation and Gender

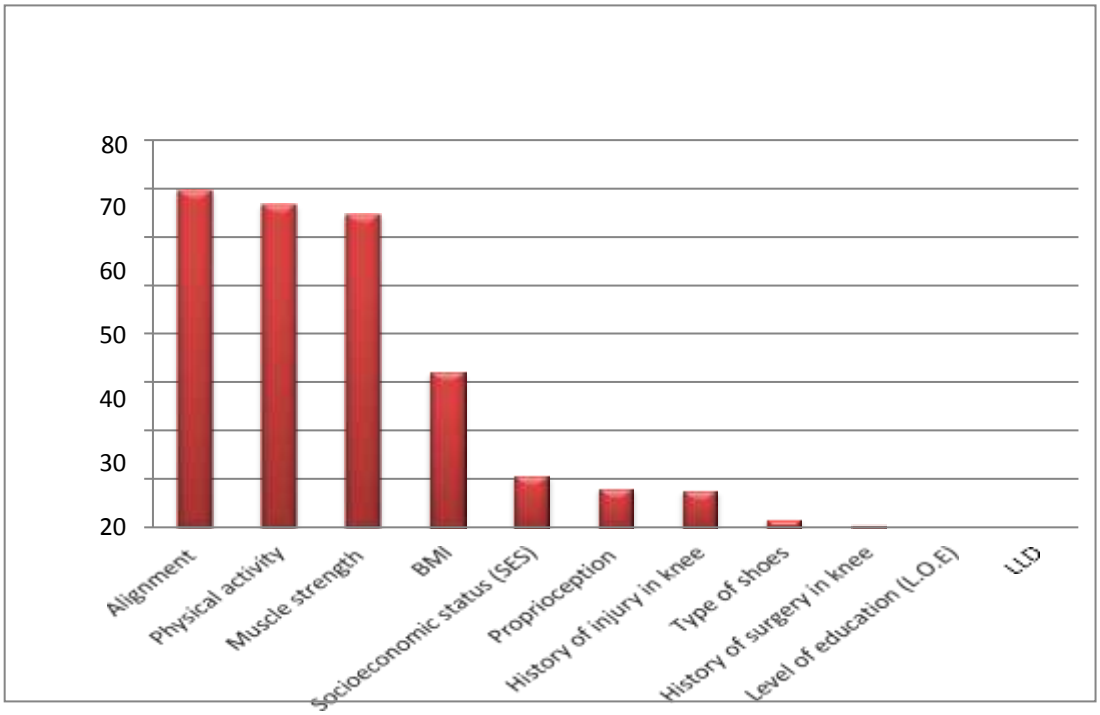

Figure 3: shows Percentage of Risk factors present in participants

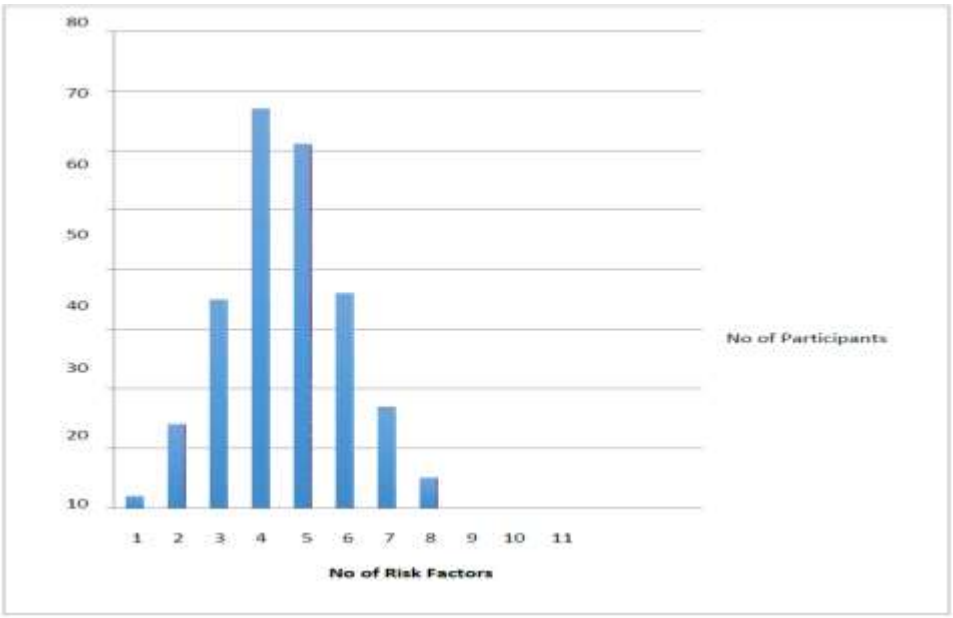

Figure 4: shows number of risk factors present in Number of participants

Number of risk factors present in participants are shown in figure 4. Initially, number of participants were increased with number of risk factors. E.g., 2 participants were affected by single risk factor, 14 participants were affected by 2 risk factors, 35 participants were affected by 3 risk factors, and so on. Maximum number of participants, 67 were affected by 4 risk factors. Generally, most people were affected by 4 risk factors. After this, number of participants were reduced with number of risk factors. E.g., 61 participants were affected by 5 risk factors, 36 participants were affected by 6 risk factors, 17 participants were affected by 7 risk factors and 5 participants were affected by 8 risk factors. Then after, number of participants

was zero for 9 to 14 risk factors. Hence, participants were not affected by risk factors more than 6 risk factors.

DISCUSSIONS

In this study of 234 participants, found that the highest frequency of risk factor which present in subject was malalignment (69.62%), followed by physical activity (66.66%), muscle strength (64.56%), BMI (32.06%), socioeconomic status (10.55%), proprioception (8.02%), history of knee injury (7.59%) , risk factor related footwear (1.68%) and history of surgery in knee (0.42%). LLD and level of education these two risk factors were not present in any participants.

Genu valgum was found in 5/237 (2.11%) study subjects. Whereas, Genu recurvatum found in 15/237 (6.33%) study subjects. Only 3/237 (1.27%) subjects had foot supination. Foot pronation was found in 73/237 (30.80%) subjects. Total 69/237 (29.11%) subjects had more than one malalignment also. A study carried out by Tanamas et al found that malalignment leads to uneven weight distribution and also increases stress the on cartilage. Which leads to destruction of articular cartilage and so this is a major modifiable risk factor for developing knee osteoarthritis.[6]

Obesity a major modifiable risk factor for knee OA. Multiple studies have found that there is a strong association between OA and both overweight and obesity. [7,8] In current study, the body mass index (BMI) showed that 20.25% study population were overweight, 9.28% obese (class 1), 2.53% obese (class 2) and 0% obese (class 3). So, total 76/237 (32.06%) study subjects were under this risk factor prevalence of knee OA is more common who have sedentary lifestyle or low physical activity. In this study majority of participants had low physical activity and which was 66.67%. Out of 237 participants, total 158 had low physical activity. Study found that total 36.29% study population had poor muscle strength of the quadriceps. 18.99% had average and 9.28% had fair muscle strength. So, total 64.56% study subjects were under risk factor related to muscle strength. A study carried out by N.A. Segal et al. identified that quadriceps weakness is a risk factor for knee joint. Quadriceps weakness leads to knee pain and cartilage loss.[10]

For the joint stability; proprioception is very important. The number of studies showed that knee proprioception accuracy tends to be a modifiable risk factor in knee. [11] In this study only 8.02% subjects had affected proprioception. A recent prospective study found that increased the likelihood of subsequent knee osteoarthritis because of a previous knee injury/ surgery. Therefore, previous knee injury/ surgery seems to be very significant non- modifiable risk factors for causation of OA.[8,12,13] However, current study found that there were 7.59% subjects had a history of knee injury and only 0.42% subjects were having a history of surgery.

Nisha Elizabeth Ajit et al and Harshal Salve et al reported that osteoarthritis was found to be higher with low socioeconomic group and low level of educational group. So, both are also risk factors for osteoarthritis. [8] According to the modified Kuppuswamy classification of socioeconomic status 8.86% belong to lower middle class, 0.84% upper lower and 0.84% lower class in our study. Total 10.55% participants were under this risk factor. Maximum number of participants were undergraduate (73.84%), Followed by graduate (23.21%) and postgraduate (2.95%). In current study, 0% subjects having this risk factor because data were collected from the institute.

Limitation of the present study is that have collected samples from the institute, one of the risk factor levels of education, is nil. Future study can be conducted for the large sample size and different kind of population with other risk factors like diet, ethnicity, bone mineral density (BMD) can be determined. We can prepare guidelines on how to manage modifiable risk factors and suggest exercises and treatment on the basis of guidelines. By this way can reduce the prevalence of osteoarthritis.

CONCLUSION

Many risk factors responsible for causation of knee OA are present in the young adult group. Malalignment, physical activity, muscle strength, BMI, socioeconomic status, proprioception is more prevalent. Hence it is likely that if preventive measures can be taken in the young adult group, the rate of osteoarthritis can be reduced.

Declaration by Authors

Ethical Approval: Approved

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