EVALUATION OF BODY MASS INDEX AS AN RISK FACTOR FOR ACL INJURY

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- Disclosure : None

BACKGROUND

- Anterior Cruciate Ligament is the most frequently injured knee ligament. The risk factors for ACL injury have been segregated into modifiable and non-modifiable risk factors.
- As a modifiable risk factor, significant association between body mass index (BMI) and ACL injury has been demonstrated. In addition to prevention programs, it is also important to raise awareness about modifiable risk factors, such as being overweight, which can cause ACL injury.
- We hypothesized that BMI, as a modifiable risk factor, might be significantly associated with ACL injury. Our study aimed to assess the role of BMI as a contributory factor in non-contact ACL injury.

METHODOLOGY

The study was conducted in department of Sports medicine, Sports injury centre, VMMC and Safdarjung hospital, New Delhi.

Study Design: Cross-sectional Observational study

Study site: Sports Injury Centre, VMMC and Safdarjung Hospital, New Delhi.

Number of patients: This study was performed on 129 consecutive patients fulfilling the inclusion and exclusion criteria.

Study Duration: This study was performed for a period of 18 months.

INCLUSION CRITERIA

CASES: Patients in the age group of 18 to 40 years with non-contact ACL injury(confirmed on Clinical history and examination) reporting within 3 months since injury.

CONTROL: Age & Sex matched Controls with intact ACL coming for complaints other than ACL injury.

EXCLUSION CRITERIA

1. Patients with associated fracture of knee.
2. Patients with Osteoarthritis knee (Kellgren-Lawrence grade 3 and4).
3. Past history of ligamentous reconstruction of knee.

RESULTS

Variable	Cases (n=43)	Controls (n=86)	p value
	Mean ± SD	Mean ± SD	
Age (in Years)	26.55 ± 5.88	26.86 ± 6.10	0.781
Body Mass Index (kg/m2)	26.87 ± 6.20	23.42 ± 3.51	0.001
Protein (in Kg)	11.51 ± 1.85	10.40 ± 1.82	0.002
Total Body Water (in Kg)	40.54 ± 6.06	36.61 ± 6.47	0.001
Percentage body Fat	22.88 ± 8.02	21.55 ± 6.95	0.248
Fatness (in Percentage)	12.30 ± 17.87	5.86 ± 8.28	0.012
Lean Body Mass (in Kg)	55.68 ± 7.68	49.76 ± 8.68	0.001
Mean Body Fat (in Kg)	18.08 ± 8.54	13.13 ± 3.96	0.001
Mineral	4.30 ± 0.82	3.57 ± 0.50	0.001

DISCUSSION

The purpose of our study was to evaluate the significance of body mass index as a risk factor for anterior cruciate ligament injury by comparing body mass index in two groups (43 cases with ACL tear and 86 controls without ACL tear)

The mean age in ACL torn cases was 26.43 years and 27.14 years in males and females respectively. Though females in age group 21-30 year had highest number of ACL tear but the difference between females and males for similar age group as well as overall was not significant.

Li et al. in their study conducted in 2019 found that the average age of patients undergoing ACL reconstruction was 30.3+/-9.5 years (range 14-52 years). Erquicia et al. found the median age of 32 years (range, 16-59 years) in a study conducted by them in 2013.[23]

The age group in our study was comparable to other studies, indicating that the ACL injuries requiring arthroscopic repairs are common in younger population.

- Bojicic et al. showed that BMI and knee morphometry have an obvious association in the causation of ACL injury. They found that subjects with elevated BMI had higher risk to develop ACL injuries. They looked at BMI as a modifiable risk factor and posterior tibial slope as non-modifiable risk factor and concluded that the BMI contributes in exacerbation of the positive correlation between posterior tibial slope and ACL injury risk.
- They also concluded that an increased fat body mass in a subject with already having a higher posterior tibial slope causes more chance of injury; while an increase in lean body mass may not exacerbate injury risk, rather it might even decrease the chance of injury.
- In our study cases had significantly more lean body mass (55.68 ± 7.68 vs 49.76 ± 8.68) and total body fat (18.08 ± 8.54 vs 13.13 ± 3.96) as compared to control group.

- Derraik et al reported an association between patients with elevated BMI and the progressive decrease in physical functions, therefore such a deficit can include patients who suffer from orthopaedic diseases such as ACL injuries.
- In a prospective study by Brophy et al, 246 patients were evaluated at the time of revision ACL reconstruction, and it was demonstrated that more varus alignment and elevated BMI were associated with worse chondral lesions in the medial compartment.
- BMI has also been found to be associated with other intra-articular injuries observed during ACL reconstructions. A higher BMI might increase the risk of ACL tear because of greater axial compressive force.

Our study showed that patients with elevated BMI had higher risk for developing ACL tear.

BMI is one of the modifiable risk factors, so understanding the relationship between these variables will give us an opportunity to improve the prevention strategies of ACL injuries.

Our study, though powered for difference in BMI in patients with and without ACL injury, had limitation of small sample size for sex based variations in BMI and its co-relation to ACL injury. Other confounding factors such as genetics, neuromuscular, hormonal, static bony alignment, environmental and level of competition stratification, also need to be considered.

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