

# Incidence of anterior cruciate ligament injury in a rural tertiary care hospital

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## ABSTRACT

**Introduction:** Knee is the largest joint in the human body with a very complex anatomy. It is a mobile trochoginglymus (i.e. a pivotal hinge joint), which permits flexion and extension as well as a slight medial and lateral rotation. Since the knee supports nearly the whole weight of the body, it is vulnerable to both acute injury and the development of osteoarthritis. The anterior cruciate ligament (ACL) is an important ligament for the proper movement of knee joint. ACL injury commonly causes knee instability than injury to other knee ligaments. **Conclusion:** In our study, we found the following: 1. Patients suffering from road traffic accidents have the highest rate of development of ACL injury department of Jawaharlal Nehru medical collage sawangi. 2. Twisting injuries/trivial fall injuries/injuries from fall on ground give the second highest numbers of ACL injuries in rural population. 3. Men are more prone to have ACL injury than women in rural population. 4. Patients falling in the age group of 16-25 years of age are more prone to have ACL injuries in rural population.

**Keywords:** ACL injury, anterior cruciate ligament injury, incidence, sports injury

## Introduction

Knee is the largest joint in the human body with a very complex anatomy. It is a mobile trochoginglymus (i.e. a pivotal hinge joint), which permits flexion and extension as well as a slight medial and lateral rotation.

The ligaments surrounding the knee joint offer stability by limiting movements, together with several menisci and bursae, shield the articular cartilage, and capsule. The knee permits flexion and extension about a virtual transverse axis, and a slight medial and lateral rotation about the axis of the lower leg in the flexed position. The total range of motion depends upon several parameters such as soft-tissue restraints, active insufficiency, and hamstring tightness.

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The anterior cruciate ligament (ACL) originates from the medial and anterior aspect of the tibial plateau and runs superiorly, laterally, and posteriorly toward its insertion on the lateral femoral condyle. The ACL consists of two major fiber bundles, namely anteromedial and posterolateral bundles. Together, these bundles provide approximately 85% of total restraining force of anterior translation.<sup>[1-4]</sup> The ligament is 31-35 mm in length and 31.3 mm in cross section. The primary blood supply to the ligament comes from the middle geniculate artery. The posterior articular nerve, a branch of the tibial nerve, transmits pain in the intrafascicular spaces.

Since the knee supports nearly the whole weight of the body, it is vulnerable to both acute injury and the development of osteoarthritis. The ACL is an important ligament for the proper movement of knee joint. ACL injury commonly causes knee instability than injury to other knee ligaments.<sup>[5]</sup>

Noncontact tears and ruptures are the most common causes of ACL injury. There are many ways the ACL can be torn; most

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prevalent is when the knee is bent too much toward the back and when it goes too far to the side. ACL tears can also happen in older individuals through slips and falls and are seen mostly in individuals over forty years of age due to wear and tear of the ligament. Tear in the ACL often takes place when the knee receives a direct impact from the front while the leg is in a stable position.

ACL failure has been linked to heavy or stiff-legged landing; as well as twisting or turning the knee while landing, especially when the knee is in the valgus position. The discrepancy has been attributed to differences between the sexes in anatomy, general muscular strength, reaction time of muscle contraction and coordination, and training techniques. Study suggests hormone-induced changes in muscle tension associated with menstrual cycles may also be an important factor.<sup>[6]</sup> Recent research also suggests that there may be a gene variant that increases the risk of injury.<sup>[7]</sup>

ACL injury has an annual incidence of more than 200,000 cases with 100,000 of these knees reconstructed annually. An estimated 70% of ACL injuries are sustained through noncontact mechanisms, while the remaining 30% result from direct contact.<sup>[8,9]</sup>

MRI has a higher accuracy than clinical examination in detecting ACL tears when multiple ligament injuries are involved.

## Objectives

To evaluate the incidence of ACL injury in Indian rural population who visit to the Department of Orthopedics in routine and emergency hours with the complaint of knee injury.

## Methodology

We conducted a study at the Orthopedics Department of AVBRH, Sawangi. Prior to study initiation, the protocol and informed consent documents were taken by the Institutional Ethics Committee 30/06/2018. Written informed consent was obtained from each study participant. We assessed all the patients who have been enrolled in AVBRH for knee injury and have been diagnosed with ACL tear by clinical methods and were supported with radiological (MRI) findings in the first part of the study and the study was continued prospectively for the assessment and analyses of the patients coming to the above-mentioned department.

### Clinical methods

Lachman test and anterior drawer test.

### Radiological method

MRI reports.

### Study setting

This study was conducted in the Department of Orthopedics of Acharya Vinoba Bhave Rural Hospital, DMIMS, Sawangi (Meghe), Wardha.

## Subjects

Patient attending AVBRH for knee injury.

## Study population

Patients of all age group.

## Type of study design

The study was conducted in two parts. In the first part of the study, the retrospective data of all the patients of ACL injury was collected and analyzed. In the second part, we continued the study prospectively and diagnosed, analyzed, and studied the patients visiting the orthopedic department on regular OPD and emergency days.

## Sample size

100 patients (by using nonrandomized purposive sampling we selected 100 patients in the study).

## Selection criteria

### Inclusion criteria

1. All the patients between 16 and 60 years of age admitted in our hospital for ACL injuries

### Exclusion criteria

1. Patient with active knee joint infection/additional bony injury.
2. Patient not willing for any treatment and follow-up.
3. Patient who is not willing to give consent for participation in the study.

## Consent

Prior to the examination of each patient, consent was taken.

## Data collection procedures

All the patients coming to the Department of Orthopedics with the complaint or history of knee injury were included in the study for observation, evaluation, and analysis.

## Plan of analysis

All adult patients who met the inclusion criteria were included in the study. Clinical history of each patient was recorded as per the proforma. Clinical details including risk factors, antibiotics given, complete hemogram, and other biochemical parameters were also recorded.

## Statistical analysis

The tabulation and cross-tabulation were done. Results are expressed in percentage. Statistical analysis was performed on the intent-to-treat (ITT) population. For statistical analysis, data was first entered in Microsoft excel database and subsequently processed by standard statistical software: Statistica version 6.

## Results

The patients included in the study were divided into age groups and then studied further.

**Table 1: Age distribution**

Age group	<25	25-34	35-44	45-54	>55
Count	54	50	25	21	4

Patients falling in the age group of 16-25 years of age, are more prone to have ACL injuries followed by the patients falling in the age group of 25-35 years of age [Table 1].

Out of 155 patients included in the study, 15 were female and 140 were male.

In our study, we found that 40% of the patients were affected on the left side, 59% on right side, and 1% on both the sides of the knees.

Out of 155 patients, 2 were affected on both the sides, 62 on left side, and 91 patients on the right side.

## Discussion

Over period of time many studies have been conducted on the incidence and mode of injury to the ACL. It has been proved by many foreign researches that injury to ACL is caused by mainly to the sports persons and is also termed as sports injury. But in our research, we found that road traffic accidents cause more incidence of ACL injury.

Several findings in our study differed significantly from the other reported studies. As other studies have mainly been done in urban population, we included only the rural population. The lifestyle of rural population differs from that of the urban. Hence, our study holds a great importance for rural urban population.

R. John *et al.* study: epidemiological profile study of sports-related knee injuries in northern India: An observational study at a tertiary care center found that the most common injury noted was the ACL tear accounting for a whopping 86.5% of the knee injuries, which was similar to our findings 70%.<sup>[10]</sup>

Waldén M *et al.* study: The epidemiology of ACL injury in football (soccer): a review of the literature from a gender-related perspective found female athletes having more incidence of ACL injuries than male athletes, which is contradictory to our study in which we have found male incidence of ACL injury has outnumbered females.<sup>[11]</sup>

Joseph AM *et al.* study: A multisport epidemiologic comparison of ACL injuries in high school athletics found that the most common mechanisms of injury were player-to-player contact (42.8%) and no contact (37.9%) which was not similar to our study where we found 70%. They also concluded that the ACL injury rates vary by sport, sex, and type of exposure. Recognizing such differences is important when evaluating the effectiveness of evidence-based, targeted prevention efforts.<sup>[12]</sup>

Rick P Csintalan *et al.* study: Incidence Rate of ACL reconstructions found that the highest number of knee injuries was seen in 20-to-29-year-old age group also, the number of males is higher than the number of females consistently throughout the years which is similar to our results where we have 90% male and 10% females.<sup>[13]</sup>

Nathan D. Schilaty *et al.* study: Incidence of Second ACL Tears and Identification of Associated Risk Factors From 2001 to 2010 Using a Geographic Database found that in both sexes, the highest prevalence of ACL injuries was between the ages of 17 and 25 years supporting our result.<sup>[14]</sup>

Ashwini Sankhe *et al.* study: MRI evaluation in knee joint injuries related to bike trauma show the highest incidence of injuries at an age of 21-30 years of age which was similar to our results where the incidence was highest between 24 and 35 years of age. Also, they found the right knee to be more injured than the left knee which was similar to our findings.<sup>[15]</sup>

Approximately 70-80% of ACL injuries occurs as noncontact injuries, defined by Myklebust *et al.* as an injury that occurs without any body-to-body contact which is contradictory to our results where we found that the road traffic accidents had the highest number of ACL injuries following injuries by fall on ground and twisting injuries.<sup>[16]</sup>

## Conclusion

In our study, we found the following

- Patients suffering from road traffic accidents have the highest rate of development of ACL injury.
- Twisting injuries/trivial fall injuries/injuries from fall on ground give the second highest numbers of ACL injuries.
- Men are more prone to have ACL injury than women.
- Patients falling in the age group of 16-25 years of age are more prone to have ACL injuries.

## Limitations of the Study

This study has many significant limitations. The most important one is duration of follow-up period. Our maximum follow-up of 2 months is too short. Most studies of this type have durations of at least of 2 years or more than 2-3 years. A longer follow-up is therefore desirable so that we may have more precise results.

Another significant limitation was the sample size in our study. A larger patient group would be preferable so that data is more valid and there would be more number of patients to study further subgroups.

## Relation to the journal

As this we know that ACL injury is known as a sports injury and this is probably because most of the studies have been done considering the urban population, where sport is a lifestyle and is played by most of the population. Here in this study we have specifically concentrated on the rural population (which

is majority in India) where sports is not a lifestyle and is not played by many. Yet, ACL injury is seen in a majority of the rural population without it being of a sports origin.

In this study we have found out other modes of injury which cause ACL tear and should be considered as a probable diagnosis in rural patients also. This study is important for primary care as it provides a basis for treatment and diagnosis in rural patients.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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