

ORIGINAL RESEARCH

A Prospective Observational Study to Assess Incidence Of Concomitant Knee Injuries Associated With ACL Tear During Sports In Patients Attending Tertiary Care Hospital

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ABSTRACT

Background: Sports injuries are common injuries resulting Anterior Cruciate ligament and associated injuries. The primary goal of this study was to determine the prevalence of concurrent knee injuries linked to ACL tears in athletes. **Material and Methods:** A prospective observational study was undertaken in department of Orthopaedics of a tertiary care centre. This study was undertaken among 100 cases treated at Jehangir hospital, Pune with knee injuries associated with ACL tear during sports. All the cases underwent thorough clinical examination and radiological assessment including X ray and MRI. Diagnostic arthroscopy was also performed and clinic – radiological findings were confirmed and final diagnosis was made. **Results:** Most common age group affected was 20 - 30 years with a mean age of 25.09 years. The male to female ratio was 1.56:1. Left knee was affected in more than half of the cases. About 70% of the cases had ACL associated injuries. Most common sports leading ACL injury was football. Meniscal injury was most common ACL associated injury in more than half of the cases. Other associated injuries included PCL tear, Osteochondral lesion, PLC injuries and bony fracture. **Conclusion:** This study had shown that, meniscal injury was the most common associated injury of ACL in sports persons.

Keywords: Sports Injury, Football, Anterior Cruciate ligament injury, Meniscal Injury, Collateral ligament injury.

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INTRODUCTION

The anterior cruciate ligament (ACL) is responsible for preventing translational and rotational load at the knee. Less than 10 percent of cases result in an isolated ACL injury. Therefore, more testing is required to determine whether ACL-related injuries are present.^{1, 2} Because of the anatomical and functional relationships between these tissues and the ACL, meniscal, articular cartilage, medial collateral ligament (MCL), and lateral collateral ligament (LCL) injuries are the most prevalent injuries associated with ACL tears. About 60% of concomitant meniscal injuries occur, articular cartilage injuries occur

between 16 and 46% of the time, and MCL and LCL injuries occur between 5 and 24% of the time.^{3, 4, 5}

Only few studies have described the effect of sports specific injury mechanisms on concomitant injuries during ACL rupture. Basketball and soccer players with ACL ruptures had their bone bruise patterns examined by Shi et al. They found no variations in the types of meniscal injuries or patterns of bone bruises between sports. Nevertheless, the site and kind of lesion were not mentioned in any of these investigations; instead, they only described the general incidence of meniscal and chondral injuries connected to ACL injuries. Furthermore, these

investigations did not involve elite athletes, in whom the mechanisms behind ACL injuries may differ from those observed in amateur sports.^{6,7}

This study was mainly undertaken to study the incidence of concomitant knee injuries associated with ACL tear during sports.

MATERIAL AND METHODS

A prospective study was conducted in a tertiary care hospital, Pune draining cases from all over the Pune district and western Maharashtra. All patients between 18 to 40 years age group treated at Jahangir hospital with knee injuries associated with ACL tear during sports presenting to the orthopaedic department. The study was conducted in Department of Orthopaedics at Jahangir hospital Pune.

Sample size was determined by using the effect sizes from the previously published study. About 100 patients were included under study group. The sample

size is calculated depending on previous data of the patients with similar injury presenting to department. A detailed case history was taken of all patients coming in outpatient department with suspected ACL tear and associated knee injuries after sports. Thorough clinical examination was done. The patients underwent radiological assessment by X-ray and MRI. About 100 patients of ACL tear after satisfying the inclusion and exclusion criteria were included in this study. Informed consent was taken before enrolling in the study. Routine preoperative investigations were conducted on patients undergoing surgery were underwent routine preoperative investigations. Knee examination was done under anaesthesia and findings noted. Diagnostic arthroscopy of knee was performed in a set protocol, Clinico-radiological findings confirmed and final diagnosis was made. The data was compiled and analysed using appropriate statistical methods.

RESULTS

Table 1: Demographic and clinical characteristics of the study group

Characteristics		Frequency	Percent
Gender	Male	61	61.0
	Female	39	39.0
Age group	<20 years	25	25.0
	20-30 years	60	60.0
	>30 years	15	15.0
Side affected	Right knee	43	43.0
	Left knee	57	57.0
Sports	Foot ball	61	61.0
	Basket ball	12	12.0
	Kabaddi	10	10.0
	Wrestling	6	6.0
	Volley ball	5	5.0
	Other	6	6.0

This study was a prospective observational study on 100 patients, who came with h/o knee injury after sports to the Department of orthopaedic surgery, Jehangir Hospital, Pune, suspected to have ACL and scheduled to undergo arthroscopy. This study included 18-40 years aged patients with ACL tear with h/o sports injury. Patients assessed clinically, radiologically and after diagnostic and/or therapeutic arthroscopy of knee, the diagnosis was confirmed and recorded. Salient features of study included most common age group was 20-30 years with mean age 25.09 years. Second most common age group was 18–

20 years. Male: female ratio is 1.56:1. Male patients predominated in study; there were 61% male and 39% female patients. Left knee affected commonly (57%) of the cases, both in males and females. About 30 patients (30%) were diagnosed to have isolated ACL tear. About 70 patients (70%) had any one of the associated structure of knee injured. Most common sport leading to ACL tear was football, comprising of 61% of cases. Followed by basketball in 12% of cases. But the distribution of incidence of overall ACL tear with associated injuries did not differ significantly across various types of sports.

Table 2: Lesion characteristics

Lesion characteristics	ACL tear only	30	30.0
	ACL with associated injuries	70	70.0
Associated injury	Meniscus	55	55.0
	Collateral ligament	16	16.0
	Posterior cruciate ligament	3	3.0
	Osteochondral fracture	27	27.0
	Posterolateral Corner Injuries	8	8.0
	Associated fracture	5	5.0

Meniscus affected	Medial Meniscus	21	21.0
	Lateral Meniscus	30	30.0
	Both meniscus	04	4.0
	Total meniscus Injured	55	55.0

About 30% of patients were diagnosed to have isolated ACL tear. About 70% of patients had any one of the associated structure of knee injured. In this study, meniscus injury (55%) was the most common finding associated with ACL tear. Out of 55 cases of meniscal tear, lateral meniscus (30%) was the most common meniscus affected. Medial meniscus tear was seen in 21% cases, and 4% had tear in both menisci.

Table 3: Part of meniscus Injured

Part of meniscus affected	Anterior horn	Posterior horn	Body	Total
Medial meniscus	2 (9.5)	13 (61.9)	6 (28.6)	21 (100)
Lateral meniscus	3 (10.0)	22 (73.3)	5 (16.7)	30 (100)

Posterior horn of the medial meniscus was affected in 61.9% of the cases and body in 28.6% of the cases. Posterior horn of the lateral meniscus was affected in 73.3% of the cases and body was affected in 16.7% of the cases.

Table 4: Collateral ligament injury

	NO OF ACL	Percentage Of Patients With Collateral Injury
MCL	12	12%
LCL	4	4%
TOTAL	16	16%

Medial collateral ligament was affected in 12% of the cases and lateral collateral ligament in 4% of the cases.

DISCUSSION

This study was undertaken in order to study the associated injuries of ACL in sports injuries. The impact of sports-specific injury mechanisms on concurrent injuries during ACL rupture has only been briefly discussed in a few publications. Shi et al. looked at the bone bruise patterns of basketball and soccer players who had ruptured their ACLs. There were no differences observed between sports in the kinds of meniscal injuries or the patterns of bone bruising. However, none of these studies addressed the specific location or kind of lesion; rather, they merely reported the overall frequency of meniscal and chondral injuries associated with ACL injuries. Furthermore, professional athletes may have different mechanisms underlying ACL injuries than those seen in amateur sports, and these investigations did not include them.^{6,7}

The study's standout characteristics were a mean age of 25.09 years and a most prevalent age group of 20–30 years. The second most popular age range was 18 to 20 years old. The ratio of men to women is 1.56:1. Sixty-one percent of the patients in the study were male, whereas just 39 percent were female. Males and girls alike had left knee impairment in 57% of cases. It was determined that about 30 patients (30%) had an isolated ACL injury. About 70 individuals (about 70%) experienced injuries to any one of the related knee structures. Football was the most common sport associated with ACL tears (61% of cases). Basketball in 12% of the cases. However, there was little difference in the incidence of ACL tears overall and related injuries among other sports. A study by Torgutalp had shown that, the mean age of the cases was 27.2 years and football was the most common sports discipline.⁸ Granan et al. identified football as

the most common sport linked to ACL injuries in a study analysing patient demographics and injury trends at the time of ACL reconstruction by activities that cause ACL injuries.⁹

It was determined that about 30% of patients had an individual ACL injury. Approximately 70% of patients suffered from injuries to any one of the related knee structures. Meniscus damage (55%) was the most often found finding in this study linked to an ACL tear. The most often damaged meniscus (30%) out of 55 cases of meniscal tears was the lateral meniscus. Of the cases, 21% had a medial meniscus tear and 4% had a tear in both menisci. A study by Torgutalp et al had also shown that, Meniscal injury was found in more than half of the patients similar to these study findings.⁸ A study by Mansori et al also reported similar findings. The medial meniscus is sensitive to anterior-posterior shear stresses because it is believed to be the knee's secondary stabiliser following the ACL against the tibia's anterior displacement.¹⁰

In 61.9% of the instances, the posterior horn of the medial meniscus was damaged, and in 28.6% of the cases, the body. In 73.3% of the cases, the lateral meniscus's posterior horn was damaged.

In 12% of the cases, the medial collateral ligament and 4% of the lateral collateral ligament were injured. A study by Torgutalp et al had found no significant difference of MCL and LCL injuries.⁸ ACL disruption may later result in related injuries, which could alter knee kinematics because of joint instability.¹¹ Patients with a partial tear are likely to have relatively less mechanical instability in their knees than those with a total tear. Fayard et al. evaluated the risk variables for a partial ACL tear to develop into a full tear in a study. The authors examined 41 individuals with partial ACL tears who were involved in sports but did not have

concurrent meniscal or chondral abnormalities on MR imaging. Researchers discovered that 39% of patients with a partial ACL injury went on to develop a total ACL rupture, with half of those patients presenting with a concurrent meniscal lesion at the time of repair. Given the results of our investigation and those of Fayard et al.^{12,13}

CONCLUSION

This study had shown that, football was the main sport resulting in ACL associated injuries. In acute ACL injury, meniscal injuries are most common, among which lateral meniscus especially posterior horn of lateral meniscus being most common.

REFERENCES

- Lam MH, Fong DT, Yung PSh, Ho EP, Chan WY, Chan KM. Knee stability assessment on anterior cruciate ligament injury: Clinical and biomechanical approaches. *Sports Med Arthrosc Rehabil Ther Technol*. 2009 Aug 27; 1 (1):20.
- Spindler KP, Wright RW. Anterior cruciate ligament tear. *N Engl J Med*. 2008; 359 (20):2135-42.
- Brophy RH, Zeltser D, Wright RW, Flanigan D. Anterior cruciate ligament reconstruction and concomitant articular cartilage injury: Incidence and treatment. *Arthroscopy*. 2010; 26(1):112-20.
- Noyes FR, Bassett RW, Grood ES, Butler DL. Arthroscopy in acute traumatic hemarthrosis of the knee. Incidence of anterior cruciate tears and other injuries. *J Bone Joint Surg Am*. 1980; 62(5):687-95.
- Spindler KP, Schils JP, Bergfeld JA, Andrich JT, Weiker GG, Anderson TE, et al. Prospective study of osseous, articular, and meniscal lesions in recent anterior cruciate ligament tears by magnetic resonance imaging and arthroscopy. *Am J Sports Med*. 1993; 21 (4):551-7.
- Shi H, Ding L, Jiang Y, et al. Comparison between soccer and basketball of bone bruise and meniscal injury patterns in anterior cruciate ligament injuries. *Orthop J Sport Med*. 2021;9(4):2325967121995844.
- Urabe Y, Ochi M, Onari K, Ikuta Y. Anterior cruciate ligament injury in recreational alpine skiers: analysis of mechanisms and strategy for prevention. *J Orthop Sci Off J Japanese Orthop Assoc*. 2002;7(1):1-5.
- Torgutalp SS, Donmez G, Korkusuz F. Incidence rates of injuries associated with anterior cruciate ligament tear diagnosed by magnetic resonance imaging: A retrospective cohort study. *Turk J Sports Med*. 2021;56(1):33-7.
- Granan LP, Inacio MCS, Maletis GB, Funahashi TT, Engebretsen L. Sport-specific injury pattern recorded during anterior cruciate ligament reconstruction. *Am J Sports Med*. 2013;41(12):2814-8.
- Mansori A El, Lording T, Schneider A, Dumas R, Servien E, Lustig S. Incidence and patterns of meniscal tears accompanying the anterior cruciate ligament injury: possible local and generalized risk factors. *Int Orthop*. 2018;42 (9):2113-21.
- Dargel J, Gotter M, Mader K, Pennig D, Koebke J, Schmidt-Wiethoff R. Biomechanics of the anterior cruciate ligament and implications for surgical reconstruction. *Strategies Trauma Limb Reconstr*. 2007;2(1):1-12.
- Dordevic M, Hirschmann MT. Biomechanics of the Knee After Complete and Partial ACL Tear. Anterior Cruciate Ligament Reconstruction. In: Siebold R, Dejour D, Zaffagnini S, editors. Anterior Cruciate Ligament Reconstruction. Berlin, Heidelberg: Springer; 2014. p. 55-7.
- Fayard JM, Sonnery-Cottet B, Vrgoc G, O'Loughlin P, de Mont Marin GD, Freychet B, et al. Incidence and risk factors for a partial anterior cruciate ligament tear progressing to a complete tear after non-operative treatment in patients younger than 30 years. *Orthop J Sport Med*. 2019;7(7): 2325967119856624.