



Original Article

Mechanism of Meniscal Injury and its Impact on Performance in Athletes

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ABSTRACT

Background: In today's life style, the gap between athletic activities and daily life activities is becoming wider. The daily life routine is becoming sedentary due to technology and sports activities and thus require high level of physical performance. Knee joint is the most vulnerable to rapid forces and injuries, in which meniscal injury is quite noticeable. **Objective:** To determine the mechanism of meniscal injury and its impact on performance in athletes after knee meniscal injury. **Methods:** After taking approval from ethical committee, consent was taken from the athletes prior to filling out the forms. The study was conducted on 145 male athletes in Lahore, aged between 17 to 40 years. Data was collected through international knee documentation committee subjective knee form which consisted of demographical data and questions which were divided into three sections; symptoms, sports activities and knee functions. **Results:** The main results regarding the mechanism of meniscal injury showed that there were 29% athletes having insidious tear, 16.6% acute noncontact, 32.4% contact with player and 22.1% non-specific mechanism of tear. The mean and standard deviation of total international knee documentation committee score was found to be 66.64 ± 3.83 , reflecting a moderately affected level of performance. **Conclusion:** The findings concluded that the common mechanism of meniscal injury was during contact with player or defense strategy during activity. The athletic performance level due to meniscal injury was moderately affected.

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INTRODUCTION

Medial and lateral menisci are important in knee joint due to their capacity to absorb stress and help in the function of this joint. Accidents may alter the biomechanics of the knee joint and cause pain.¹ Meniscal tears are the most prevalent knee disorder, followed by meniscal cysts. The first injury is induced by trauma, and the second by deterioration of the meniscus. A meniscal cyst may manifest with symptoms and indications similar to those of a common meniscal illness. Meniscal injuries represent around 15% of all sporting injuries.² Meniscal damage can cause partial or complete tears to the medial and lateral menisci. Medial tears are far more common than lateral tears.

In addition to meniscal tears caused by sports, osteoarthritis can weaken and destroy the meniscal structure, which can lead to spontaneous meniscal tears.³ Studies on the epidemiology of meniscal lesions are constrained by the likelihood that many of these lesions remain undiscovered. This is because tears in the meniscus do not always show the usual signs and some can heal on their own.⁴ Males are more susceptible to meniscal injuries because they engage in more physically demanding activities. Bucket-handle lesions are trauma-induced and are more prevalent in men than in women.⁵

The menisci are two crescent-shaped fibrocartilagenous structures that exist in the knee. They are located between the femoral condyles and the tibial plateau.⁶ The anterior and posterior meniscal horns of the meniscus are related to the tibial plateau's intercondylar prominence. The existence and proper function of the coronary ligaments are required for the establishment of peripheral attachments between the tibial plateau and the meniscal rim on each side of the knee.⁷ The anterior cruciate ligament connects to the tibia roughly 6 to 7 mm anterior to the attachment

of the anterior horn of the medial meniscus's fan-shaped insertional ligament. The anterior portion of the medial meniscus contains this ligament.⁸ The instability of the torn section of the meniscus causes the symptoms that accompany a meniscal tear induced by trauma. If the "bucket handle" tendon is ruptured, the knee may become immobilized or locked as a result of these symptoms. When a torn section of the meniscus travels beneath the femoral condyle, the joint may pop or click.⁹ Discomfort in the medial or lateral compartment of the knee, which may occur on either side of the knee depending on which compartment is afflicted, is one of the most uncomfortable symptoms of this condition.

This pain is caused by a rise in joint capsule tension that isn't normal and is making it worse.¹⁰ Athletic performance, advanced age, male gender and history of osteoarthritis may all increase the risk of meniscal rupture in the knee. Being overweight, engaged in excessive exercise, lacking sufficient muscular strength and having a varus or valgus deformity of the lower leg all enhance the likelihood of developing this condition. Meniscal tears are linked to an increased risk of developing knee osteoarthritis.¹¹ A positive Lachman test may result and physical examination findings lead to the diagnosis of anterior knee instability.¹² Magnetic resonance imaging provides the most comprehensive diagnostic picture after the knee injury.¹³

This imaging method is not only cost-effective but it may also help doctors figure out what's wrong and give them more treatment options. Young athletes with meniscal tears do not respond well to conservative therapy and meniscal injuries almost always need surgical repair. The correction of a meniscal lesion in younger individuals should be highly considered if the rupture is both peripheral and longitudinal.¹⁴ This condition should be addressed in conjunction with anterior cruciate ligament repair. To avoid quadriceps atrophy,

physiotherapy is a kind of conservative treatment that emphasizes quadriceps muscle activation.¹⁵ When there is a partial or stable tear in an area where blood flow is present, this therapy has the best chance of success.¹⁶ The vast majority of meniscal tears heal on their own without the need for therapy.¹⁷

METHODS

After taking approval from ethical committee, consent was taken from the athletes prior to filling out the forms. Data was collected from sports academies and rehabilitation centers providing sports rehabilitation in Lahore and the study was conducted on 145 male athletes, aged between 17 to 40 years using non-probability convenient sampling technique. Athletes having previous history of lower limb fracture and knee osteoarthritis were excluded from this study.

Data was collected through international knee documentation committee (IKDC) questionnaire consisted of demographical data and questions which were divided into three sections; symptoms, sports activities and knee function. After taking informed written consent, data was collected through IKDC subjective knee form. The total functional score of the patient with meniscal injury was calculated with the help of this questionnaire.

The data was analyzed using IBM SPSS statistics 25. The quantitative variables were presented as mean and standard deviation with histogram. Categorical variables were presented as frequencies, percentages with bar or pie chart.

RESULTS

The results regarding age and body mass index (BMI) showed that mean and standard deviation was 28.303 ± 6.37 and 23.83 ± 1.47 , respectively. The results regarding affected knee showed that in 52.4% athletes, right knee

was affected while in those of 47.6% athletes left knee was affected. The results regarding mechanism of meniscal tear showed there were 29% athletes having insidious tear, 16.6% acute noncontact, 32.4% contact with player and 22.1% non-specific mechanism of tear. The results regarding activity at onset showed that there were 16.6% athletes having insidious, 16.6% offense, 18.6% general game, 24.1% defense and 24.1% others activity at onset. The results regarding descriptive statistics of frequency, pain severity, and knee function before and current found to be 4.406 ± 1.13 , 4.48 ± 1.11 , 6.83 ± 1.42 and 7 ± 1.44 , respectively while the total score

Table I: Frequency & Percentage of Mechanism of Meniscal Tear

Mechanism of Meniscal Tear	Frequency	Percentage
Insidious	42	29.0%
Acute-noncontact	24	16.6%
Contact with player	47	32.4%
Non-Specific	32	22.1%

Table II: Frequency & Percentage of Activity at Onset

Activity at Onset	Frequency	Percentage
Insidious	24	16.6%
Offense	24	16.6%
General game	27	18.6%
Defense	35	24.1%
Other	35	24.1%

of IKDC found to be 66.64 ± 3.83 , reflecting a moderately affected level of performance.

DISCUSSION

The aim of study was to find the mechanism

Table III: Frequency & Percentage of Level of activity without pain

Level of activity without pain	Frequency	Percentage
Moderate Activities	48	33.1%
Strenuous Activities	46	31.7%
Very Strenuous	51	31.7%

Table IV: Mean and Standard Deviation of different variables

	Mean	S±D
Since your injury or in past 4 weeks, Intensity of your pain	4.41	1.13
Pain Severity	4.48	1.11
Knee Function before injury	6.83	1.42
Current Knee Function	6.83	1.42
Total IKDC Score	66.64	3.83

of meniscal injury and its impact on performance in athletes after knee meniscal injury. The major findings in this study is that great majority of athlete's injury reports are epidemiology studies. These studies do not dive into the details of injuries, such as which ligament was damaged or how meniscal injuries are classified; rather, they offer just the frequency of injuries. the incidence of injuries is given as a percentage of total injuries.¹⁸ This is due to the fact that Olympic competition in individual sports is less fierce.

It would be necessary to review publications produced by specialized knee surgery units that have reported on the outcomes of injuries sustained by elite athletes in order to obtain

information regarding the sub classifications of meniscal injuries, as well as their respective treatments and prognoses. These athletic injuries, on the other hand, would not be restricted to the Olympics, but would also occur in other sports and training sessions. As a result, based on the data, specifics about meniscal injuries.

Body mass index was shown to be a statistically significant predictor of meniscal injury risk. Athletes with a BMI greater than 25.0 had a higher risk of injury compared to those with a lower BMI. Athletes with a BMI greater than 25.0 were also significantly more likely to tear their lateral meniscus than their medial meniscus. When determining whether a player is "overweight" or "obese," traditional BMI calculations should be avoided whenever possible, especially when the athlete in question is a professional athlete.^{19,20} Because the average athlete is taller than the general population, the BMI cutoffs used to define overweight and obesity in the general population may not be applicable in this context.

Despite accounting for these health distinctions, the numbers reported in this study are still accurate when considering the risk of isolated meniscal tears. Unlike a previous study, which found that basketball players in the general population had an unusually high meniscal injury rate of 80% in the right knee, the professional players in this study had more evenly distributed isolated meniscal injuries, with 53.5% occurring on the right side and 46.5% occurring on the left side. Because of the professional character of the players, both the left and right knees are conditioned to their maximum capacity, but in the general population, as Baker et al. expected, a dominant knee is more likely to arise.

It was also noteworthy to see that isolated lateral meniscal tears happened more often on the right knee, while isolated medial meniscal tears occurred more frequently on the left

knee.^{21,22} Activities of daily living were found to be quite easy. Almost in all activities at three days reported that there is moderate to none difficulty in performing daily life activities. The total score of IKDC showed that overall performance of athletes was only moderately affected. The performance level shown by athletes it was much better than expected. It was also better as compared to previous studies.²³ Main reason of such a high-performance level would be being not aware of meniscal injury and athletes continues to play without calculating the possible bad impact of on their long-term performance. This also shows that placebo effect made athletes perform better.^{24,25} The mechanism of meniscal injury and activity and onset of meniscal injury show that injury occurred at time of game rather than during practice. However, practice has indirect impact on incidence of injury innovate add more the practice is, the less are the chances of injury during the game.²⁶

CONCLUSION

The findings concluded that the common mechanism of meniscal injury was during contact with player or defense strategy during game. The athletic performance level due to meniscal injury was moderately affected.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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Authors' contributions: All authors read and approved the final manuscript.

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