Frequency of Different Ligament Tears in Knee Injury On Magnetic Resonance Imaging

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Abstract:
Background: MRI had been useful in the diagnosis of ligament injuries and the tears were detected by non-invasive procedure. Objective: To determine the frequency of different ligament tears in knee injury on Magnetic Resonance Imaging. Methods: A descriptive cross-sectional was conducted with the sample size of 206 patients of both genders by selecting the convenient sampling from Ghurki Trust Teaching Hospital, Lahore. Out of 206 patients, 157 were males while 49 were females. Data was analyzed with the help of SPSS version 24. The results were derived by mean, frequency and standard deviation. Results: Findings shows that among 206 patients, with in age limit of 12 years to 70 years. 157(76.2%) were males and 49(23.7%) were female while 96(46.6%) were presented with ACL tear, 19(9.2%) were presented with PCL tears, 51(25.7%) were presented with MCL tears, 33(16.0%) patients were presented with LCL tears and all of these 206 patients were suffering from pain. Conclusion: We concluded that males are more prevalent than females and in this population the incidence of ACL tears is more than other ligament tears. Hence, ACL is proved to be the most injured ligament. Keywords: Anterior cruciate ligament, Posterior cruciate ligament, Medial collateral ligament, Lateral collateral ligament and Magnetic resonance imaging.

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Introduction
The largest joint in the body is knee joint which consist of vast network of ligaments and muscles. The most frequently injured joint in the body is knee joint. The presence of ligament provide greater stability to the knee joint1. Anterior cruciate ligament is the main component in the knee joint because it withstand anterior and tibial movement and rotational loads and often injured structure and does not recover when torn2. Due to higher prevalence during sporting exertion, Anterior Cruciate Ligament injury is significant harm to knee joint and also leave the subject with immobilize joint during physical exertion3. The presence of ligament provide greater stability to the knee joint. In the united states ACL injuries occur between 100000 to 200000 per year this shows that ACL is the most frequently injured ligament and mostly soccer players are at high risk of ACL injuries(53% of total) with athletes and skiers are also prone to ACL injuries4. The anatomy of lateral collateral ligament is based on two attachment one is attachment of femur and the other is attachment of tibia and medial collateral ligament is also called tibial Collateral ligament and dense medial side of the joint capsule which is deep as compared to the superficial medial collateral ligament form the deep medial collateral ligament which comprises of meniscofemoral and meniscotibial constituent5. When intact, the superficial medial collateral ligament is the foremost immobile stabilizer to valgus deformity as compared to deep medial collateral ligament although when superficial medial collateral ligament is damaged, the major role of deep medial collateral ligament is to act as stabilizer in providing greater flexion angles and postermomedial capsular is deeper in extension6. The anatomy of lateral sides of knee is complicated pattern of stationary (ligament) and mobile (tendons and muscles) stabilizing framework and the entanglement of anatomy is because of progressive changes in the anatomic affiliation of fibular head, the popliteal tendon and the biceps femoris muscle, the role of the ligament is kind of mosaic and there essential act is to prevent abnormal motion7. For the evaluation of acute knee ligament tears, Magnetic resonance imaging scan have been seen to be greatly effective8. When Magnetic resonance imaging implemented right after the injury it shows to be the most accurate imaging technique for the knee and also helps those patients who need further treatment9. Magnetic Resonance Imaging has immense effect on musculoskeletal scanning to often visualize the knee and signifies in those with suspicious damage of the menisci and cruciate ligament, Magnetic resonance imaging aids in evaluating the knee injuries due to its high soft tissue resolution10.

In this study we had investigated the accuracy of MRI in those patients suffering with ligament (ACL, PCL, LCL and MCL) tears of the knee joint.
Methods
In this descriptive cross sectional study, 206 patients with history of pain were included all the patients had been collected from Ghurki Trust Teaching Hospital Lahore. After informed consent data were collected through 0.35 Tesla Hitachi machine. Patients having pain and with age ranging from 12 to 70 years were included. Tears of Anterior cruciate ligament, Posterior cruciate ligament, lateral collateral ligament and medial collateral ligaments were identified. T1, T2, proton density, axial and sagittal sequences were used to obtained images of knee ligaments.

Discussion
In the current study, it is depicted that out of total 206 patients whose age ranges from 12 years to 70 years were presented with pain. Out of these 206 patients, 157(76%) patients were males and 49(23.7%) were females. Among these 96(46.6%) were presented with ACL tears out of which 86(94.9%) were males and 10(10.41%) were females. Males showed increased incidence than females in ACL tears. These findings are similar to the study conducted by Singh Ap et.al which shows that total 75 patients were included out which 50(66.6%) appears to be males and the rest 25(33.3%) were females. ACL tears were appeared in 36(48%) patients. Males are shown to be more prevalent than females. Current results were compared with similar study performed by Choi WR et.al in 2019. Out of 148 patients with anterior cruciate ligament rupture, 145 patients injured, among them 41 patients were found to be females and 107 patients were male. This result also described that males are more sufficiently affected than females. Similarly result of previous study conducted by Selcan Koc in 2019, according to their study they took 102 patients out of which 46 (45.1%) patients had anterior cruciate ligament injuries.

This study showed that out of total 206 patients who clinically presented with pain(9.2%) patients had PCL tears among which 18(95.7%) were males and 1(5.2%) was female. Males are greatly affected than females. These findings are similar to the results of study conducted in 2007 by Laprade et.al. In their study they took 187 subjects among these 11(5%) had PCL tears. We correlate our results with a study conducted by JS. Grover which shows that they take 4364 football players from 51 teams. Out of these players 130(3%) presented with MCL injuries.

According to the present study, 33(16%) patients were presented with LCL tears among which 30(90.9%) were found to be Males and 3 (9.09%) were females. Similar results were related to the study by Singh Ap et.al during June 2018, which depicted that 2 (2.6%) patients were presented with LCL tears, the age group, which is mostly, affected range from 21 to 40 years, and the least affected group was 61 to 80 years. This finding is also similar with the study conducted in 2007 by Laprade et.al, which shows that out of 187 subjects which were taken for study 4(2.1%) subjects had LCL tear.

Results
Findings shows that among 206 patients, 157(76.2%) were males and 49(23.7%) were female while 96(46.6%) were presented with ACL tears, 19(9.2%) were presented with PCL tears, 51(25.7%) were presented with MCL tears, 33(16.0%) patients were presented with LCL tears. All of these 206 patients were suffering from pain.

Table no.1: Frequency distribution of different ligament tears

| No. of tears | ACL | PCL | MCL | LCL |
|--------------|-----|-----|-----|-----|
| YES          | 96  | 19  | 51  | 33  |
|              | 46.6% | 9.2% | 24.7% | 16.0% |
| NO           | 110 | 187 | 155 | 173 |
|              | 53.3% | 90.7% | 75.2% | 83.9% |

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This pie chart showing percentages of ACL (48%), PCL (9%), MCL(26%), LCL(17%) tears.

Table no 2: shows Descriptive Statistics

|                  | N   | Minimum | Maximum | Mean  | Std. Deviation |
|------------------|-----|---------|---------|-------|----------------|
| No of tears      | 206 | .00     | 4.00    | .9660 | 1.01396        |
| Age              | 206 | 12.00   | 70.00   | 32.8641 | 12.47010    |
| Valid N (listwise)| 206 |         |         |       |                |

Table no.2 shows that those patients included have minimum (0.00) tears and maximum (4.00) tears. Patients with minimum age of 12 years and maximum age of 70 years are included.

Table no.3: Shows Gender distribution

|      | Frequency | Percent | Valid Percent | Cumulative Percent |
|------|-----------|---------|---------------|--------------------|
| Valid|           |         |               |                    |
| F    | 49        | 23.8    | 23.8          | 23.8               |
| M    | 157       | 76.2    | 76.2          | 100.0              |
| Total| 206       | 100.0   | 100.0         |                    |

Table no.3 shows that out of total 206 patients 49(23.8%) were females and 157(76.2%) males were included.

Conclusion
We concluded that males are more prevalent than females and in this population the incidence of ACL tears is more than other ligament tears. Hence, ACL is proved to be the most injured ligament.

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