

## ORIGINAL RESEARCH

### Assessment of knee joint pathologies using magnetic resonance imaging

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#### ABSTRACT

**Background:** MR examination, a non-invasive modality, is now routinely used to assess a wide spectrum of internal knee derangements and articular disorders. The present study was conducted to assess the efficacy of MRI in evaluation of knee joint pathologies.

**Materials & Methods:** 70 patients with painful knee joint of both genders underwent MRI of knee joint with 1.5 Tesla high gradient MRI scanner. T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal and sagittal planes and fat suppressed T2 or STIR sequences were recorded.

**Results:** Out of 70 patients, males were 45 and females were 25. Common knee pathologies were anterior cruciate ligament tear in 12, posterior cruciate ligament tear in 8, chondromalacia patellae in 5, rheumatoid arthritis in 7, medial collateral ligament tears in 10, lateral collateral ligament tears in 8, medial meniscal tears in 5, lateral meniscal tears in 5, osteochondritis dissecans in 6 and infection in 4 patients. The difference was significant ( $P < 0.05$ ).

**Conclusion:** MRI is an accurate and cost-effective radiographic aid useful in diagnosis of painful knee. Common knee pathologies were anterior cruciate ligament tear, posterior cruciate ligament tear, chondromalacia patellae, rheumatoid arthritis, medial collateral ligament tears, lateral collateral ligament tears, medial meniscal tears, lateral meniscal tears, osteochondritis dissecans and infection.

**Key words:** Arthroscopy, Knee, MRI

#### INTRODUCTION

Arthroscopy is considered “the gold standard” for the diagnosis of traumatic intraarticular knee lesions. However, arthroscopy is an invasive procedure that requires hospitalization and anesthesia, thus presenting all the potential complications of a surgical procedure.<sup>1</sup> Since its introduction in the 1980s, magnetic resonance imaging (MRI) has gained in popularity as a diagnostic tool for musculoskeletal disorders. Many surgeons believe that MRI is an accurate, non-invasive method to diagnose knee injuries, and gives sufficient information to support decisions for conservative treatment and save a patient from unnecessary arthroscopy.<sup>2</sup>

The value of magnetic resonance imaging (MRI) for imaging the knee was apparent almost immediately after the introduction of this modality in the early 1980s.<sup>3</sup> With the introduction of special closely coupled extremity coils, high field systems, open systems, extremity units and other technical advances, the utility of MRI in the knee has expanded dramatically.<sup>4</sup> MR examination, a non-invasive modality, is now routinely used to assess a wide spectrum of

internal knee derangements and articular disorders and has virtually replaced conventional arthrography in the evaluation of menisci and cruciate ligaments, decreasing both morbidity and costs associated with negative arthroscopic examinations.<sup>5</sup> MR imaging has also proved valuable in the selection of surgical candidates and in preoperative planning.<sup>5</sup> The decrease in the cost of MR knee studies has also contributed to their acceptance by the orthopaedic community as a non-invasive replacement for arthrography and non-therapeutic arthroscopy.<sup>6</sup> The present study was conducted to assess the efficacy of MRI in evaluation of knee joint pathologies.

## MATERIALS & METHODS

The present study was consisted of 70 patients with painful knee joint of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. All underwent MRI of knee joint with 1.5 Tesla high gradient MRI scanner. T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal and sagittal planes and fat suppressed T2 or STIR sequences were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## RESULTS

**Table I Gender wise distribution**

Total- 70		
Gender	Males	Females
Number	45	25

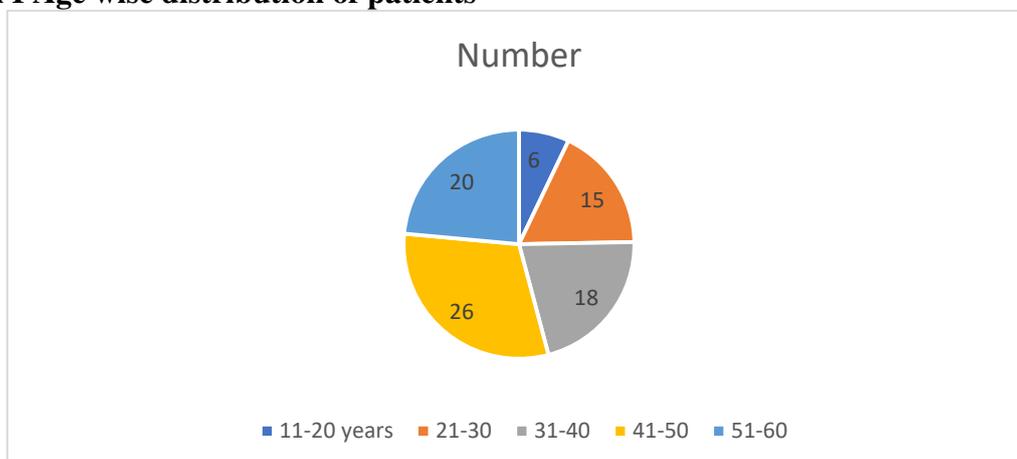
Table I shows that out of 70 patients, males were 45 and females were 25.

**Table II Age wise distribution of patients**

Age group (Years)	Number	P value
11-20	6	0.04
21-30	15	
31-40	18	
41-50	26	
51-60	20	

Table II, graph I shows that age group 11-20 years had 6, 21-30 years had 15, 31-40 years had 18, 41-50 years had 26, 51-60 years had 20 patients. The difference was significant (P< 0.05).

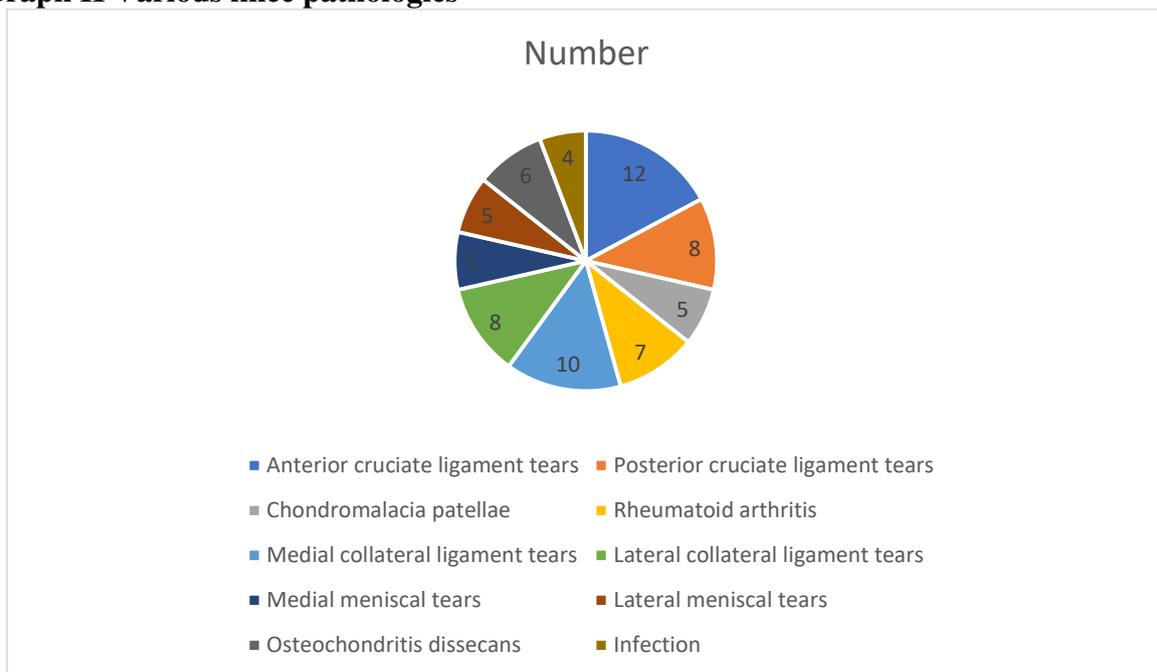
**Graph I Age wise distribution of patients**



**Table III Various knee pathologies**

Knee pathologies	Number	P value
Anterior cruciate ligament tears	12	0.05
Posterior cruciate ligament tears	8	
Chondromalacia patellae	5	
Rheumatoid arthritis	7	
Medial collateral ligament tears	10	
Lateral collateral ligament tears	8	
Medial meniscal tears	5	
Lateral meniscal tears	5	
Osteochondritis dissecans	6	
Infection	4	

Table III, graph II shows that common knee pathologies were anterior cruciate ligament tear in 12, posterior cruciate ligament tear in 8, chondromalacia patellae in 5, rheumatoid arthritis in 7, medial collateral ligament tears in 10, lateral collateral ligament tears in 8, medial meniscal tears in 5, lateral meniscal tears in 5, osteochondritis dissecans in 6 and infection in 4 patients. The difference was significant ( $P < 0.05$ ).

**Graph II Various knee pathologies**

## DISCUSSION

Magnetic resonance imaging (MRI) has become the most important modality for assessment of pathologic changes in knee cartilage, in both clinical and research environments.<sup>7</sup> One of the major advantages of MRI is that it allows the manipulation of contrast to highlight different tissue types.<sup>8</sup> The new surgical and pharmacologic options available to treat damaged cartilage and the need to monitor the effects of treatment, have led to the development of various MRI techniques that allow morphologic assessment of cartilage, quantification of its volume and evaluation of its biochemical composition.<sup>9</sup> MRI, by virtue of its superior soft-tissue contrast, lack of ionizing radiation and multiplanar capabilities, is superior to more conventional techniques for the evaluation of articular cartilage.<sup>10</sup> Hence, MRI is the most important imaging modality for the evaluation of traumatic or degenerative

cartilaginous lesions in the knee.<sup>11</sup>The present study was conducted to assess the efficacy of MRI in evaluation of knee joint pathologies.

In this study, out of 70 patients, males were 45 and females were 25. Shah et al<sup>12</sup> conducted a study on 150 patients. All patients were subjected to radiograph of knee anterior-posterior and lateral view. MRI was performed. Articular cartilage defect was found in 90 patients (60%). Out of 90 patients with articular cartilage defect, 30 patients (20%) had full thickness cartilage defects. Subchondral marrow edema was seen beneath 30 patients (20%) with articular cartilage defects. 32 patients (21.1%) had a complex or macerated meniscal tear. Complete anterior cruciate ligament tear was found in seven patients. Joint effusions were detected in 70% (105) of the knees. Large Baker cysts were observed in 6.1% of the knees.

We observed that age group 11-20 years had 6, 21-30 years had 15, 31-40 years had 18, 41-50 years had 26, 51-60 years had 20 patients. Bansal et al<sup>13</sup> evaluated knee MRI and found that meniscal tears were the commonest soft tissue abnormality found in our study. Tears involved posterior horn of the medial meniscus more commonly and were mostly Grade 2. Vertical tears were the commonest type of meniscal tear and were associated with a history of trauma. Tear was the commonest pathology affecting the ACL, most being acute in nature. Partial PCL tear was the commonest PCL pathology. One-third of the patients had bone contusion and tibia was more commonly involved followed by lateral femoral condyle. Acute ACL tears were usually associated with bone contusions. Popliteal cyst was the commonest cystic lesion and was associated with effusions and meniscal tears.

We found that common knee pathologies were anterior cruciate ligament tear in 12, posterior cruciate ligament tear in 8, chondromalacia patellae in 5, rheumatoid arthritis in 7, medial collateral ligament tears in 10, lateral collateral ligament tears in 8, medial meniscal tears in 5, lateral meniscal tears in 5, osteochondritis dissecans in 6 and infection in 4 patients. Avcu et al<sup>14</sup> examined the relationship between the pathological findings and the age and sex of the patients. The ages of the patients ranged between 1 and 74 years. Age was significantly correlated with meniscal degeneration and tears, medial collateral ligament degeneration, parameniscal cyst, and chondromalacia patellae. There was a significant correlation between male gender and anterior cruciate ligament injury. Meniscal injury was significantly correlated with bursitis, as well as medial collateral ligament injury. Bone bruise was significantly correlated with medial collateral ligament injury, lateral collateral ligament injury, Baker's cyst, and anterior cruciate ligament injury. Chondromalacia patellae was significantly correlated with anterior cruciate ligament injury, patellae alta and osteochondral lesion. Bursitis (in 53.2% of the patients) followed by grade-II meniscal degeneration (in 43% of the patients) were the most common knee pathologies observed by MRI.

## CONCLUSION

Authors found that MRI is an accurate and cost-effective radiographic aid useful in diagnosis of painful knee. Common knee pathologies were anterior cruciate ligament tear, posterior cruciate ligament tear, chondromalacia patellae, rheumatoid arthritis, medial collateral ligament tears, lateral collateral ligament tears, medial meniscal tears, lateral meniscal tears, osteochondritis dissecans and infection.

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