Medical Science

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Prevalence of Knee osteoarthritis with Magnetic resonance imaging in Al Kharj city

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ABSTRACT

Background: Osteoarthritis is a global joint disorder with high morbidities. The current study aimed to investigate the prevalence of knee osteoarthritis in Al Kharj by using magnetic resonance imaging in patients of knee pain. *Methods:* MRI evaluations of from all patients were suffering from pain in the knee and attending King Khalid and University Hospitals. All cases were referred from Rheumatology and Orthopedic departments from October 2021 to March 2022. *Results:* A total of 229 participants were included in our study; 172 (75%) males and 57 (25%) females. After MRI, 91 participants (39%) were diagnosed with knee osteoarthritis. All cases initially diagnosed by X-ray and then confirmed by MRI. Females had a higher prevalence of osteoarthritis than males. *Conclusions:* Knee osteoarthritis is a frequent condition among Al-Kharj population, especially females. Its prevalence rises with age, with the elderly suffering from higher levels of severity.

Keywords: MRI, Knee pain, Osteoarthritis, Al Kharj

1. INTRODUCTION

The knee joint is the body's biggest joint is a synovial condyloid or modified hinge. The joint between the patella and femur is a synovial joint of the plane synovial. The capsule of the knee is attached to the margins of the articular surfaces and surrounds the sides and posterior aspect of the joint (Standring, 2021). On the front of the joint, the capsule is absent. It has an opening for the tendon of the popliteus muscle. The knee has extracapsular and intracapsular ligaments. The latter includes cruciate ligaments. The menisci are C-shaped sheets of fibrocartilage (Standring, 2021).

In Saudi Arabia, osteoarthritis is one of the most common causes of impairment among the elderly. The prevalence of Osteoarthritis increased with increasing age reaching 30.8% in those aged 46-55 years and 60.6% in the age group 66-75. The incidence rises with age, and women have a higher rate than men (Alrowaili, 2019). Osteoarthritis is defined as breakdown of the extracellular matrix of the cartilage and degeneration of bone with impairment of repair as well as bony overgrowth. It can affect any joints but it is common in knee joint. The hand and hip joints can also be affected. Risk factors attributed to the development of osteoarthritis include obesity, advanced age and diabetes mellitus (Palazzo et al., 2016; Singer et al., 2018; Pal et al., 2016; Plotnikoff et al., 2015; Liu et al., 2016). Pain, tenderness and stiffness are important factor in disability. Pain reduces joint activity, which can lead to atrophic alterations in the muscles around it (Berenbaum, 2020).

Magnetic resonance imaging has become a well-established and reliable tool for assessment of Osteoarthritic cases. When compared to typical X-ray photos, it is more suited to examine the patients. Moreover, it allows the detailed study of knees features such as articular bones, cartilage, and osteophytes (Hayashi et al., 2016). The goal of this study is to determine the prevalence of knee osteoarthritis in adult patients in Al-Kharj.

2. MATERIALS AND METHODS

After obtaining permission from our institution's ethics committee and accreditation (IRB), (PSAU-2021 IRB 5/43PI), we launched our research. It was a prospective cohort study that carried out from October 2021 to March 2022. Magnetic resonance imaging evaluations of from all patients were suffering from pain in the knee and attending the Prince Sattam bin Abdul Aziz and King Khalid Hospitals. All cases were referred from Rheumatology and Orthopedic departments. A total of 230 participants were included in our study; 172 (75%) males and 57 (25%) females. All cases referred to Radiology department from Orthopedic and Rheumatology departments. All of the participants complaining knee pain aged from 18-90 were enrolled in our study. Any patient had a history rheumatoid or septic arthritis, motor car accidents and who has previous operation were excluded.

The trochleas of the femur, as well as the articulating surfaces of the tibia, patella, and femur, were all examined. All patients underwent X-rays before MRI (Park et al., 2013) grading system was used for the grading of MRIs, depending on bone marrow edema, cartilage defect, bony ulceration and osteophytes. Grade 0 means no injury to cartilage, bone spurs or osteophytes less than 5 mm. Cartilage defect less than 99%, bone marrow edema more than 10mm or subchondral cyst more than 10mm means Grade II. Finally, Grade IV means meniscal injury with total cartilage loss. The grading of cartilage defects, on the other hand, was based on the Noyes classification (Noyes & Stabler, 1989). Obtained images were diagnosed by an experienced radiologist for the presence of cartilage tear, injury of ligament and laxity. In addition, the menisci degeneration, joint effusion, cyst and tumor were noted in all cases.

Statistical analysis was performed using Microsoft Excel Software and the standard Statistical Package for the Social Sciences version 15 for windows.

3. RESULTS

During the period of study, 229 cases were included; 172 (75%) males and 57 (25%) females. The mean age was 35.5 ± 11.5 years (18 - 90 years). Data of our results have been taken from the images of MRI and also from Park's scoring system. On the other hand, more than 95% of cases were diagnosed by X-ray and then confirmed by MRI. Among the 229 cases, 91 patients were diagnosed with Knee osteoarthritis by MRI with a general prevalence of 39.73 %. Knee osteoarthritis was 46 cases in people aged 18 to 39 (about 25 percent). It increased by about 67% among cases over the age of 40 (Table 1). Males had 28 percent of the prevalence of knee osteoarthritis, whereas females had 76 percent (Table 2). Patients with osteoarthritis of the knee were classified using the Park Scoring System. MRI findings in cases included cartilage injuries, osteophytes, meniscal tears, and bone marrow edemas (Fig 2-7). Twenty-seven were categorized as Grade 0. Twenty-three cases showed MRI criteria of Grade I. Grades, II, III and VI were fifty cases (Table 3 and figure 1).

Table 1 Prevalence of osteoarthritis according to age

Age groups	No.	With osteoarthritis	Without osteoarthritis	P value
18-40	151	46	105	<0.0011
41-50	41	24	17	<0.0021
51-60	25	20	5	<0.0004
61-90	12	10	2	<0.0003
Total	229	100	129	

Table 2 Gender differences in osteoarthritis prevalence.

Gender	No.	With osteoarthritis	Without osteoarthritis	P value
Male	172	52	120	<0.0001
Female	57	42	15	<0.0001
Total	229	94	135	

Table 3 Incidence of osteoarthritis according to Park's scoring system.

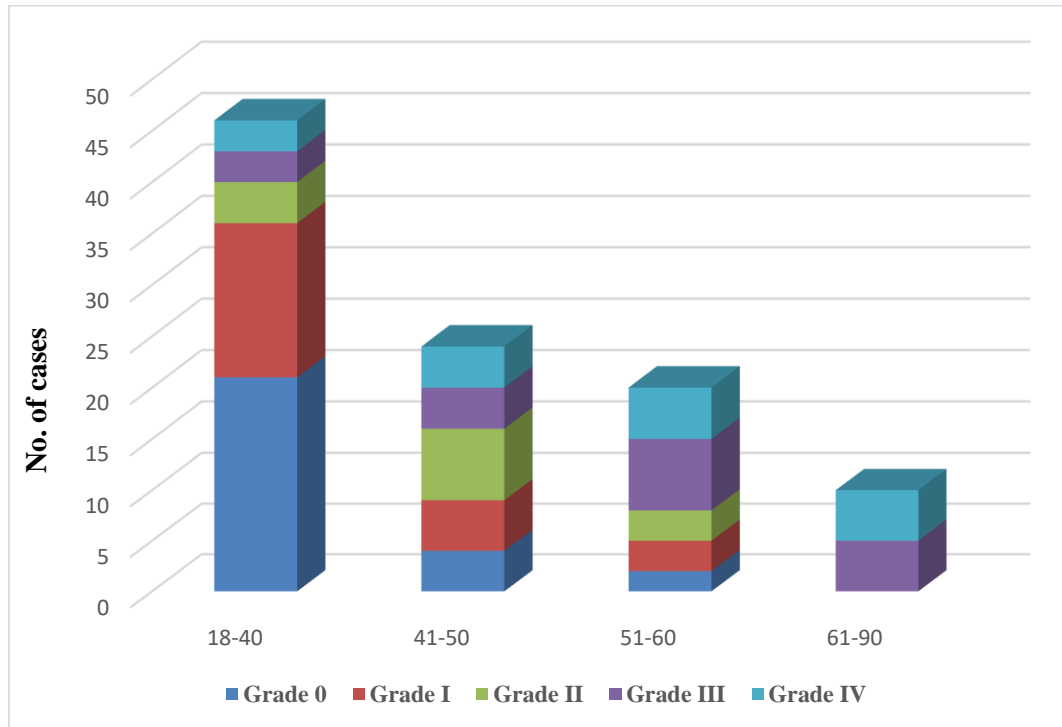| Age groups	Grade 0	Grade I	Grade II	Grade III	Grade IV	P value
18-40	21	15	4	3	3	<0.0011
41-50	4	5	7	4	4	<0.0021
51-60	2	3	3	7	5	<0.0004
61-90	-	-	-	5	5	<0.0003
Total	27	23	14	19	17	

Figure 1 Demographic profile of incidence of osteoarthritis according to Park's scoring system.
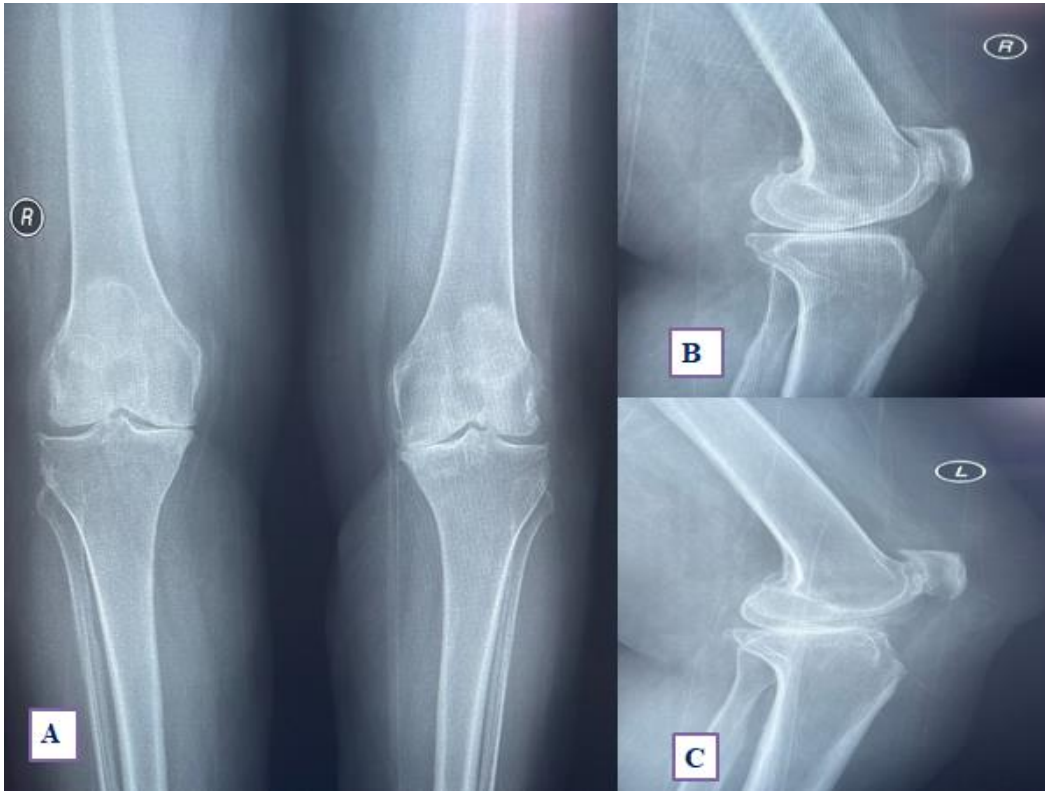
Figure 2 Plain x-ray of both knee A) Anteroposterior view B, C) Lateral view shows severe osteoarthritic changes with bilateral median joint space narrowing.
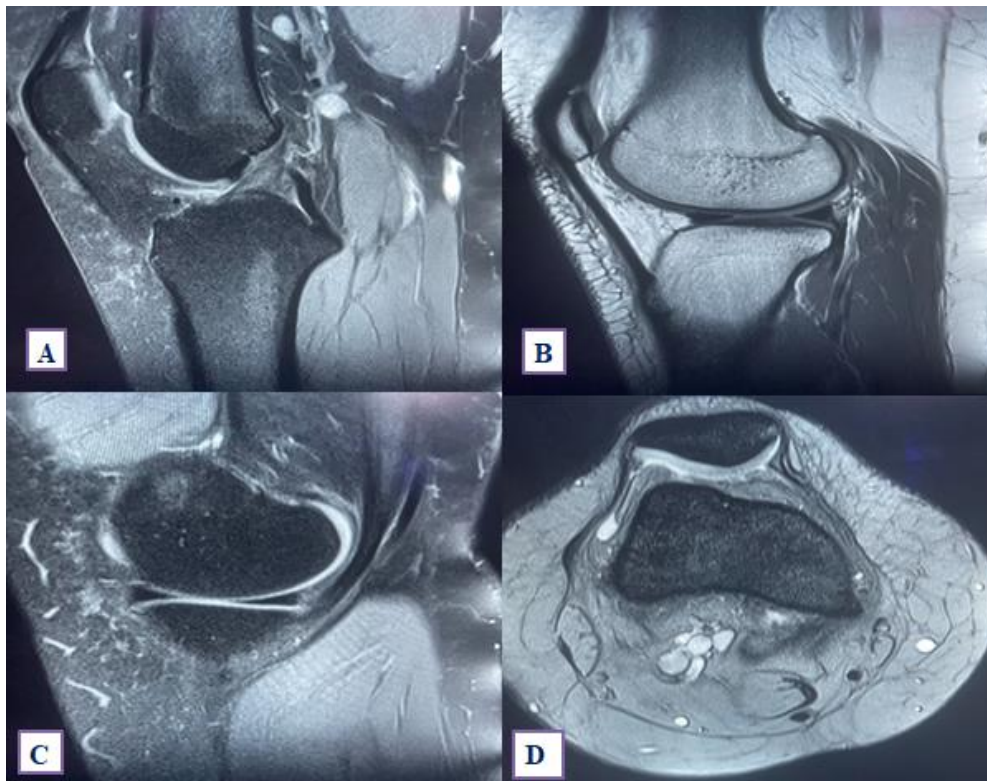

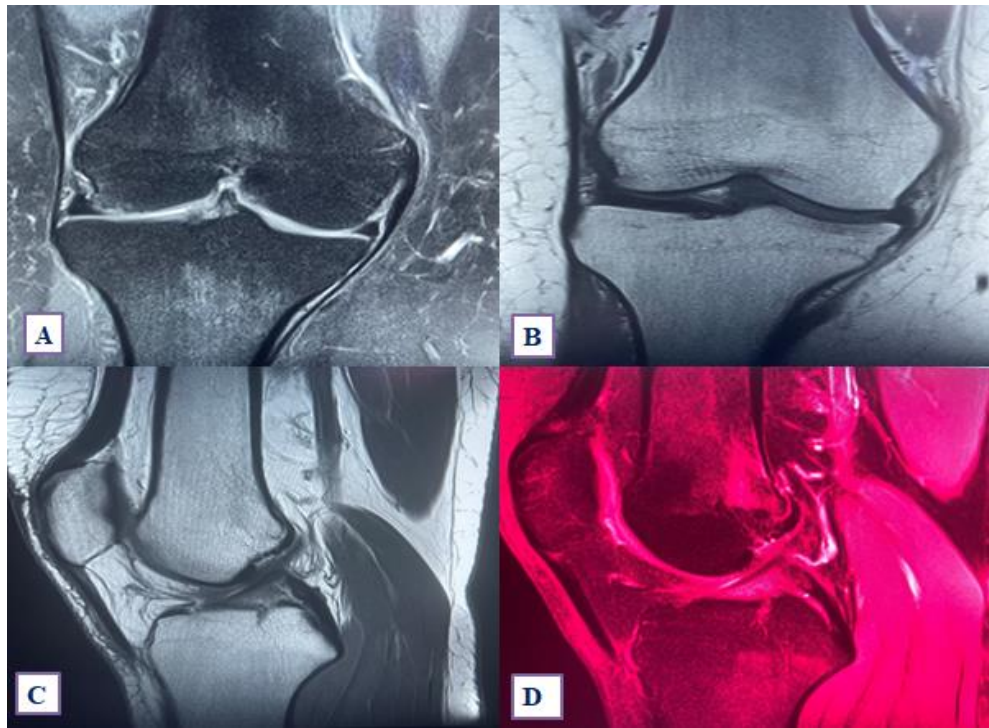**Figure 3** A, B, C) Sagittal D) Axial MRI images of male patient 18 years old show normal knee.

Figure 4 A, B) Coronal C, D) Sagittal MRI images of male patient 32 years old show normal knee.
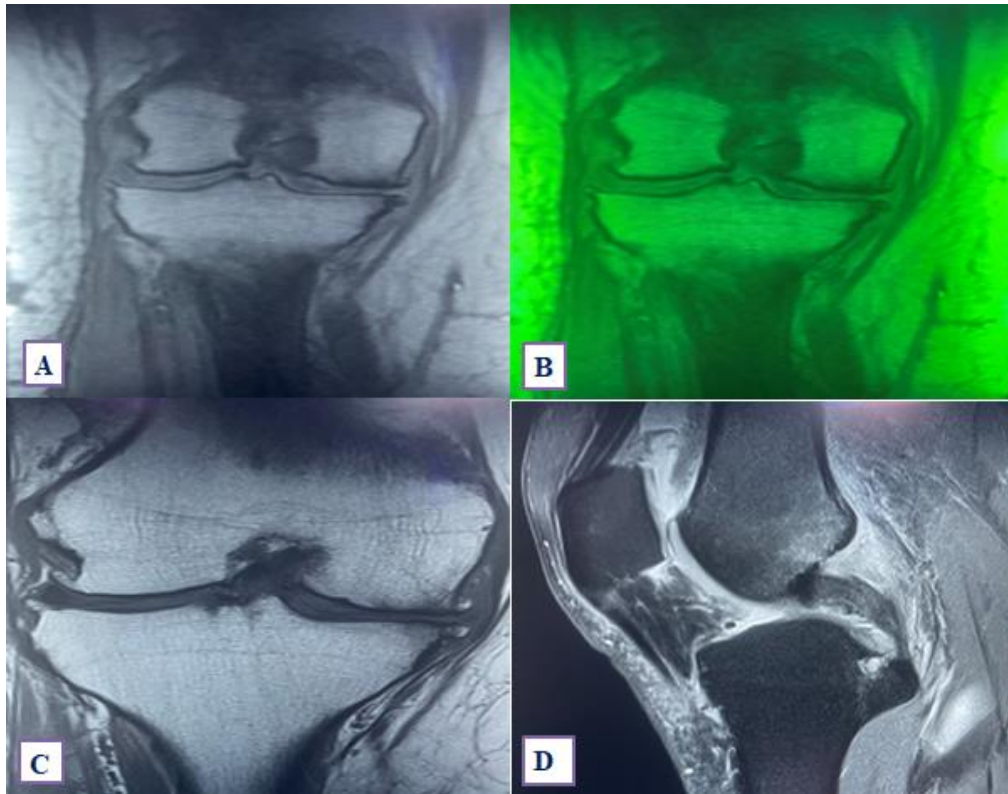

Figure 5 A, B, C) Coronal D) Sagittal MRI images of patient 46 years old show osteoarthritic manifestation in the form of loss of articular cartilage and osteophyte formation.
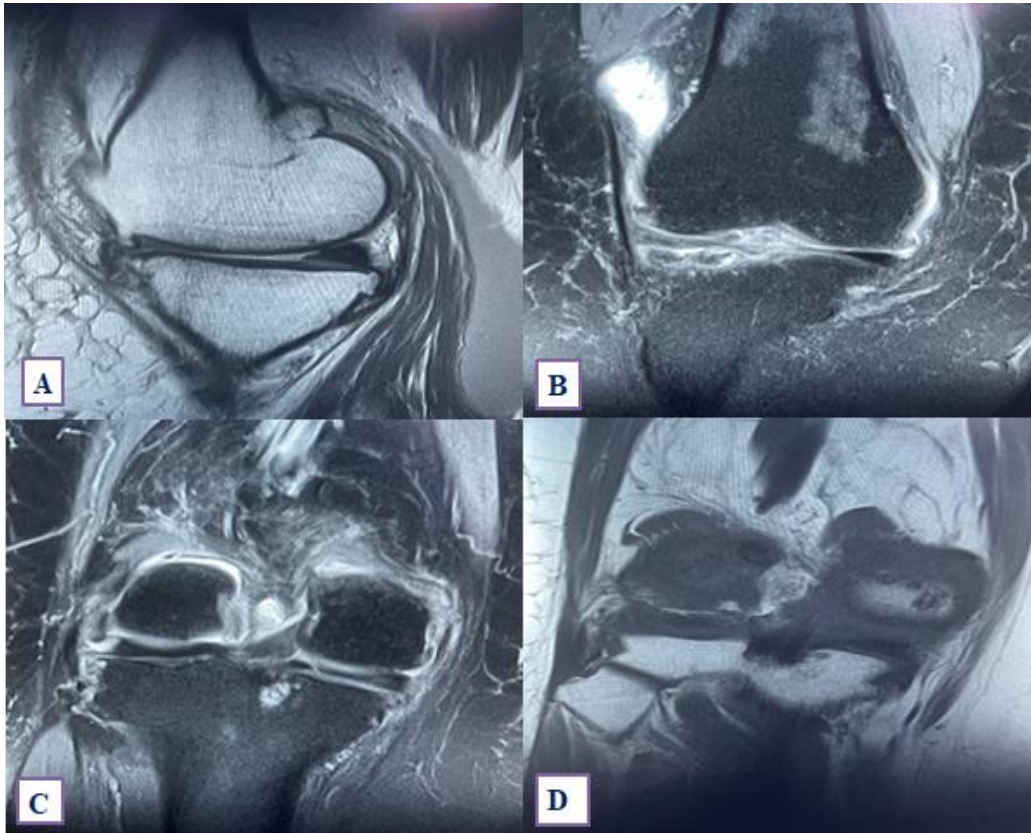
Figure 6 A) Sagittal B, C, D) Coronal MRI images of 52 female patient show osteoarthritic changes in the form of chondral degeneration and subchondral cysts.
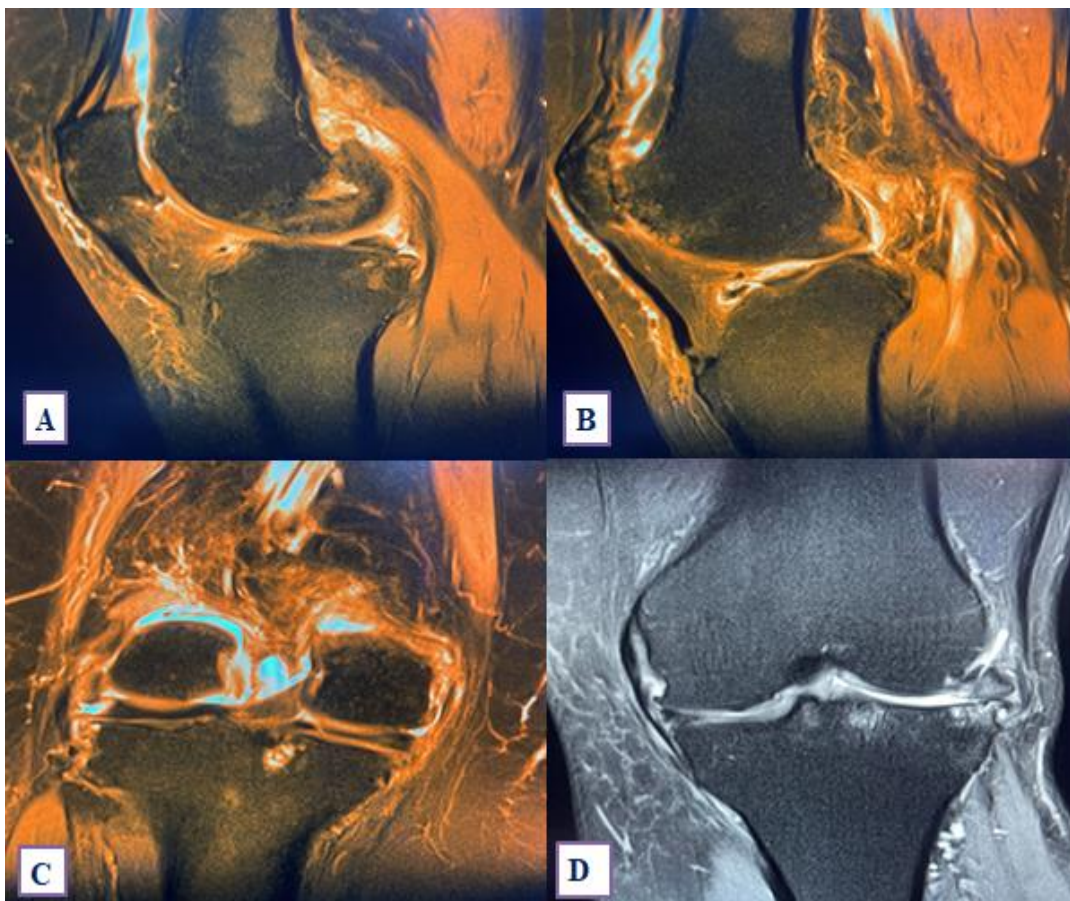

Figure 7 A, B) Sagittal C, D) Coronal MRI images of male patient 61 years old show osteoarthritic changes with chondral and subchondral degeneration.

4. DISCUSSION

In this paper, magnetic resonance imaging was used to assess 229 subjects for knee soreness in relation to the prevalence of knee osteoarthritis. Knee osteoarthritis was found to be common in females as compared to males. Similar results have been reported in other studies in Arar city as well (Alrowaili, 2019). The incidence of osteoarthritis was reported in Alqaseem (Al-Arfaj et al., 2003) in Madinah (Alamri et al., 2016) by clinical examination studies and questionnaires. In addition, osteoarthritis prevalence was estimated X-ray in Riyadh and it was 56% (Al-Arfaj & Al-Boukai, 2002). Another study reported the prevalence of osteoarthritis in India and it was about 28% (Pal et al., 2016). Internationally, the incidences of osteoarthritis in the United Kingdom in adults above 45 years old were around 18% and in Canada was 14% (Birtwhistle et al., 2015).

The reasons behind the high incidence of osteoarthritis in females may be due to various genetic, anatomical and hormonal problems. Anatomically, females have narrower femur bones, thinner patellas and differences in the size of the tibial condyles, which may contribute to knee osteoarthritis (Hame & Alexander, 2013). Other research has discovered that osteoarthritis is more common in women over fifty. The prevalence of osteoarthritis varies depending on the definition used, age, gender, and geographic area studied (Litwic et al., 2013; Heidari, 2011).

Limitation of our study there is a significant need for more researches involving a larger number of cases especially females and covering different regions of Saudi Arabia to make the results more general.

5. CONCLUSION

Knee osteoarthritis is more common in women than in men, according to research. It does not only affect the elderly; it can also affect people in their younger and middle years. MRI is not widely available and expensive, which is why the study recommends the use of X-rays of the painful knee joint in routine patient care.

Authors' Contributions

All authors contributed to the research and/or preparation of the manuscript. Ali Hassan A. Ali, Omar O. Serhan and Ali Amer Hamdi participated in the study design and wrote the first draft of the manuscript. Abdulmajeed Mazroua Almazroua, Abdullah Mohammed Alqahtani, and Meshari Sanad Almutairi collected and processed the samples. Abdullah Mubarak Aldawsari, Turki Fahhad Almutiry, Muath Ali Alghamdi, Ahmad Alrasheedi and Alaa Alzuwayyid participated in the study design and performed the statistical analyses. All of the authors read and approved the final manuscript.

Ethics Approval

All series of steps that were implemented in this study that included animal models were in compliance with Ethics Committee of Prince Sattam bin Abdulaziz University Institutional Review Board (PSAU-2021 IRB 5/43PI).

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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