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Original Research

Analysis of radiographic findings of Osteoarthritis of knee joint using Kellgren-Lawrence score

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ABSTRACT:
Background: The present study was conducted for the Analysis of radiographic findings of Osteoarthritis of knee joint using Kellgren-Lawrence score **Materials & methods:** Forty patients in all who were suspected of having knee osteoarthritis were enrolled. Prior to the study, informed consent was obtained from each subject and their guardian. Additionally, a thorough clinical history about the onset of symptoms was acquired. The following grades of osteoarthritis were applied to all radiographs using the Kellgren-Lawrence scoring system: grade 0, normal; grade 1, questionable osteoarthritis; grade 2, mild; grade 3, moderate; or grade 4, severe. SPSS software was used to conduct statistical analysis. **Results:** We examined forty OA patients in total. The patients' average age was 50.11. Thirty percent of the patients were men and seventy percent were women. In terms of radiography, the Kellgren-Lawrence score showed that grades 0, 1, 2, and 3 were observed in 29, 5, 4, and 2 patients, respectively. Notable outcomes were attained when comparing the patient distribution to the Kellgren-Lawrence score. **Conclusion:** significant outcomes were attained when comparing the patient distribution to the Kellgren-Lawrence score.
Key words: Kellgren-Lawrence score, Osteoarthritis,

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INTRODUCTION

Knee osteoarthritis (OA), also known as degenerative joint disease, is typically the result of wear and tear and progressive loss of articular cartilage. It is most common in the elderly. Knee osteoarthritis can be divided into two types, primary and secondary. Primary osteoarthritis is articular degeneration without any apparent underlying reason. Secondary osteoarthritis is the consequence of either an abnormal concentration of force across the joint as with post-traumatic causes or abnormal articular cartilage, such as rheumatoid arthritis (RA).

Osteoarthritis is typically a progressive disease that may eventually lead to disability. The intensity of the clinical symptoms may vary for each individual. However, they typically become more severe, more frequent, and more debilitating over time. The rate of progression also varies for each individual. Common clinical symptoms include knee pain that is gradual in onset and worse with activity, knee stiffness and swelling, pain after prolonged sitting or resting, and pain that worsens over time. Treatment for knee osteoarthritis begins with conservative methods and progresses to surgical treatment options when conservative treatment fails. While medications can help slow the progression of RA and other inflammatory conditions, no proven disease-modifying agents for the treatment of knee osteoarthritis currently exist.[1-3]

Osteoarthritis (OA) is a disease of the synovial joint tissues in which there is destruction of synovial joint tissues and active, but ineffective attempts at repair. This structural change can lead to pain and disability. Technologic advances and implementation of sophisticated post-processing instruments and analytic strategies have resulted in imaging playing a more and more important role in understanding the disease process of OA. Radiography is still the most commonly used imaging modality for establishing an imaging-based diagnosis of OA. [4-6]

The present study was conducted for the Analysis of radiographic findings of Osteoarthritis of knee joint using Kellgren-Lawrence score

Materials & methods

Forty patients in all who were suspected of having knee osteoarthritis were enrolled. Prior to the study, informed consent was obtained from each subject and their guardian. Additionally, a thorough clinical history about the onset of symptoms was acquired. The following grades of osteoarthritis were applied to all radiographs using the Kellgren-Lawrence scoring system: grade 0, normal; grade 1, questionable osteoarthritis; grade 2, mild; grade 3, moderate; or grade 4, severe. SPSS software was used to conduct statistical analysis.

Results

We examined forty OA patients in total. The patients' average age was 50.11. Thirty percent of the patients were men and seventy percent were women. In terms of radiography, the Kellgren-Lawrence score showed that grades 0, 1, 2, and 3 were observed in 29, 5, 4, and 2 patients, respectively. Notable outcomes were attained when comparing the patient distribution to the Kellgren-Lawrence score.

Table 1: Distribution of patients according to Kellgren-Lawrence score (on Radiography)

Kellgren-Lawrence score (on Radiography)	Parameter	Number of patients	Percentage of patients
Grade 0	Normal	29	72.5
Grade 1	Doubtful Osteoarthritis	05	12.5
Grade 2	Minimal Osteoarthritis	04	10
Grade 3	Moderate Osteoarthritis	02	5
Grade 4	Severe Osteoarthritis	0	0

Table 2: Correlation of distribution of patients according to Kellgren-Lawrence score.

Cartilage abnormality (On MRI)	Kellgren-Lawrence score (On Radiographic)				Total	Fisher's Exact Test p- value
	Grade 0	Grade 1	Grade 2	Grade 3		
Grade 0	11	00	0	0	11	0.00 (Significant)
Grade I	08	00	0	0	08	
Grade II A	05	02	0	0	07	
Grade II B	03	02	02	0	07	
Grade III A	01	01	02	01	05	
Grade III B	01	00	00	01	02	
Total	29	05	04	02	40	

Discussion

Knee osteoarthritis is a major public health problem that primarily affects the elderly. The increasing importance of imaging in osteoarthritis for diagnosis, prognosis and follow-up is well recognized by both clinicians and osteoarthritis researchers. Radiography is the simplest, least expensive and most commonly deployed imaging modality for OA. The severity of radiographic OA can be assessed with semi-quantitative scoring systems. The Kellgren and Lawrence (KL) grading system is a widely accepted scheme for defining radiographic OA based on the presence of a definite osteophyte. MRI has become a key-imaging tool for OA research thanks to its ability to assess pathology in structures not visualized by radiography i.e. articular cartilage, menisci, ligaments, synovium, capsular structures, fluid collections and bone marrow.[7-9]

Osteoarthritis (OA) is the most common form of arthritis and one of the leading causes of disability. This degenerative and progressive joint disease affects around 250 million people worldwide and more than 27 million people in the United States. Elderly (approximately 35% of patients over 65 years old) females, patients with obesity and African Americans are the population with the highest risk of developing OA. Given the trend of the population to live longer and the progressive increment of obesity in our country, the number of affected patients most likely will substantially increase within the upcoming years. This is concerning given the functional impairment and disability associated with this condition and its negative toll on the social and economic aspects of our society. The knee is the largest synovial joint in humans, it is composed by osseous structures (distal femur, proximal tibia, and patella), cartilage (meniscus and hyaline cartilage), ligaments and a synovial membrane. The

latter is in charge of the production of the synovial fluid, which provides lubrication and nutrients to the avascular cartilage.[10-12]

Hence; the present study was conducted for assessing correlating the correlation of distribution of patients according to Kellgren-Lawrence score (On Radiography) and according to cartilage abnormality (On MRI).

In the present study, we examined forty OA patients in total. The patients' average age was 50.11. Thirty percent of the patients were men and seventy percent were women. In terms of radiography, the Kellgren-Lawrence score showed that grades 0, 1, 2, and 3 were observed in 29, 5, 4, and 2 patients, respectively. Notable outcomes were attained when comparing the patient distribution to the Kellgren-Lawrence score.

Singh AP et al (2021)[13] compared ultrasonographic findings with clinical and radiographic findings in osteoarthritis (OA)-affected knee joints. This prospective study was conducted in Subharti Medical College, Meerut, after getting clearance from the ethical committee. Eighty-five symptomatic knees fulfilling American College of Rheumatology criteria for OA were included in the study. Patients with trauma, inflammatory, and infective conditions of the knee and with a history of intra-articular interventions and surgery were excluded. Demographic data, body mass index (BMI), visual analog scale (VAS), and Western Ontario and McMaster Universities Arthritis (WOMAC) questionnaire score were obtained. Kellgren–Lawrence (K-L) score was obtained on radiography. Ultrasonographic findings which were recorded include effusion, meniscal extrusion, femorotrochlear cartilage grading, maximum length of osteophytes at medial and lateral compartments, and presence or absence of Baker cyst. A total of 85 consecutive symptomatic knees were examined. The male: female ratio was 22:63, with a mean age of 54.52 ± 9.44 years, mean duration of disease of 24.24 ± 19.14 months, mean BMI of 28.91 ± 3.69 kg/m2, and mean score of VAS and WOMAC pain scale of 6.27 ± 1.45 and 62.45 ± 10.96, respectively. K-L grading of 1, 2, 3, and 4 was reported in 12.9%, 21.2%, 25.9%, and 40% of the knees, respectively. The mean VAS score and WOMAC score showed statistically significant correlation with KL grading ($P < 0.05$). Knees with the presence of osteophytes, medial meniscal extrusion, effusion, and medial femoral trochlear cartilage grading showed statistically significant correlation with VAS and WOMAC scores ($P < 0.05$). However, the correlation was not significant for lateral meniscus extrusion and lateral femoral trochlear cartilage grading. Their study found that K-L grading and few ultrasonographic criteria showed a significant positive correlation with pain scores, while few other ultrasonographic criteria did not. Both imaging modalities are complementary to each other, rather than one being superior to the other.

Al-Mahmood MR et al (2022)[14] correlated goniometric ROM with Kellgren-Lawrence (KL) radiographic score of female osteoarthritic knee. The study was a cross-sectional study conducted in Department of Physical Medicine and Rehabilitation, BSMMU, Dhaka, from February 2020 to March 2021. According to ACR (American College of Rheumatology) criteria, total 66 patients with primary OA knee were selected and examined in this study. Maximal flexion, extension, and rotation movements were measured by a universal goniometer. X-ray of standing both (A/P and lateral) view and skyline view of knee joint were taken and assessed with KL radiographic scores for medial, lateral, and patellofemoral compartments. Correlations between ROMs and KL scores were analyzed by Pearson correlation test. Among the 66 patients, mean age was 53.59 ± 7.19 years and mean body mass index was 26.62 ± 3.35. Majority (84.8%) of the patients were housewives. Mean maximum flexion was 126.71 ± 4.88°, maximum extension was –3.98 ± 1.74°, and internal and external rotations were 6.38 ± 1.29 and 8.48 ± 1.55°, respectively. More than half of patients had medial compartment KL score 3 or more while KL score 2 was found in 47% and 62.1% patients, respectively, in lateral and patellofemoral compartments. Statistically significant negative correlations were found between range of motion and radiographic scores. Strong correlation was present between maximal flexion and medial compartment score ($r = –0.821$, $P < .001$), whereas moderate correlation with other compartments. Extension values were moderately correlated with patellofemoral scores ($r = –0.560$, $P < .001$) and weakly correlated with rest of radiographic scores. Internal and external rotation were more related with medial compartment ($r= –0.469$, $P < .001$) and lateral compartment scores ($r = –0.481$, $P < .001$), respectively, than other compartment scores. There were significant negative correlations between goniometric measurements of knee ROM and radiographic scores in osteoarthritis knee in female patients.

Conclusion

significant outcomes were attained when comparing the patient distribution to the Kellgren-Lawrence score.

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