VOLUME - 12, ISSUE - 06, JUNE - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Radio Diagnosis

"ULTRASONOGRAPHY IN EVALUATION OF KNEE OSTEOARTHRITIS AND ITS CORRELATION WITH WOMAC SCORE"

Dr Bhupendra Amrute*	Resident Department Of Radiodiagnosis N.S.C.B. Medical College & Hospital Jabalpur (M.P) *Corresponding Author
Dr. Sonjjay Pande	MD Radiodiagnosis Professor & Head Department of Radiodiagnosis N.S.C.B. Medical College & Hospital Jabalpur (M.P)
Dr Avadhesh Pratap Singh Kushwah	MD Radiodiagnosis Professor & Head Superspeciality Hospital Department of Radiodiagnosis N.S.C.B. Medical College & Hospital Jabalpur (M.P)
Dr. S.S. Nelson	MD (Medicine) FIRH, Fellow In Rhuematology Professor Department of Medicine N.S.C.B. Medical College & Hospital Jabalpur (M.P)

ABSTRACT

Background- Ultrasonography is rapidly evolving as an important imaging modality in various rheumatic diseases. Osteoarthritis is a progressive disease that causes extreme morbidity and functional limitation in those who are affected. Ultrasound is able to image structural lesions as well as inflammatory changes in early and late diseases. it is also helpful in monitoring disease, which guides the clinician in planning appropriate management. **Methodology-** This study was conducted as a facility-based prospective observational study at the Department of Radio-diagnosis N.S.C.B. Medical College and Hospital, Jabalpur on patients with knee osteoarthritis. Clinical diagnosis was confirmed by the American College of Rheumatology (ACR) clinical criteria. **Results-** Major findings seen on ultrasound are degeneration of articular cartilage in the medial, lateral, and intercondylar regions, extrusion of the medial and lateral meniscus, osteophyte along the medial and lateral joint line, knee joint effusion, Baker's cyst, synovial hypertrophy, degenerative changes in the medial collateral ligament. positive correlation between pain scores (assessed using WOMAC) and various ultrasonographic findings such as meniscus extrusion, joint effusion, synovial hypertrophy, Baker's cyst, osteophyte formation, and cartilage degradation in the femoral trochlear region.

KEYWORDS : ultrasonography, knee osteoarthritis, WOMAC score.

INTRODUCTION

Osteoarthritis (OA) is a progressive joint disorder that causes pain, stiffness, and disability. In India, knee osteoarthritis is prevalent in approximately 28.7% of the population. Early diagnosis and treatment are crucial to prevent further damage to the joint. The prevalence of knee OA is increasing globally, particularly among aging populations, females, and individuals with obesity. Joint replacement surgery is an effective treatment for end-stage knee OA, although functional outcomes may vary. Traditional imaging techniques like conventional radiography have limitations in assessing disease status[1]. However, advanced imaging modalities such as magnetic resonance imaging (MRI) and musculoskeletal ultrasound (MSUS) offer more accurate assessments of OA, aiding in diagnosis, disease monitoring, and treatment guidance. Ultrasound has emerged as a valuable tool for assessing various knee structures affected by OA and predicting disease progression. It is also useful in guiding therapeutic interventions and monitoring treatment effectiveness[2].

METHODS

This study was conducted as a facility-based prospective observational study at the Department of Radio-diagnosis N.S.C.B. Medical College and Hospital, Jabalpur, Madhya Pradesh on patients with unilateral or bilateral knee osteoarthritis during the study period of 1 st March 2021 to 31st August 2022.

The study aimed to include patients with knee osteoarthritis based on the American College of Rheumatology (ACR) clinical criteria. The inclusion criteria encompassed all diagnosed patients of knee osteoarthritis. However, certain exclusion criteria were established to ensure the study's focus and eliminate confounding factors. Patients with a history of recent trauma, mechanical knee derangement, fibromyalgia, inflammatory arthritis, microcrystalline arthropathy, recent surgery, or known cases of malignancies around the knee were excluded from the study.

The methodology involved recruiting patients who visited the Rheumatology Clinic and met the ACR criteria for knee osteoarthritis[3]. Ultrasound examinations were conducted on these patients to gather relevant data. Before the study commenced, informed consent was obtained from all the participants to ensure their willingness to participate and their understanding of the study's purpose.

To assess pain levels in each knee, the WOMAC criteria (Western Ontario and McMaster Universities Arthritis Index) were utilized as part of the clinical assessment. This index provides a standardized measure for evaluating the severity and impact of osteoarthritis-related pain in patients' knees.

The Ultrasound examination was conducted using the GE LOGIQ P9 machine, equipped with a high-frequency linear probe operating at 12 MHz. Standard imaging protocols were employed to assess the affected knees.

The evaluation involved the following scanning techniques:

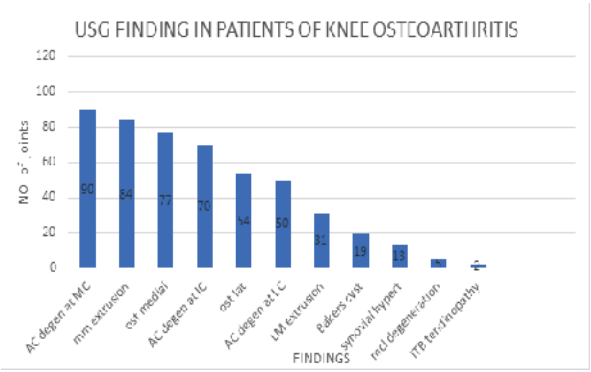
1. Anterior Longitudinal Scan: This scan was performed to assess the joint space and cartilage in the anterior region of the knee.
2. Transverse (Trochlear) Scan: The trochlear region was scanned in a transverse plane to evaluate joint space and cartilage in that specific area.
3. Medial and Lateral Scans: These scans were conducted to detect osteophytes (bone spurs), meniscal protrusion, and any other relevant findings in the medial and lateral compartments of the knee.
4. Posterior Scan: A posterior scan was carried out to examine the back of the knee, particularly for the presence of a Baker's cyst, which is a fluid-filled sac that can form in the posterior aspect of the knee joint.

The newly updated (2019) OMERACT definitions for ultrasonographic pathologies and elementary lesions of rheumatic disorders were adopted in this study for image interpretation. Data was compiled using MsExcel and analyzed using IBM SPSS software version 20.

RESULTS

53 symptomatic knee OA cases were examined and analyzed. The study population included 37 (70%) females and 16 (30%) males, with a mean age of 62.6 ± 8.6 years.

On ultrasonography, the most frequent pathological finding observed at the knee was articular cartilage degeneration at the medial condyle (84.9%) followed by medial meniscus extrusion (79.2%), osteophyte at the medial joint line (72.6%), articular cartilage degeneration at the intercondylar area (66%), osteophyte at the lateral joint line (50.9%), articular cartilage degeneration at lateral condyle (47.2%), Knee effusion(31.1%), lateral meniscus extrusion (29.2%), Baker's cyst (17.9%), synovial hypertrophy (12.3%), degenerative changes in medial collateral ligament [MCL] (4.7%), Iliotibial band insertional tendinopathy (1.9%)



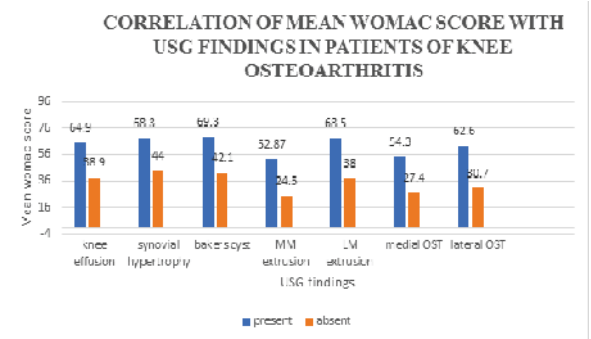
Graph 1-Usg Finding In Patients Of Knee Osteoarthritis

The mean total WOMAC score was 47.0 ± 18.6 in our study. A statistically significant correlation ($p < 0.05$) was present with medial meniscus extrusion, lateral meniscus extrusion, joint effusion, synovial hypertrophy, baker's cyst, and medial and lateral joint osteophyte.

No significant correlation ($p > 0.05$) was present between iliotibial band insertional tendinopathy and degenerative changes in the medial collateral ligament [MCL].

The mean WOMAC score increased with an increase in femoral trochlear cartilage grading and was found maximum in Grade 3 in all three areas.

When mean WOMAC scores were compared with the grading of femoral trochlear cartilage degeneration, it was found to be statistically significant (as $P < 0.05$) for medial, intercondylar, and lateral positions.



Graph 2-Correlation Of Mean Womac Score With Usg Findings In Patients Of Knee Osteoarthritis

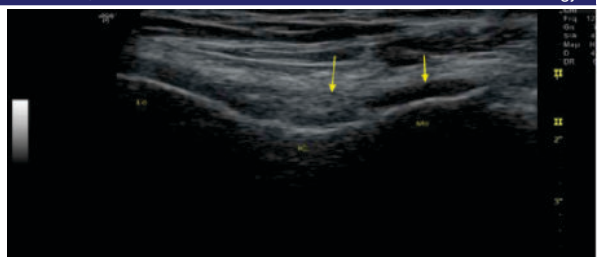


Fig 1-'grade 1 Articular Cartilage Degeneration'-Ultrasound Image In The Transverse Plane Over The Distal Femur Shows – Loss Of The Normal Sharpness Of Cartilage Interface And Increased Echogenicity Of The Hyaline Cartilage Of Trochlea At Medial Condyle And Intercondylar Area(Arrow)(lc-lateral Condyle, Ic-inter-condyle, Mc-medial Condyle).

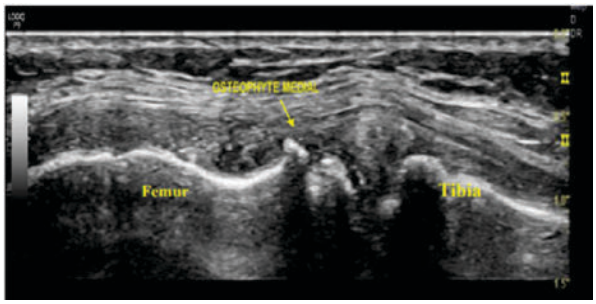


Fig-2, Osteophyte -high-frequency Ultrasonographic Evaluation Of Osteoarthritis Affected Knee Joint Demonstrating Multiple Osteophytes At Medial Joint Line.

DISCUSSION

With increasing awareness of health, the number of people getting diagnosed with osteoarthritis is increasing. Radiology plays an indispensable role in assessing the disease activity and progression at various joints. This study utilizes musculoskeletal ultrasound for assessing Knee joints in patients of osteo- arthritis. In this study, we evaluated 106 knee joints in 53 patients with osteoarthritis (2010 ACR/EULAR criteria). MSK ultrasound was performed using both greyscale and power Doppler mode at the knee joint

In our study on knee osteoarthritis, the gender distribution among 53 patients was analyzed. Out of the total, 37 patients (70%) were female, while the remaining 16 patients (30%) were male. This female preponderance aligns with findings from other studies by authors such as Serban et al [4]. (2016) who have also reported a higher incidence of osteoarthritis among females and explored factors contributing to this gender difference.

The study also examined the age groups of the patients, revealing that the majority fell within the 50 to 80-year age range, with a mean age of 62.6 ± 8.6 years. Similar mean age ranges have been reported by Serban et al[4]. (2016) and Podlipská et al[5]. (2016). Age has been identified as a significant factor associated with the increased incidence of knee osteoarthritis.

Body mass index (BMI) was assessed in the study, with 9.4% of patients classified as having a normal weight (BMI 18.5-24.9), 49.1% as overweight (BMI 25-29.9), and 41.5% as obese (BMI >30). Zheng et al[6]. (2015) found a significant association between being overweight or obese and a higher risk of knee osteoarthritis.

Ultrasonographic findings were also analyzed in the study. The most common pathological findings observed were articular cartilage degeneration, medial meniscus extrusion, osteophyte formation, and knee effusion. Similar findings

have been reported by other studies conducted by Rath PD et al[7]. (2019), which emphasize the prevalence of cartilage loss, osteophytes, and meniscal protrusion in patients with knee osteoarthritis.

The study found a positive and significant correlation between ultrasonographic features such as joint effusion, Baker's cyst, medial and lateral meniscus extrusion, and pain and functionality scores measured by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). These results align with previous studies conducted by Abd El Monaem et al[8]. (2017), which have also reported associations between these ultrasonographic findings and pain or WOMAC scores.

Furthermore, the presence of osteophytes, synovial hypertrophy, and trochlear cartilage damage was found to be correlated with pain, functional impairment, and WOMAC scores. These correlations have been supported by studies conducted by Mortada et al[9]. (2021).

CONCLUSION

Ultrasonography is a rapidly evolving imaging technique used in rheumatic diseases. In particular, it has proven valuable in diagnosing and monitoring osteoarthritis, a progressive condition that leads to functional limitations and morbidity. This study focused on evaluating the knee joints of osteoarthritis patients using ultrasonography. The findings revealed several important observations, including degeneration of articular cartilage in the medial, lateral, and intercondylar regions, extrusion of the medial and lateral meniscus, osteophyte formation along the medial and lateral joint line, knee joint effusion, Baker's cyst, synovial hypertrophy, degenerative changes in the medial collateral ligament, and tendinopathy at the insertion of the iliotibial band. Additionally, the study found a positive correlation between pain scores (assessed using WOMAC) and various ultrasonographic findings such as meniscus extrusion, joint effusion, synovial hypertrophy, Baker's cyst, osteophyte formation, and cartilage degradation in the femoral trochlear region.

REFERENCES

1- Wenham C, Conaghan P. Imaging the painful osteoarthritic knee joint: what have we learned Nat Clin Pract Rheum. 2009;5:149–58.
2- Keen HI, Wakefield RJ, Conaghan PG. A systematic review of ultrasonography in osteoarthritis. Ann Rheum Dis. 2009;68:611-9
3- Altman R, Asch E, Bloch D, Bole G, Borenstein D, Brandt K, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association. Arthritis Rheum. 1986;29(8):103949
4- Serban O, Porojan M, Deac M, Cozma F, Solomon C, Lenghel M, et al. Pain in bilateral knee osteoarthritis-correlations between clinical examination, radiological, and ultrasonographical findings. Med Ultrason 2016;18:318-25
5- Podlipská J, Guermazi A, Lehenkari P, Niinimäki J, Roemer FW Arokoski JP, et al. Comparison of diagnostic performance of semi-quantitative knee 80 |y. Sci Rep 2016;6:1-2
6- Zheng H, Chen C. Body mass index and risk of knee osteoarthritis: a systematic review and meta-analysis of prospective studies. BMJ Open. 2015 Dec 11;5(12):e007568. doi: 10.1136/bmjopen-2014-007568. PMID: 26656979; PMCID: PMC4679914
7- Rath, Prasan & Pandey, Swetal. (2019). Ultrasound findings in the knee of patients of osteoarthritis and their correlation with pain. International Journal of Research in Orthopaedics. 5. 944. 10.18203/issn.2455- 4510. Int Jres Orthop 20193840.
8- Abd El Monaem, S. M., Hashaad, N. I. & Ibrahim, N. H. Correlations between ultrasonographic findings, clinical scores, and depression in patients with knee osteoarthritis. Eur. J. Rheumatol. 4(3), 205–209 (2017)
9- Mortada M, Dawa GA, Amer YA. Construct validity of clinically correlated knee osteoarthritis ultrasonographic scale: a cross-sectional observational study. BMJ Open. 2021 Dec 14;11(12):e048444. doi: 10.1136/bmjopen-2020-048444. PMCID: PMC8671929