



KNEE OSTEOARTHRITIS EVALUATION BY ULTRASONOGRAPHY AND PLAIN X-RAY

Radiology

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ABSTRACT

Background; Osteoarthritis (OA) is the most prevalent condition affecting the musculoskeletal system. One of the most often affected joints by OA is the knee. In fact, 6–10% of adults have been observed to have symptoms of knee OA. In India, there is a prevalence of 22% to 39% for symptomatic OA of the knee. The primary imaging method for diagnosing OA is a straightforward radiograph. The osteoarthritic joint can be evaluated holistically using more recent imaging techniques as high-frequency MSK ultrasonography. **Aims And Objective:** To evaluate appearances of various findings in knee osteoarthritis on ultrasonography and plain x-ray. **Study Design:** Hospital based observational Study in Department of Radio-diagnosis, Assam Medical College and Hospital for a period of 1 year. **Materials And Methods;** The present study was carried out in department of radiodiagnosis, AMCH Dibrugarh. We evaluated 50 patients with age of >40 years with clinically diagnosed case of osteoarthritis of knee. Ultrasonographic examination was performed with SAMSUNG RS 80A scanner. Transducer used was 7.5-10MHz linear array transducer. Radiographic imaging was taken with Allengesr-525 scanner. **Result and Observation:** Knee Osteoarthritis is more common in adult females than adult males, mean age of knee osteoarthritis is 58.07 ± 7.01 yrs. USG of knee osteoarthritis revealed Meniscal protrusion is most common findings in knee osteoarthritis followed by effusion, Baker's cyst, synovial hypertrophy and Infrapatellar bursitis and measuring cartilage thickness on USG it revealed that cartilage is most thick in intercondylar notch and least thick in medial epicondyle. Plain Xray knee osteoarthritis revealed that plain radiographic degenerative changes noted in 76% cases and by doing KL grading most patient having KL grade II followed by Grade III, Grade I, Grade IV and Grade 0 and measuring the FT space width its revealed Mid-point of medial compartment is mostly narrowed and peripheral lateral compartment is least narrowed. **Conclusion:** MSK Ultrasonography is a non-invasive diagnostic technique for assessing periarticular and intraarticular abnormalities related to knee Osteoarthritis. Knee Osteoarthritis seen on plain X-ray produces superior results for FT (femorotibial) space narrowing.

KEYWORDS

OA- Osteoarthritis, MSK- Musculoskeletal, KL- Kellgren and Lawrence, FT-Femorotibial

1. INTRODUCTION;

Osteoarthritis (OA) is the most prevalent condition affecting the musculoskeletal (MSK) system. One of the most often affected joints by OA is the knee. In fact, 6–10% of adults have been observed to have symptoms of knee OA.^{1,2} Clinical examination is used to make the diagnosis of knee OA, which is typically supported by plain radiography (PR).

Radiographically, it manifests as a narrowing of the joint interval, increased density and thickening of the subchondral bone, subchondral cysts, and marginal bony excrescences.

When assessing patients with early knee OA and evaluating the course of the disease, the combination of biochemical markers with clinical and radiographic data is most beneficial.³

In India, there is a prevalence of 22% to 39% for symptomatic OA of the knee, which is defined as having pain on the majority of days of the month in addition to radiologic evidence of arthritis.⁴ The present study was undertaken with an aim to evaluate appearances of various findings in knee osteoarthritis on ultrasonography and plain x-ray patients attending Assam Medical College and Hospital, Dibrugarh.

2. METHODOLOGY

Aims and objectives;

To evaluate appearances of various findings in knee osteoarthritis on ultrasonography and plain x-ray.

Inclusion Criteria:

Patients of >40 years of age with clinically diagnosed case of osteoarthritis of knee.

Exclusion Criteria :

Patients not giving consent. All other cases of painful knee not related with osteoarthritis.

Place Of Study: Assam Medical College and Hospital, Dibrugarh, Assam.

Study Design: Hospital based observational study.

Study Population : All the patient attending the department of Radio diagnosis, Assam Medical College and Hospital Dibrugarh with diagnosis of OA of knee joint.

Sample Size : 50 patients.

Equipment: Ultrasonographic examination was performed with SAMSUNG RS 80A scanner. Transducer used was 7.5-10MHz linear array transducer. Radiographic imaging was taken with Allengesr-525 scanner.

RESULTS AND OBSERVATION;

Table 1: Age wise distribution of study subjects

Age Group (in years)	Number	Percentage
40–49	10	20.00
50–59	20	40.00
60–69	17	34.00
70–79	3	6.00
≥ 80	0	0.00
TOTAL	50	100.00
Mean $\pm$ S.D.	58.04 $\pm$ 7.71 years	

Table 2: Sex wise distribution of the study subjects

Gender	Number	Percentage
Male	24	48
Female	26	52
TOTAL	50	100
Ratio (M : F)	1 : 1.03	

Table 3: Showing knee alignment.

Knee Alignment	Number	Percentage
Normal	41	82.00
Genu Varus	7	14.00
Genu Valgus	2	4.00
TOTAL	50	100.00

Table 4: Showing Ultrasonographic Findings in Study Subjects

Ultrasonographic Findings	Number (n = 50)	Percentage
Effusion	23	46.00
Meniscal Protrusion	27	54.00
Baker's Cyst	12	24.00
Synovial Hypertrophy	10	20.00
Infrapatellar Bursitis	3	6.00

Table-5 Showing Cartilage Thickness on Ultrasonography

Cartilage Thickness on Ultrasonography	Mean	Standard Deviation ($\pm$ S.D.)
Medial Epicondyle (mm)	1.75	0.01
Intercondylar Notch (mm)	2.25	0.01
Lateral Epicondyle (mm)	1.86	0.01

Table 6: Showing Radiographic Findings (K-L Grade)

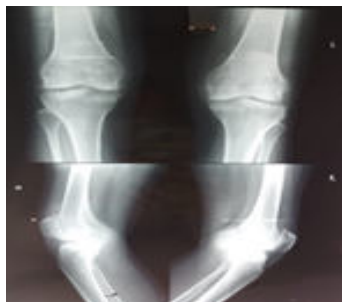
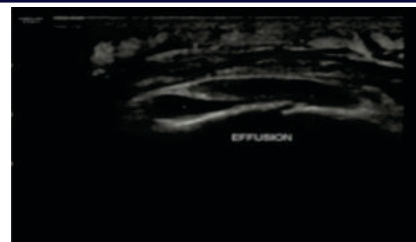
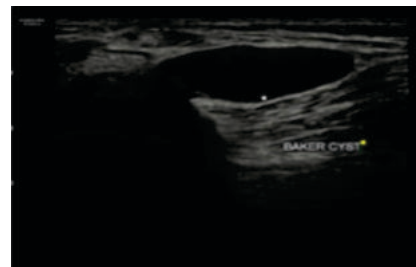
Radiographic Findings (K-L Grade)	Number	Percentage
Grade 0	0	0.00
Grade I	12	24.00
Grade II	20	40.00
Grade III	16	32.00
Grade IV	2	4.00
TOTAL	50	100.00

Table 7: Showing FT space width in study subjects

FT Space Width	Mean	Standard Deviation ($\pm$ S.D.)
Peripheral MC (mm)	6.47	0.17
Mid-point MC (mm)	5.56	0.14
Peripheral LC (mm)	9.39	0.13
Mid-point LC (mm)	6.5	0.15

Table 8: Showing the plain radiographic degenerative signs in study subjects

Plain Film Radiographic Degenerative Signs	Number	Percentage
Present	38	76
Absent	12	24
TOTAL	50	100

Few Sample Cases:**Plain X-ray of bilateral knee (AP and Lateral views) showing osteophytes, grossly medial joint space reduction and sclerosis.****Plain X-ray of bilateral knee (AP and Lateral views) showing osteophytes, grossly joint space reduction and sclerosis.****Gray scale USG image showing knee effusion****Gray scale USG image showing bakers cyst.****DISCUSSION;**

This study involved 50 patients of knee osteoarthritis who have come to the department of radiology Assam medical college for x-ray of knee (AP & Lateral Views) and USG of knee. In our study we found that 40% of the subjects were between 50-59 yrs, 34% of the study subjects were between 60-69 years, 20% of the study subjects were between 40-49 years and 6 % of the study subjects were between 70-79 years and non above the 80yrs and mean age was 58.07 ± 7.01 yrs. However study conducted by **Primorac et al**⁵ mean age was 60 yrs. In present study we found 52 % were females and 48% were males, i.e., it affecting more the female patients it is in agreement with **Primorac et al**. In present study it reveals that 82 % were normally aligned, 14 % were Genu varus and 4 & were Genu valgus alignment, however study conducted by **E. Naredo M.D et al**⁶ found that 83.3% study subjects were normally aligned 12.2 % were Genu varus and 4.4 % were Genu valgus. In present study USG was done of all the study subjects and found that Effusion is present in 46 % subjects, Meniscal protrusion is present in 54% subjects, Baker's Cyst is present in 24% study subjects, synovial hypotrophy is present in 20% study subjects and Infrapatellar bursitis is present in 6% study subjects and Cartilage thickness in medial epicondyle having mean of $1.75 \text{ mm} \pm 0.01$, Cartilage thickness in intercondylar notch having mean of $2.25 \text{ mm} \pm 0.01$ and Cartilage thickness in lateral epicondyle having mean of $1.86 \text{ mm} \pm 0.01$, however study conducted by **E. Naredo M.D et al**⁶ found that Effusion was present in 46.7%, Meniscal protrusion was present in 61.1 % and Baker's cyst was present in 22.2%. and in study done by **Karen B et al**⁷ Effusion was present in 16.7%, Meniscal protrusion was present in 61.7%, Infrapatellar bursitis was present in 5.6 %, Bakers cyst was present in 26.1% study subjects and Cartilage thickness in medial epicondyle having mean of $1.75 \text{ mm} \pm 0.56$, Cartilage thickness in intercondylar notch having mean of $2.26 \text{ mm} \pm 0.67$ and Cartilage thickness in lateral epicondyle having mean of $1.86 \text{ mm} \pm 0.50$. In present study for KL Grading was done we found that 40 % patients having Grade II, 32% having Grade-III, 24% having Grade-I and only 4% having Grade-IV and no study subjects having Grade-0, however study conducted by **E. Naredo M.D et al**⁶ found that KL grade I in 28%, II in 39%, III in 30% and IV in 3% and Grade-0 in 0 % study subjects. In present study for FT space width, it reveals that peripheral LC having mean of $9.39 \text{ mm} \pm 0.13$, Mid-point LC having $6.5 \text{ mm} \pm 0.15$, Peripheral MC having $6.47 \text{ mm} \pm 0.17$ and Mid-point MC having mean of $5.56 \text{ mm} \pm 0.14$; however study conducted by **E. Naredo M.D et al**⁶ for FT space width found that peripheral LC having mean of $9.4 \text{ mm} \pm 1.7$, Mid-point LC having $6.7 \text{ mm} \pm 1.5$, Peripheral MC having $6.7 \text{ mm} \pm 2.7$ and Mid-point MC having mean of $5.6 \text{ mm} \pm 2$ in symptomatic patients and peripheral LC having mean of $9.4 \text{ mm} \pm 1.8$, Mid-point LC having $7.1 \text{ mm} \pm 2$, Peripheral MC having $8.1 \text{ mm} \pm 1.5$ and Mid-point MC having mean of $7.2 \text{ mm} \pm 1.4$ in asymptomatic patients. In present study 76% patients having the plain radiographic degenerative signs while it is absent in 24 % patients, however study conducted by **E. Naredo M.D et al**⁶ found plain film degenerative signs were present in 78% patients and absent in 22% patients.

CONCLUSION;

The study of Ultrasonographic and Plain X-ray evaluation in knee Osteoarthritis was done in Assam Medical College, Dibrugarh for the period of 1 year had led to the following conclusions;

MSK Ultrasonography is a non invasive diagnostic technique for assessing periarticular and intraarticular abnormalities related to knee Osteoarthritis.

Knee Osteoarthritis seen on plain X-ray produces superior results for FT (femorotibial) space narrowing.

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