# STUDY ON THE ULTRASONOGRAPHIC AND RADIOGRAPHIC FINDINGS OF KNEE OSTEOARTHRITIS PATIENTS AT CAN THO UNIVERSITY OF MEDICINE AND PHARMACY HOSPITAL IN 2022-2023

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## ABSTRACT

*Background: Knee osteoarthritis is a common disease in the group of bone and joint diseases. The incidence of the disease increases with age, commonly occurs in elderly patients or can also occur in young people. Diagnosis of knee osteoarthritis is mainly based on clinical symptoms combined with radiographs. Currently, ultrasound can be used to examine the damage*

*that occurs in early-stage knee osteoarthritis. In addition, it has the ability to evaluate joint cartilage thickness, detect synovitis, joint effusion,... and abnormal features in other joint diseases of the knee, especially when there are no clinical manifestations or no damage on X-ray images.* **Objectives***: To describe and compare ultrasonographic and radiographic findings in osteoarthritis-affected knee joints.* **Materials and Methods:** *A cross-sectional study was conducted on 50 patients and 62 knee joints diagnosed with osteoarthritis according to the American College of Rheumatology (ACR) 1991 criteria. General characteristics, radiographic findings, and ultrasonographic findings in osteoarthritis-affected knee joints of participants were collected at Can Tho University of Medicine and Pharmacy from May 2022 to April 2023.* **Results:** *Radiographs showed the most common finding was grade 1 osteophytes. The most common feature found on ultrasound was also grade 1 osteophytes. Medial condyle osteophytes and lateral condyle osteophytes: Grade 1 was the most common finding, with 53.2% and 58.1%. Medial tibial plateau osteophytes and lateral tibial plateau osteophytes: Grade 1 was the most common finding, with 54.8% and 50.0%. Medial compartment joint space narrowing: grade 1 was the most common (41.9%). Lateral compartment joint space narrowing was not found (grade 0) in 64.5%. In addition, ultrasound detected synovitis in patients with knee osteoarthritis, accounting for a fairly high rate of 87.1%. There was moderate agreement between osteophyte and joint space narrowing grading on ultrasound and radiographs.* **Conclusion:** *There was moderate agreement between osteophyte and joint space narrowing grading on ultrasound and radiographs. Ultrasound can also detect and evaluate synovitis that may not be seen on radiographs. We recommend using the ultrasonography atlas created for knee osteophyte detection in routine knee ultrasound.*

*Keywords: ultrasound, radiographs, X-ray, knee osteoarthritis.*

## I. INTRODUCTION

Knee osteoarthritis is a common disease in the group of bone and joint diseases. It is a common degenerative joint disease that mainly affects the elderly and severely impairs mobility in the late stages of the disease [1]. The incidence of the disease increases with age, commonly occurs in elderly patients or can also occur in young people. According to a study in Ho Chi Minh City, the rate of knee joint space narrowing on X-rays is 8% in the age group of 40-49, increasing to 61.1% in the age group over 60 [2].

Currently, ultrasound can be used to detect the damage that occurs in early-stage knee osteoarthritis. In addition, it has the ability to evaluate joint cartilage thickness, detect synovitis, joint effusion,... and abnormal features in other joint diseases in the knee, especially when there are no clinical manifestations or no damage on radiographs [3].

In Vietnam, ultrasound has been applied to diagnose musculoskeletal diseases; however, research on ultrasound diagnosis of osteoarthritis of the knee is not yet common.

The objective of this study is to describe and compare ultrasonographic and radiographic findings in osteoarthritis-affected knee joints.

## II. MATERIAL AND METHODS

### 2.1. Subjects

Patients with primary knee osteoarthritis came for examination and treatment at Can Tho University of Medicine and Pharmacy Hospital from May 2022 to April 2023.

**Inclusion criteria:** patients were diagnosed with osteoarthritis of the knee according to the ACR 1991 criteria [4], [5].

**Exclusion criteria:** patients who had undergone interventional treatment on the knee joint, such as arthroscopic knee surgery or hyaluronic acid injection.

### 2.2. Methods

**Study design**: cross-sectional description, convenient sampling.

**Study content**: General characteristics, radiographic findings, and ultrasonographic findings in osteoarthritis-affected knee joints.

**-** General characteristics**:** age, gender, clinical findings.

**-** Radiographic findings and ultrasonographic findings:

+ Radiography: Osteophytes grading of the medial condyle, lateral condyle, medial tibial plateau, lateral tibial plateau: grade 0, 1, 2, 3 [6], [7]. Joint space narrowing: grade 0, 1, 2, 3 [6],[7]. Joint effusion (present/absent).

+ Ultrasound: Osteophytes grading of the medial condyle, lateral condyle, medial tibial plateau, and lateral tibial plateau: grade 0, 1, 2, 3 based on the ultrasonography atlas created for knee osteophyte detection [8]. Joint space narrowing/: grade 0, 1, 2, 3 [9]. Joint effusion and synovitis (present/absent).

## III. RESULTS

### 3.1. General characteristics

Among a total of 50 patients, the prevalence of knee osteoarthritis in women (78%) was significantly higher than in men (22%). The incidence of knee osteoarthritis according to age is almost equivalent in the two age groups under 60 and over 60 years old. The most common reason patients came for examination was knee pain, accounting for 70%, followed by findings during a general health examination, accounting for 16%.

### 3.2. Radiographic findings

Table 1: Radiographic findings

| Features | Grade 0 (N, %) | Grade 1 (N, %) | Grade 2 (N, %) | Grade 3 (N, %) |
|---|---|---|---|---|
| Medial condyle osteophytes | 8 (12.9%) | 41 (66.1%) | 10 (16.1%) | 3 (4.9%) |
| Lateral condyle osteophytes | 7 (11.3%) | 39 (62.9%) | 14 (22.6%) | 2 (3.2%) |
| Medial tibial plateau osteophytes | 7 (11.3%) | 41 (66.1%) | 11 (4.9%) | 3 (4.9%) |
| Lateral tibial plateau osteophytes | 8 (12.9%) | 45 (72.6%) | 7 (11.3%) | 2 (3.2%) |
| Medial compartment joint space narrowing | 23 (37.1%) | 17 (27.4%) | 18 (29.0%) | 4 (6.5%) |
| Lateral compartment joint space narrowing | 32 (51.6%) | 20 32.3%) | 29 (14.5%) | 1 (1.6%) |

Medial condyle osteophytes and lateral condyle osteophytes: Grade 1 was the most common finding, at 66.1% and 62.9%.

Medial tibial plateau osteophytes and lateral tibial plateau osteophytes: Grade 1 was the most common finding, with 66.1% and 72.6%.

Medial compartment joint space narrowing was not found in 37.1%. Lateral compartment joint space narrowing was not found in 51.6%.

### 3.3. Ultrasonographic findings

Table 2: Ultrasonographic findings

| Features | Grade 0 (N, %) | Grade 1 (N, %) | Grade 2 (N, %) | Grade 3 (N, %) |
|---|---|---|---|---|
| Medial condyle osteophytes | 8 (12.9%) | 33 (53.2%) | 17 (27.4%) | 4 (6.5%) |
| Lateral condyle osteophytes | 15 (24.2%) | 36 (58.1%) | 7 (11.3%) | 4 6.5%) |
| Medial tibial plateau osteophytes | 9 (14.5%) | 34 (54.8%) | 14 (22.6%) | 5 (8.1%) |
| Lateral tibial plateau osteophytes | 19 (30.7%) | 31 (50.0%) | 5 (8.1%) | 7 (11.3%) |
| Medial compartment joint space narrowing | 15 (24.2%) | 26 (41.9%) | 15 (24.2%) | 6 (9.7%) |
| Lateral compartment joint space narrowing | 40 (64.5%) | 17 (27.4%) | 4 6.5%) | 1 (1.6%) |

Medial condyle osteophytes and lateral condyle osteophytes: Grade 1 was the most common finding, with 53.2% and 58.1%. Medial tibial plateau osteophytes and lateral tibial plateau osteophytes: Grade 1 was the most common finding, with 54.8% and 50.0%. Medial compartment joint space narrowing: grade 1 was the most common (41.9%). Lateral compartment joint space narrowing was not found (grade 0) in 64.5%. In addition, synovitis in patients with knee osteoarthritis accounted for a fairly high rate of 87.1%.

### 3.4. Compare ultrasonographic findings with radiographic findings

Table 3: Comparison of ultrasonographic findings and radiographic findings

| Features | Kappa | P |
|---|---|---|
| Medial condyle osteophytes | 0.37 | <0.001 |
| Lateral condyle osteophytes | 0.25 | <0.001 |
| Medial tibial plateau osteophytes | 0.39 | <0.001 |
| Lateral tibial plateau osteophytes | 0.23 | <0.001 |
| Medial compartment joint space narrowing | 0.22 | <0.001 |
| Lateral compartment joint space narrowing | 0.18 | >0.05 |

There was moderate agreement between osteophytes and joint space narrowing grading on ultrasound and radiographs.

## IV. DISCUSSION

In a total of 50 patients (of which 62 knee joints were examined), we found that:

Both radiographs and ultrasound can detect osteophytes and joint space narrowing. Ultrasonography can detect earlier, subtle changes in osteochondral tissues such as osteophytes and articular cartilage, of which structural changes are a well-known feature of knee osteoarthritis [10].

In our study, synovitis in patients with knee osteoarthritis detected on ultrasound accounted for a fairly high rate of 87.1%. The results further confirm that there is secondary synovitis in degenerative knee joints.

There was moderate agreement between osteophytes and joint space narrowing grading on ultrasound and radiographs (p<0.05 and kappa: 0.2-0.4). Our research results show that ultrasound can also detect osteophytes in osteoarthritis in a similar way to radiographs. We found that all cases with osteoarthritis on radiographs showed signs of

reduced articular cartilage thickness on ultrasound. Results Saarakkala's study showed that the degree of articular cartilage damage assessed on ultrasound was closely correlated with the degree of articular cartilage damage observed through arthroscopy [9].

# V. CONCLUSION

There was moderate agreement between osteophytes and joint space narrowing grading on ultrasound and radiographs. Ultrasound can also detect and evaluate synovitis that may not be seen on radiographs. We recommend using the ultrasonography atlas created for knee osteophyte detection in routine knee ultrasound [8].

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