"CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS SECTIONAL STUDY"

BY

REGISTRATION NO: BL0121003

Dissertation

Submitted to the

KLE Academy of Higher Education & Research
(Deemed-to-be-University)
Belagavi, Karnataka

In partial fulfilment
of the requirements for the degree of

MASTER OF SURGERY
IN
ORTHOPAEDICS

DEPARTMENT OF ORTHOPAEDICS
JAWAHARLAL NEHRU MEDICAL COLLEGE,
BELAGAVI, KARNATAKA

DECEMBER – 2024 / JANUARY - 2025

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
BELAGAVI, KARNATAKA

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled **"CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS SECTIONAL STUDY"** is a bonafide and genuine research work carried out by me, under the guidance of

Department of Orthopaedics, Jawaharlal Nehru Medical College, Nehru Nagar, Belagavi-590010.

Date: 1/7/2024

Place: Belagavi

Registation No. : BL0121003

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
BELAGAVI, KARNATAKA

Endorsement

This is to certify that the dissertation entitled **"CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS SECTIONAL STUDY"** is a bonafide research work done by **REGISTRATION NO. BL0121003**, Department of Orthopaedics, Jawaharlal Nehru Medical College, Nehru Nagar, Belagavi - 590010.

DR. RAVI S. JATTI
MS (ORTHOPAEDICS)
Professor and Head,
Department of Orthopaedics,
J. N. Medical College,
Nehru Nagar, Belagavi

Date : 27/6/2024
Place : Belagavi

DR. (Mrs.) N.S. MAHANTSHETTI
MD (PAEDIATRICS)
Principal,
J. N. Medical College,
KAHER
Nehru Nagar, Belagavi

PRINCIPAL
J.N. Medical College,
BELAGAVI- 590 010

Date : 29/6/2024
Place : Belagavi

KAHER ★ BELAGAVI ★ J.N. MEDICAL COLLEGE

UNDERTAKING

"I, **REG NO: BL0121003**, hereby declare that the information and the data mentioned in my dissertation entitled "**CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS SECTIONAL STUDY"** belongs to me and is original. I am aware of the definition of plagiarism as detailed below :

- An act or instance of using or closely imitating the language and thoughts of another author without authorization and the representation of that author's work as one's own, as by not crediting the original author.
- A piece of writing or other work reflecting such unauthorized use or imitation.
- The deliberate or reckless representation of another's words, thoughts or ideas as one's own without attribution in connection with submission of academic work, whether graded or otherwise.

I, hereby declare that the dissertation prepared by me is original one and does not involve plagiarism anywhere. In case at a later stage, it is found that I have indulged in plagiarism, then I am solely responsible for the same and the institution is at liberty to take any disciplinary action against me including cancellation of dissertation or any other penalties imposed by the University."

Date : 1/7/2024 **REG NO : BL 0121003**

Place : Belagavi

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
BELAGAVI, KARNATAKA

COPYRIGHT

DECLARATION BY THE CANDIDATE

I hereby declare that KLE Academy of Higher Education and Research, Belagavi, Karnataka shall have the rights to preserve, use and disseminate this dissertation in print or electronic format for academic / research purpose.

Date: 1/7/2024

Place: Belagavi

Registration No.

BL0121003

ANTI – PLAGIARISM CHECK CERTIFICATE

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH

JAWAHARLAL NEHRU MEDICAL COLLEGE

(A constituent unit of KLE Academy of Higher Education & Research Deemed-to-be-University)

(Recognized by National Medical Commission, New Delhi)

Accredited 'A+' Grade by NAAC (3rd Cycle) Placed in Category 'A' by MoE (GoI)

Nehru Nagar, Belagavi- 590 010, Karnataka, INDIA

0831 - 2471350 0831 - 2470759 www.jnmc.edu rincipal@jnmc.edu

Ref No: MDC/PG/ Date: 24-06-2024

"ACCEPTANCE LETTER"

The softcopy of thesis entitled: "CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS - A PROSPECTIVE CROSS-SECTIONAL STUDY" has been submitted for anti-plagiarism check through Turnitin software. The scan has been carried out and the scanned output reveals a match percentage of 09% which is within the acceptable limits of 10% as per the guidelines given by UGC.

Guide.

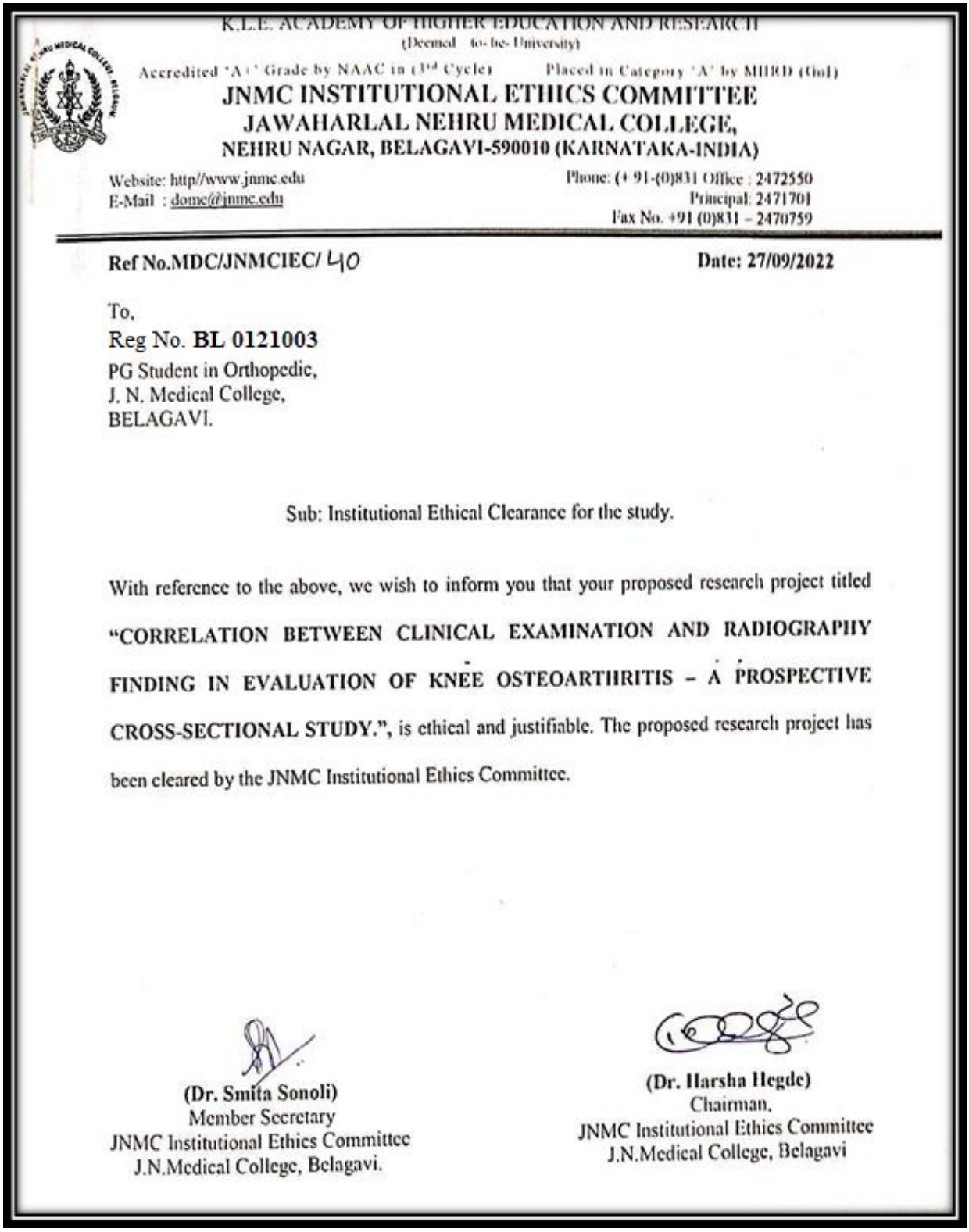
KAHER BELAGAVI J. N. MEDICAL COLLEGE

Dr. (Mrs.) N.S. Mahantashetti.
Chairperson-Antiplagiarism Committee &
Principal,
J. N. Medical College, Belagavi.

PRINCIPAL
J.N. Medical College,
BELAGAVI- 590 010

To,
Reg. No. BL0121003
Postgraduate Student,
2021-22 Batch,
Department of Orthopaedics
J. N. Medical College, Belagavi.

ETHICAL CLEARANCE



K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed to-be-University)
Accredited 'A+' Grade by NAAC in (3rd Cycle) Placed in Category 'A' by MHRD (GoI)

JNMC INSTITUTIONAL ETHICS COMMITTEE
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)

Website: http//www.jnmc.edu
E-Mail : jnmc@jnmc.edu

Phone: (+91-(0)831 Office : 2472550
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref No.MDC/JNMCIEC/ 40 **Date: 27/09/2022**

To,
Reg No. **BL 0121003**
PG Student in Orthopedic,
J. N. Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDING IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS-SECTIONAL STUDY."**, is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee.

(Dr. Smita Sonoli)
Member Secretary
JNMC Institutional Ethics Committee
J.N.Medical College, Belagavi.

(Dr. Harsha Hegde)
Chairman,
JNMC Institutional Ethics Committee
J.N.Medical College, Belagavi

ABBREVIATIONS

OA	OSTEOARTHRITIS
KL	KELLGREEN & LAWRENCE
VAS	VISUAL ANALOGUE SCALE
WOMAC	WESTERN ONTARIO AND MCMASTER UNIVERSITIES ARTHRITIS INDEX
ANOVA	ANALYSIS OF VARIANCE
MCL	MEDIAL COLLATERAL LIGAMENT
LCL	LATERAL COLLATERAL LIGAMENT
ACL	ANTERIOR CRUCIATE LIGAMENT
PCL	POSTERIOR CRUCIATE LIGAMENT
WHO	WORLD HEALTH ORGANIZATION
IGF-1	INSULIN LIKE GROWTH FACTOR-1
TGF-β	TRANSFORMING GROWTH FACTOR- β
BMP	BONE MORPHOGENETIC PROTEINS
TNF-α	TUMOR NECROSIS FACTOR- α
ILs	INTERLEUKINS
ECM	EXTRA-CELLULAR MATRIX
FGF-2	FIBROBLAST GROWTH FACTOR-2
PGs	PROTEOGLYCANS
NF-κB	NUCLEAR FACTOR KAPPA LIGHT CHAIN ENHANCER OF ACTIVATED B CELLS

MAPKs	MITOGEN-ACTIVATED PROTEIN KINASE
EULAR	EUROPEAN LEAGUE AGAINST RHEUMATISM
ACR	AMERICAN COLLEGE OF RHEUMATOLOGY
NICE	NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE
MRI	MAGNETIC RESONANCE IMAGING
USG	ULTRASONOGRAPHY
CT	COMPUTED TOMOGRAPHY
JSN	JOINT SPACE NARROWING
AP	ANTERO-POSTERIOR
HTN	HYPERTENSION
DM	DIABETES MELLITUS
FFD	FIXED FLEXION DEFORMITY
EBM	ERROR BOUND FOR POPULATION MEAN

Abstract

Introduction –

OA, or osteoarthritis is progressive degenerative condition which leads the cartilage and underlying bone within a joint to deteriorate. It is commonly referred as "wearing" of a joint. The patients with higher degree of radiographic knee OA is linked with more discomfort, however high degree of discordance has also been reported between clinical and radiological grading of knee OA.

It is observed that the patients with painful knee reduce their level of physical activities to relieve their symptoms hence possible painful knee becomes painless and accurate level of pain could not be assessed, therefore a discrepancy can be observed in clinical presentation and radiological severity.

Primary Objective –

The primary goal of the research is to explore and establish a relationship between clinical symptoms of knee pain reported by the patient, physical assessment findings as well as radiographic diagnosis of osteoarthritis in the knee.

Methodology –

The research study was conducted upon 109 subjects with knee pain and difficulty in walking coming to the Out-patient department of Orthopaedics or hospitalized in KLE Dr. Prabhakar Kore Charitable Hospital & Research Centre, Belgaum during one year of the cross-sectional study in 2022-2023.

Antero-posterior and lateral weight-bearing radiographs were obtained. The stage of osteoarthritis degeneration for which the Kellgren & Lawrence (KL) grading system applies was implemented. Clinical examination led to the determination of physical findings, and clinical symptoms are evaluated using the VAS scale and WOMAC scoring

system. Subsequently the level of pain and functional impairment correlated to the radio graphical imaging.

Results -

Within the population under investigation of 109 patients, those fulfilling inclusion criteria and willing to be part of the study were included. Majority of population (44.5%) were in those aged 60 to 69 years with 53% female and 47% male preponderance respectively.

The mean VAS score was (6.87 ± 0.90) for KL grade 2, (7.65 ± 1.19) for KL grade 3 and (9.18 ± 0.85) for KL grade 4 OA knee respectively.

Similarly, mean WOMAC score was found to be (55.10 ± 9.91) for KL grade 2, (67.80 ±12.77) for KL grade 3 and (80.06 ± 8.88) for grade 4 OA knee with (p value 0.000).

Spearman co-efficient corresponding 0.704 for VAS with grade of OA and 0.722 for WOMAC score with grade of OA shows that the grade of K-L 2 or more was linked to increased VAS score and WOMAC score.

In the study population a linear correlation of positive magnitude was discovered with knee pain, deformity, effusion, joint line tenderness, functional limitations or any of these using VAS and WOMAC questionnaire with radiographic K-L grading of OA knee using ANOVA analysis and Spearman coefficient.

Conclusion -

The correlation coefficient was found having strong positive linear correlation for both VAS and WOMAC scores with KL radiological grade of OA knee.

Keyword – Osteoarthritis, Kellgreen and Lawrence scale, WOMAC scale, VAS score

Table of Contents

List of Figures

List of Tables

Introduction

OA, or osteoarthritis is a long-term, worsening degenerative disease which affects all joint structures.

It is considered to be a condition that which impacts not just the cartilage but the entire joint including capsule, synovial tissue, ligaments, articular cartilage and subchondral bone. [3]

Joint degeneration occurs gradually as a result of a disturbance in the metabolic balance between the production and breakdown of cartilage and sub-chondral bone, which favors catabolic over anabolic processes. [1, 2]

Pain is a clinical symptom of osteoarthritis knee which also serves as a major reason for seeking medical attention. [24]

A clinical examination is used to provide a provisional diagnosis of OA which is then confirmed by radiographic abnormalities. Conventional X-rays show variations in the joint space width. This narrowing is more frequently observed in addition to bony sclerosis and cartilage deterioration on the medial side of the joint.

A painful joint on palpation, the phenomena of crepitus during movements, a reduced range of motion, joint deformation, and an impairment of joint axis, edema, effusion, and muscle weakness are all signs of a clinical evaluation. [4]

Joint deformation is the last stage of the disease progression.

Although there hasn’t been much level of evidence that radiographic osteoarthritis and clinical symptoms are directly correlated.

Thus it is required to conduct a study to establish if radiological findings in patient with knee OA can be correlated with clinical severity of symptoms.

Aim and Objective

To explore and establish a relationship between clinical symptoms of knee pain reported by the patient, physical findings and radio logically confirmed knee OA.

Review of Literature

Knee joint anatomy

Knee is a modified complex synovial type of joint. The articulating surface of the femoral condyles with the articulating surface of the patella (saddle patello-femoral joint) and the tibial and femoral condyles (hinge tibio-femoral joint) forms the body's largest joint.

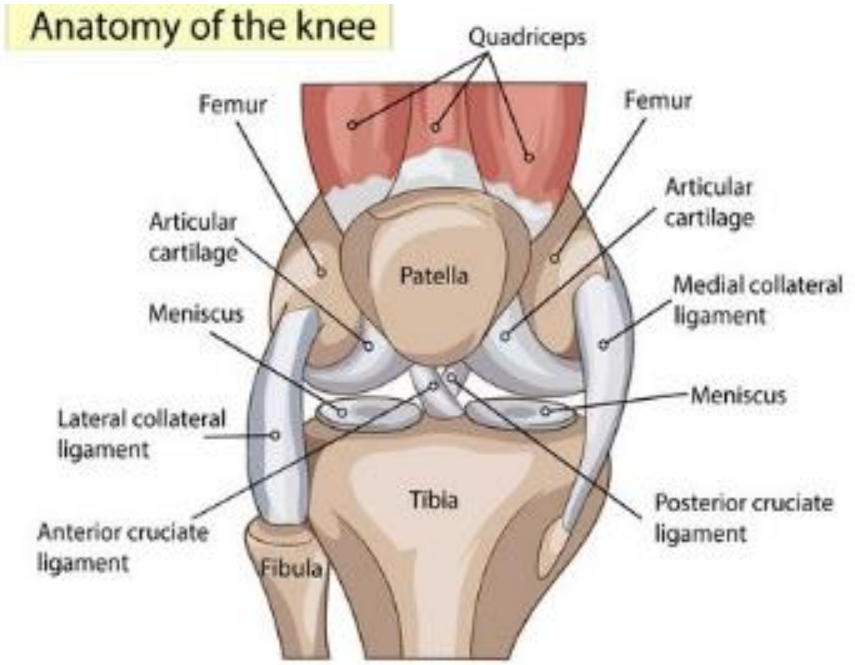


Figure 1 : Anatomical structures in knee joint

Functionally, it is a hinge type of a joint.

The knee is relatively unstable and the stability is provided by 2 main factors: **1)** Strong muscular and ligaments attached **2)** Presence of menisci which increase the congruence of articular surface.

The oblique popliteal and arcuate ligaments reinforce broad and thin fibrous capsule posteriorly.

From the articulating borders connecting the femoral condyles and intercondylar line to the articular margins of the tibia, the posterior fibers of the capsule go downward, obliquely, and medially parallel to the popliteus muscle.

Laterally, the attachment is proximal to the lateral femoral condyle such that the origin of popliteus muscle lie within the joint capsule cavity.

The medial and lateral collateral ligaments support the short, thick capsule on its sides.

Anteriorly, the capsule is deficient and as it passes anteriorly, it blends with the patellar retinaculum gaining attachment to the patella's side and extending upwards to the quadriceps tendon's side and downwards to the sides of the ligamentum patellae and the tibial tuberosity.

The deep surface of the capsule attaches weakly to the rims of the menisci as the coronary ligament and helps attaching them to the tibial plateau.

The fibrous capsule of the knee has three thickenings:

The semi-membranous tendon tendon expands to form the **Popliteal Oblique ligament** which is attached at the lateral femoral condyle posteriorly and the intercondylar fossa upward and laterally.

With its stem attached to the fibular head, lower limb linked to the tibial intercondylar region's posterior edge, and the upper limb attached to the lateral femoral condyle's posterior surface, the **Arcuate popliteal ligament** is a Y-shaped, thickened structure on the capsule's posterior aspect.

A thin fibrous band extends from the fabella in the gastrocnemius muscle lateral head forming the weak fabello-fibular ligament.

Medial capsular thickening is attached firmly to the medial meniscus and represents the deep part of the (MCL), medial collateral ligament.

The extra-capsular ligaments are derived from the fibrous capsule of the joint or from facial expansions of the surrounding muscles which include:

The tendon quadriceps femoris continues from the front and lower margins of patella to the tibial tuberosity as the **Ligamentum patellae.**

The **iliotibial tract** also spreads into a sheet of fibers that attach to the medial patellar retinaculum.

The lateral and medial patellar retinacula represent an expansion of fibers of quadriceps femoris passing backwards to the collaterals of the knee and downwards to the tibial plateaus.

Lateral (fibular) collateral ligament which pierces the biceps femoris tendon, is a structure that resembles a cord and stretches from the femur's lateral condyle to the fibula's head.

Poplitues tendon and a bursa lie between it and the lateral meniscus.

Medial (tibial) collateral ligament, a thick band which extends from the femur's medial condyle to the upper part of the medial surface of the tibia shaft and deep down to the tendons of the pes anserinus muscles. It is secured attached to the medial meniscus by its deep fibres.

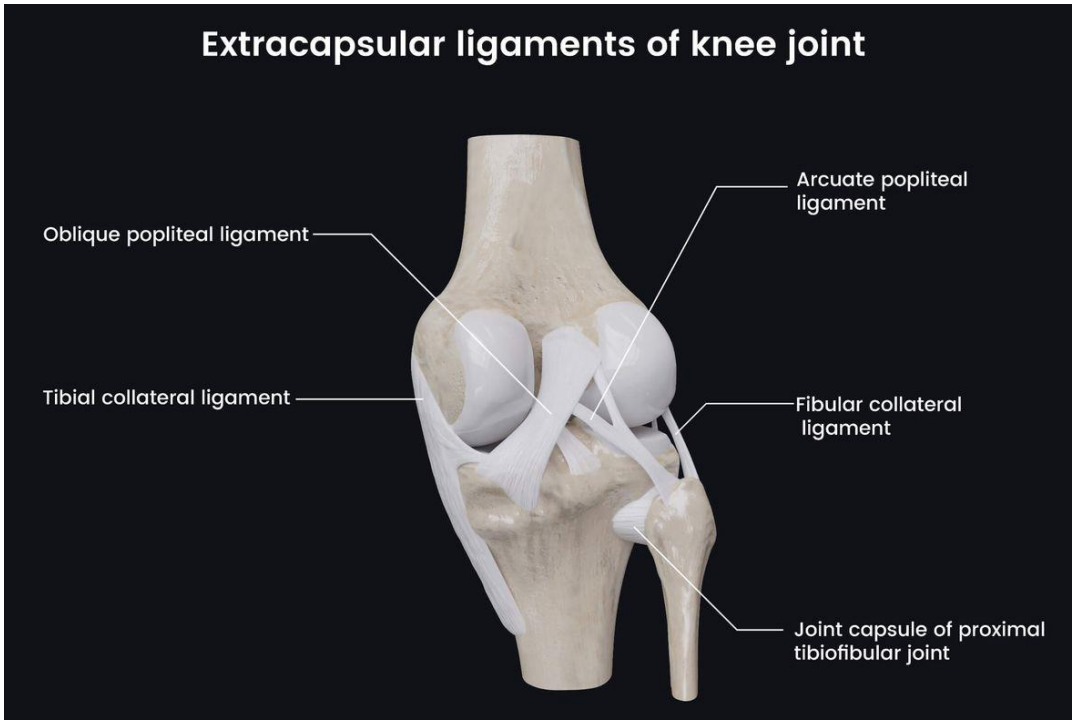


Figure 2 : Posteromedial view of knee joint depicting extra-capsular ligaments and their attachments.

The intra-capsular but extra-synovial ligaments include the anterior and posterior cruciate ligaments.

Each ligament is named according to its tibial area of attachment; anterior or posterior.

Each ligament prevent the tibia translation from in the direction consistent with its name.

Anterior cruciate ligament (ACL), **attaches** to the postero-medial surface of the femur's lateral condyle by extending upward, backward and laterally from the anterior intercondylar portion of the tibia.

It prevents the tibia from translating forward on the femur or alternatively stops the backward translation of femur over the tibia.

Posterior cruciate ligament (PCL) is less oblique, shorter and stronger. It extends upwards, forward and from the tibia's posterior intercondylar area medially to the medial femoral condyle's anterolateral surface, where it is attached.

It prevents the femur from translating forward on the tibia or alternatively stops the backward translation of tibia over the femur

The Menisco-femoral ligaments (anterior and posterior) are made up of fibers from the lateral meniscus that extend to the medial femoral condyle from both in front and behind the posterior cruciate ligament.

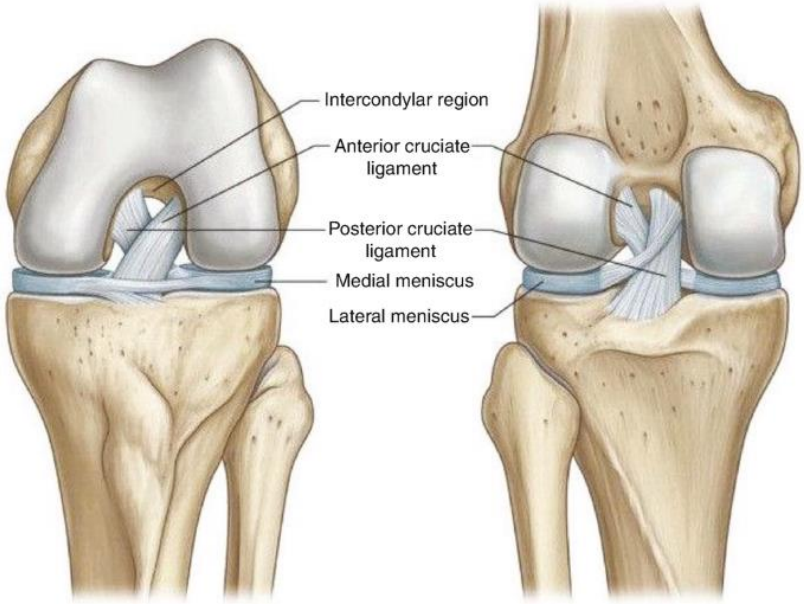


Figure 3 : Knee joint's intra-capsular ligaments

Menisci are two C-shaped avascular fibro-cartilaginous cushions that deepen the articular surface of the tibial plateaus and act as shock absorbents.

Fibers that mix in with the fibrous capsule as the coronary ligaments bind each meniscus to the tibial condyle's borders.

The menisci's inner borders are concave and thin. Each meniscus has horns on each side that connect it to the front and posterior parts of the intercondylar area.

Some fibers of the anterior horn of both medial and lateral menisci are joined together forming the knee's transverse ligament.

Lateral meniscus is smaller, more deeply concave, more circular (4/5th of a circle) and has a more regular breadth than the medial meniscus. Its horns are more closely attached to each other.

Medial meniscus is larger, less concave, more oval antero-posteriorly and less regular in breadth than the lateral meniscus.

Its horns are more widely separated in their attachments.

Because of its shape and because the medial femoral condyle is larger than the lateral one therefore the medial meniscus over 20 times is more liable of being irreversibly damaged than the lateral meniscus.

This type of injury occurs when the femur is rotated on the tibia in the weight-bearing, partially flexed knee resulting in crushing of the meniscus under the weight of the femoral.

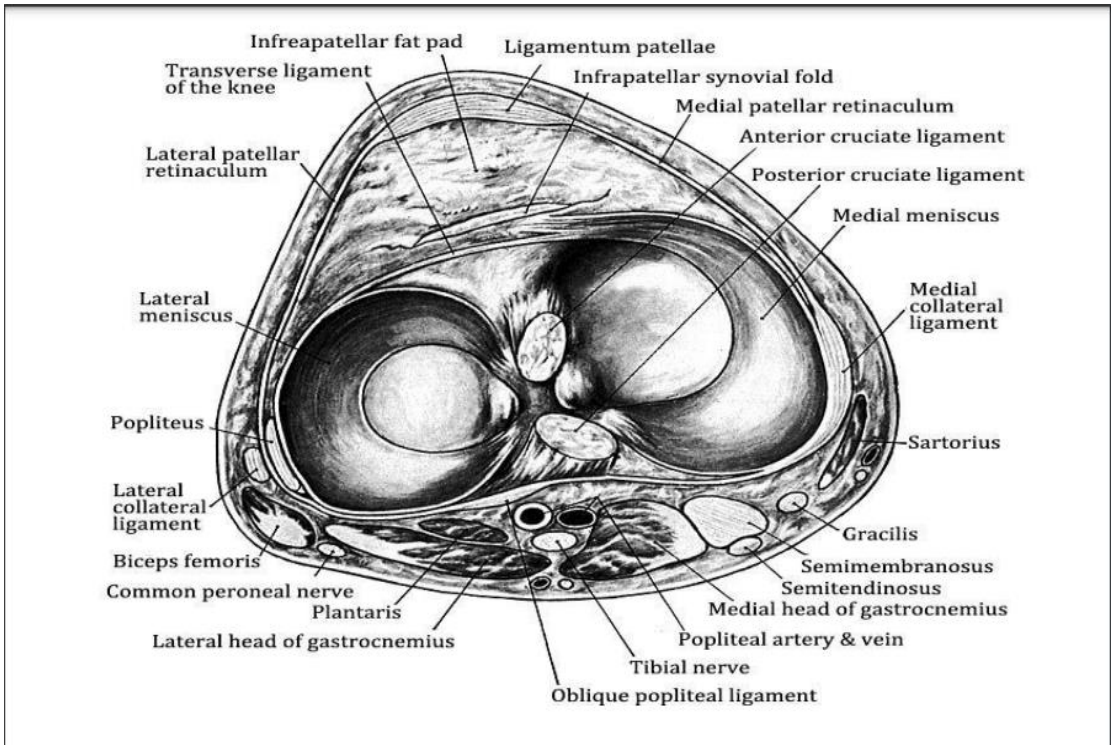


Figure 4 : Knee joint axial view

The knee joint stabilizers help in maintaining the stability of knee joint.

Static stabilizers include: Joint capsule, collateral ligaments, Medial patella-femoral ligament.

Dynamic stabilizers include: Quadriceps, Gastronemius, Pes anserinus, Biceps femoris, Tensor fascia lata, Popliteus, Semimembranous.

The knee is a functionally a hinge joint with essentially only flexion and extension movement.

Nonetheless, owing to the differences in the size between the menisci and the medial and lateral femoral condyles, the tibia can rotate to some extent on the femur in flexion.

The medial rotation of the condyles' of femur on the tibial plateau causes the knee to naturally "lock" while the person is standing with their knee completely extended.

The cruciates, collateral ligaments and the ilio-tibial tract along with skin and fascia all become taut and the knee is said to be "locked" in extension i.e. the femur cannot be rotated on the tibia.

A fully extended knee is actually 5˚-10˚ hyperextended because the vertical axis that passes anterior to the knee joint is where the body's center of gravity is located.

Lower limb is in the state of like a solid column and hence better suited for weight bearing.

The leg and thigh muscles can momentarily relax without causing instability in the knee joint while the knee is "locked".

The popliteal muscle contracts to unlock the knee, causing the femur to rotate laterally on the tibia plateau by around 5°. This allows for knee flexion owing to the flexors.

Osteoarthritis

Another prevalent musculoskeletal ailment among elderly population is osteoarthritis (OA). Primary knee OA affects around 50% of those 75 years of age and older. It causes knee discomfort, stiffness in the joint, edema, and effusions in addition to limiting mobility. (5)

Epidemiology

As people age and life expectancy gradually increases, knee OA has been shown to impair patient quality of life and to be a global public health burden. (6)

Numerous studies on osteoarthritis have been conducted in the last several decades by the the International League Against Rheumatism, World Health Organization (WHO), and research global experts in the subject. Numerous population based epidemiological research studies have been carried out globally. (7, 53)

In 2020, **595 million** people worldwide were diagnosed with osteoarthritis, representing **7·6%** of the world's population. Since 1990, an increment of **132.2%** has been reported in cases worldwide. (35)

By 2050, it is predicted that the number of cases of osteoarthritis in the knee would increase by **74.9%** (59.4-89.9) compared to 2020. [8]

Around **73%** of people with osteoarthritis are older than 55 years, and of which **60%** are female. [33]

In India, number of people with OA knee grew from around **23.46 million** individuals in 1990 as compared to 62.35 **million** in the year 2019. [9]

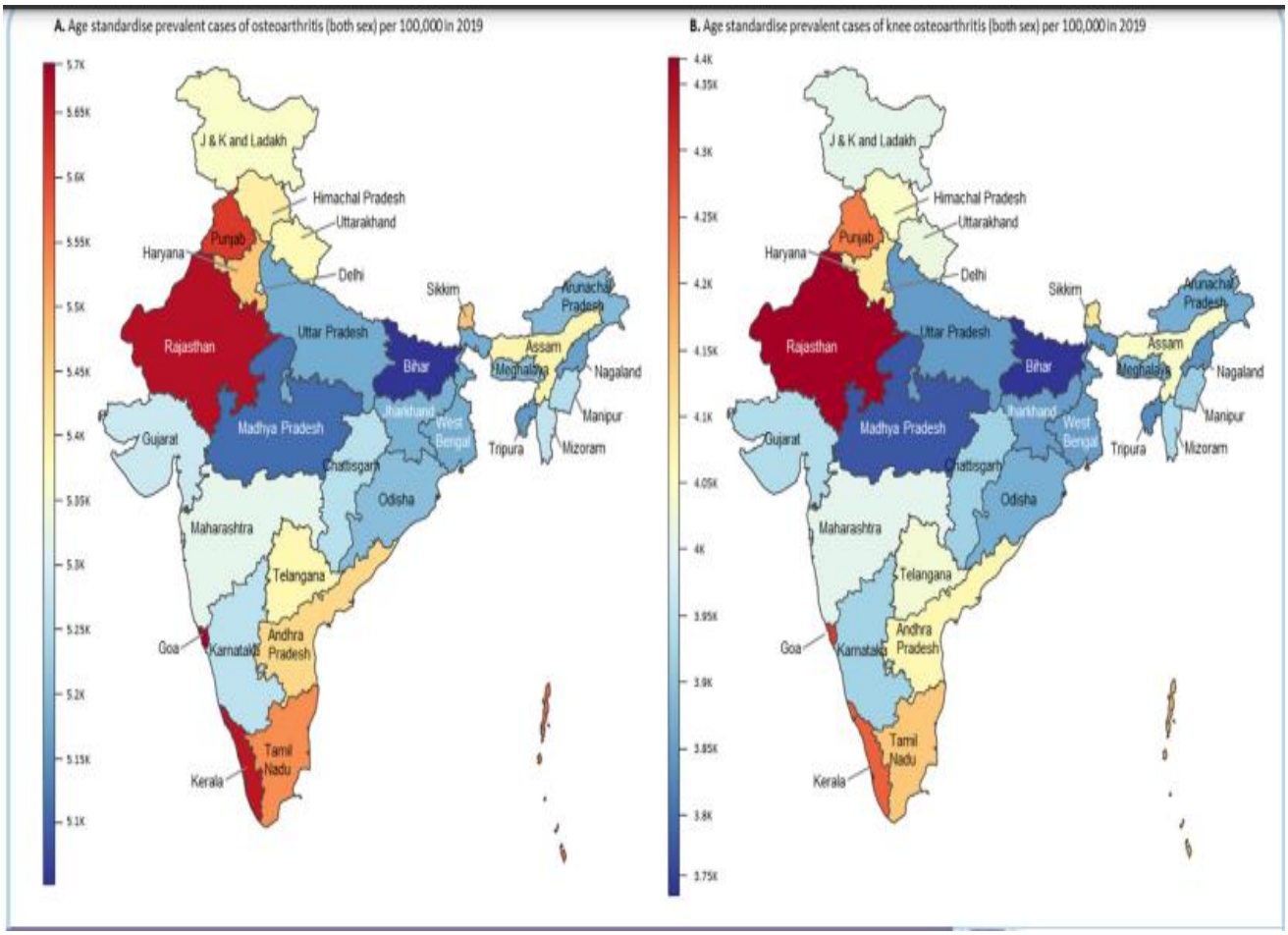


Figure 5: Age standardised prevalence of osteoarthritis in different states by 2019

Pathogenesis of Osteoarthritis

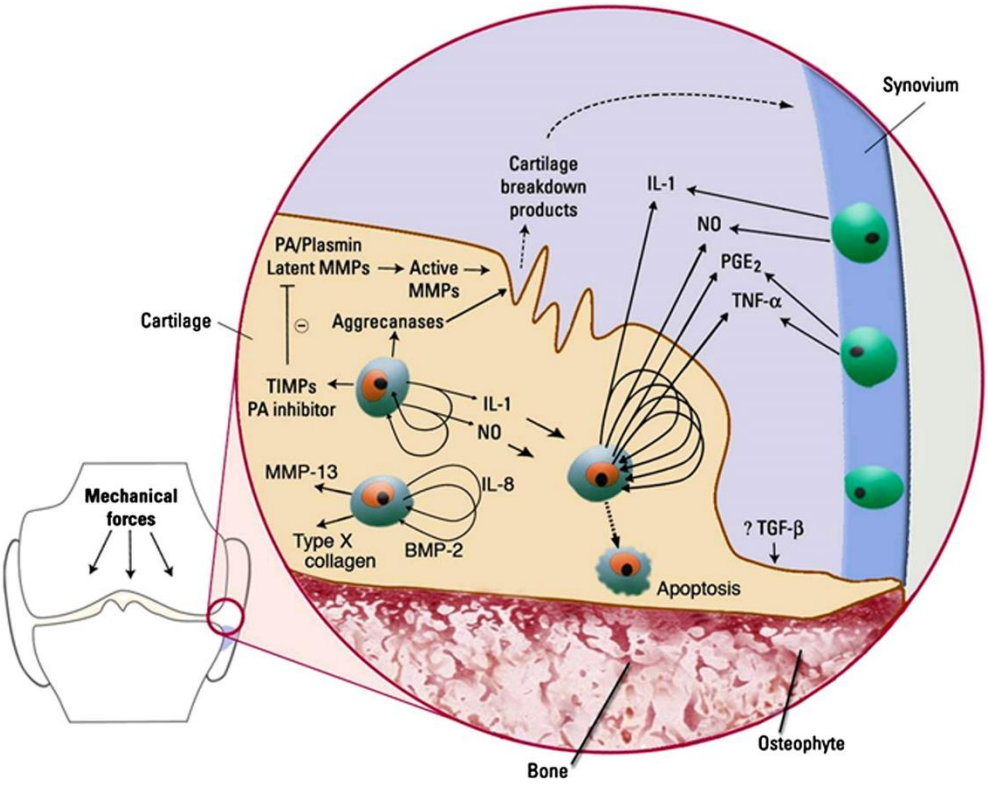


Figure 6: Pathogenesis of OA knee

The imbalance between cartilage synthesis and degradation during the pathological development of knee osteoarthritis is primarily influenced by pro-anabolics: IGF-1, TGF-β and BMP and pro-degrading cytokines: (TNF-α), Interleukins (ILs). (6)

Primary pro-degenerative factors are: TNF-α and (IL-1β, 6, 15, 17 and 18). TNF-α and IL-1β are potent activators of degradation of cartilage extra-cellular matrix (ECM).

Pro-anabolics include: FGF-2, Interleukins (IL-4, 6, 10 and 14), BMP-2 and 7, TGF-β family members, IGF-1, members of the IL-4 and 10 with anti-inflammatory and regulatory cytokines secreted by the cartilage, synovial membrane, or other tissues. (6)

Degradation of the matrix and deterioration of the cartilage are also intimately linked to free radicals.

For instance, an imbalance between the synthesis and degradation of proteoglycans (PGs) and collagen in the cartilage matrix may result from reactive oxygen species, restrict the proliferation of articular chondrocytes, and increase their apoptotic activity. All of these effects can lead to cartilage damage. (45, 46)

Extra-cellular matrix degeneration is the primary mechanism of cartilage damage in knee OA. (10)

Degradation related signaling pathways include toll-like receptors, NF-κB, the Wnt/β-catenin and signaling pathways of Notch and MAPKs.

Normal cartilage often experiences very little amount of apoptosis, confined to the superficial layer. (11)

On the other hand, increased apoptotic activity in the cartilage is one of the pathogenic processes of knee OA and a sign of degenerative process.

The traditional signs of osteoarthritis (OA) include osteophytes formation and sub-chondral bone sclerosis, sometimes referred to as bone re-modelling [(6).]

Based on a number of studies, sub-chondral bone lesions can show up before cartilage deterioration in the early stages of knee OA.

Association of risk factors

- Old age
- Female gender
- Genetics
- Overweight and obesity

While obesity was linked to a greater grade of radiographic knee OA, it had less of an impact on the disease's course. The association between BMI and knee OA is predominantly linear [(34, 63)]

Obesity is a potential contributory factor in 69% of arthroplasty knee.

- Repetitive joint usage, Traumatic injury to knee,
- Laxity in joints, decreased bone density and weakness in the quadriceps.
- Occupational related
- People who often squat are more likely to develop early-stage osteoarthritis.
- Squatting for long duration is a substantial risk factor for knee OA in the elderly people, with over 68% of females and 40% of males reporting squatting for more than 1 hour per day. [(13, 52)]

Clinical symptoms

Patient commonly presents with:

- Pain in the knee that aggravates with activity and relieves on rest
- Swelling over the knee joint
- Creaking sound on knee movement
- Restriction of movements
- Difficulty in daily routine activities like sitting crossed-leg over the floor, climbing stairs, getting out of chair, using Indian toilet seat, [54]
- Deformity

Clinical signs

- Synovial hypertrophy and swelling of the knee joint
- Tenderness commonly located over the joint line and at the insertion site of the collateral ligaments associated with muscle spasms, tendonitis and bursitis.
- Palpable crepitus produced by uneven articular surfaces rubbing against one another and loose cartilage fragments in the joint during active or passive joint movement.
- Restricted range of motion in the joints, which may be brought on by discomfort, exudate adhesions, muscle spasm, flexion contracture, degeneration and loss of cartilage, mechanical blockage from the menisci or cartilage, or intra-articular loose bodies.
- Deformed joint, either valgus or varus.

Figure 7 : Clinical photograph depicting Fixed flexion deformity (FFD) of knee

Figure 8 : Clinical photograph depicting Varus deformity of knee

The European League Against Rheumatism (EULAR) [13] ,American College of Rheumatology (ACR) criteria [14, 37], or National Institute for Health and Care Excellence (NICE) [15] guidelines-- which emphasize the importance of the patient's symptoms and clinical findings—can be utilized to establish a knee OA clinical diagnosis.

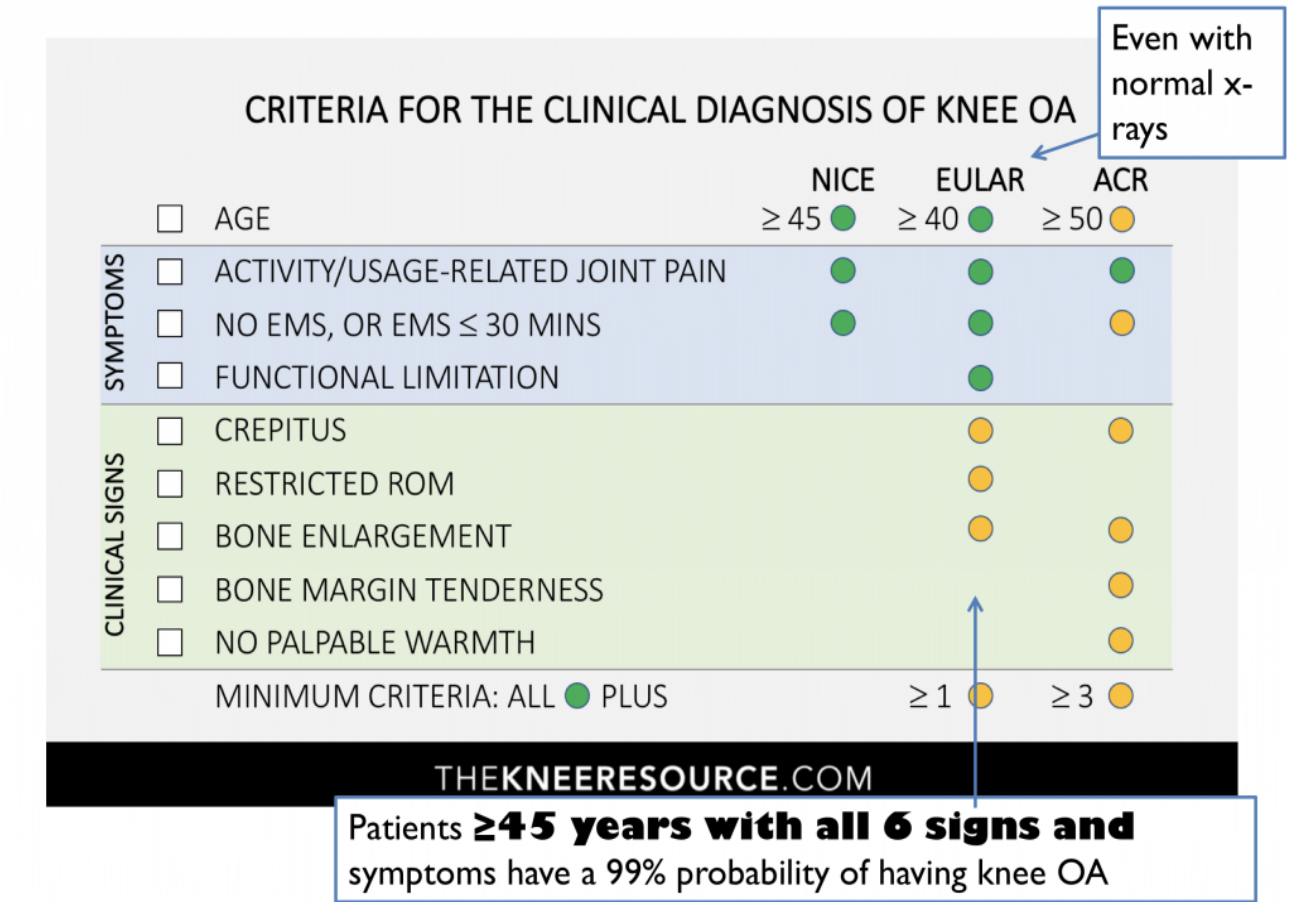


Figure 9: Criteria for diagniosis of OA knee

The most popular method for radiologically diagnosing OA knee is conventional radiography, which consists of X-rays. However, newer modalities like MRI and USG have also made it possible to see inflammatory lesions in joint and peri-articular areas more clearly. [17]

The fundamental X-ray images needed to evaluate each of the knee's three compartments are as follows: **1)** Antero-posterior weight-bearing view **2)** lateral view **3)** the Rosenberg view **4)** skyline view. [6]

While X-rays are a useful tool for identifying bone abnormalities resulting from osteoarthritis, it is still unknown how much soft tissue is affected.

Although the measurement of the joint space on X-rays is a useful but imprecise way to evaluate joint cartilage, it is not an exact approach since the joint space also comprises soft tissue components like menisci, ligaments, and synovium in addition to cartilage.

The usual X-ray findings of osteoarthritis are basically composed of sub-chondral sclerosis, osteophytes development, joint surface deformation, and cysts. [38]

Just **56%** of instances of radiographic OA may be identified by using an antero-posterior view alone. By using a skyline or lateral view, this number rises to **87%**, and by using all three views, it approaches **100%**. [17]

Definitions of radiographic knee OA, such as the Kellgren and Lawrence (K&L) grading [16, 62] focus on structural alterations that impact the joint.

When combined with radiography, the Kellgren-Lawrence grading system provides a valid and dependable assessment instrument.

This approach was approved by the World Health Organization and is often used in epidemiologic research and diagnosis of knee OA. [55]

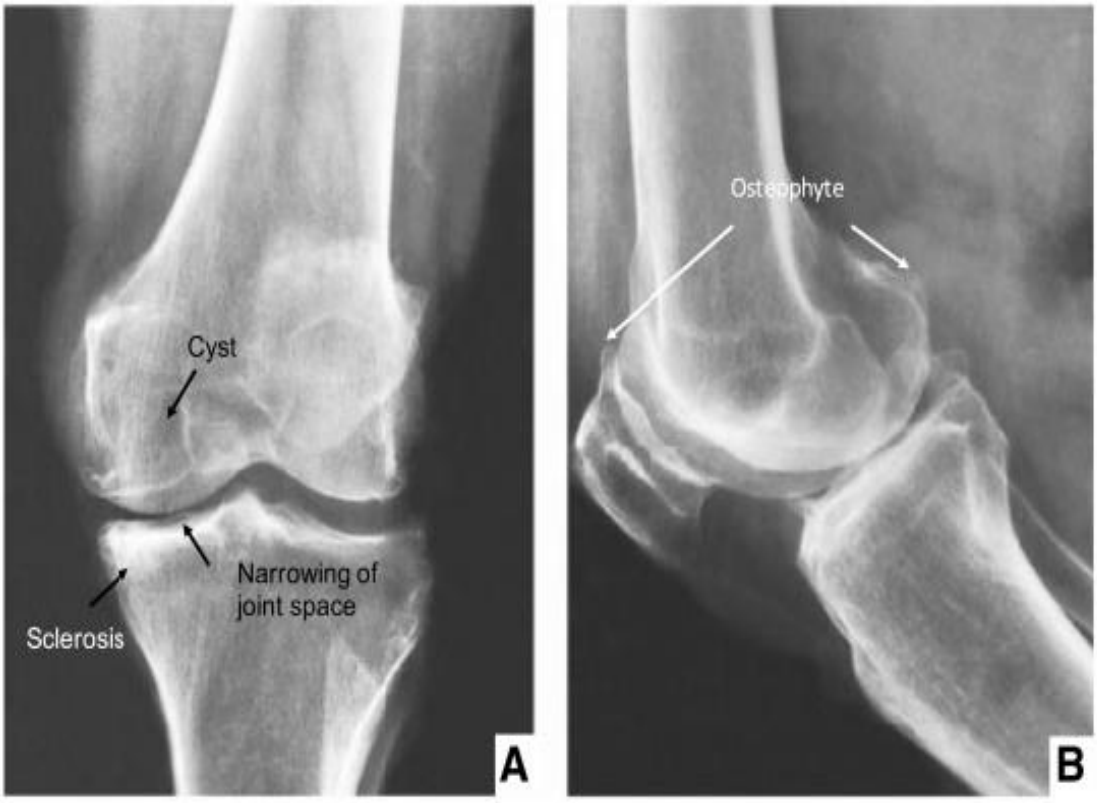


Figure 10 : Radiographic features of OA knee
A – Antero-posterior view
B – Lateral radiograph of knee demonstrating narrow medial tibio-femoral and patello-femoral compartments, subchondral sclerosis and osteophytes.

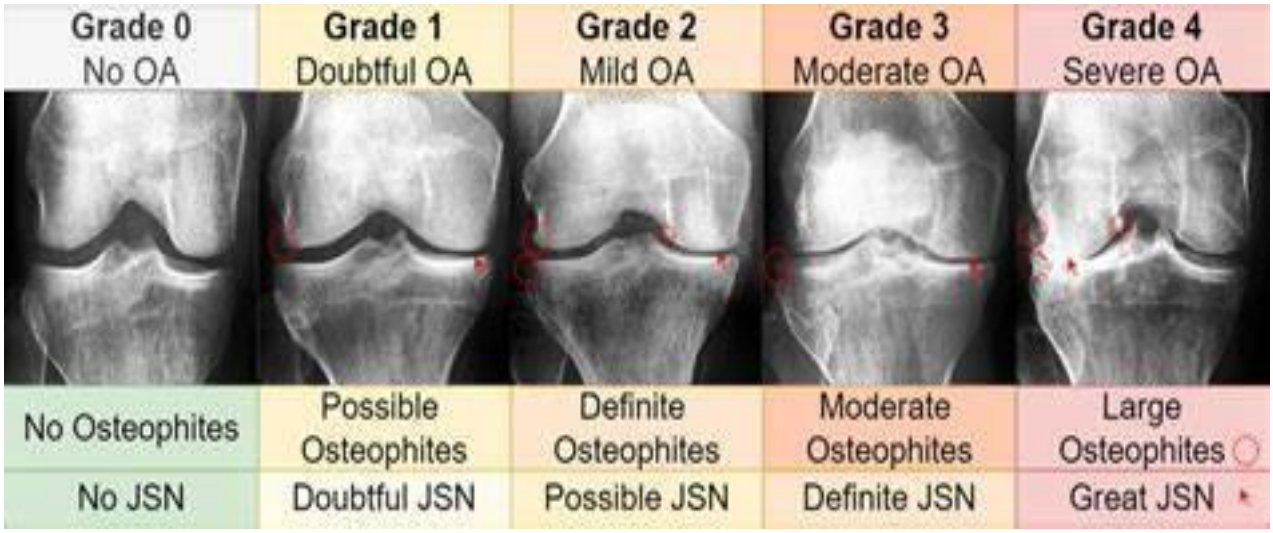


Figure 11 : Kellgreen and Lawrence radiological grading for OA knee.

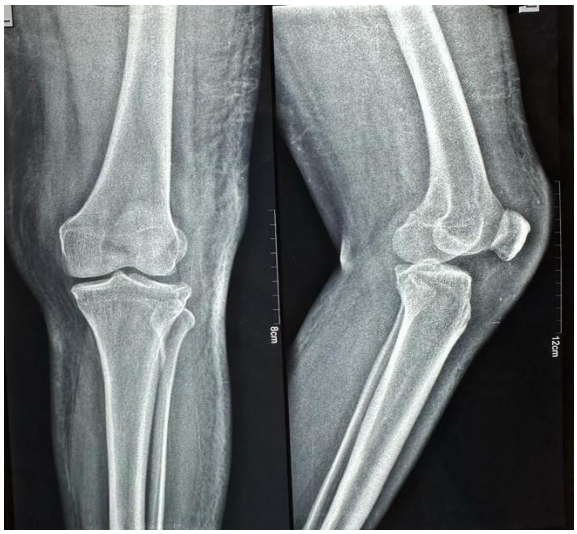


Figure 12 : Kellgreen and Lawrence grade – 1

Figure 13 : Kellgreen and Lawrence grade – 2

Figure 14 : Kellgreen and Lawrence grade – 3

Figure 15 : Kellgreen and Lawrence grade – 4

When an adult patient (over 50 years of age) exhibits activity-related joint pain [18] ,crepitus during active movement, bony enlargement, morning stiffness lasting less than 30 minutes, and no discernible warmth, a clinical diagnosis of osteoarthritis (OA) can be made without the need for additional testing.

Deformity, joint-line or peri-articular soreness, instability, and pain upon patello-femoral compression are some characteristics that may appear additionally. [17, 70].

The main purpose of Computed tomography (CT) and Magnetic resonance imaging (MRI) studies are done to rule out alternative differential diagnoses.

The CT scan has its own limits. For example, it may not be sensitive enough to detect some mild soft tissue injuries, and it is not as frequently employed in clinical practice.
Finding debris or loose body in the joint and figuring out the anatomy of the patello-femoral joint are its main indications. (17,51).

Lesions in the knee joint's soft tissue, bone marrow, and cartilage can be seen with an MRI. Early cartilage-related and synovial lesions, as well as structural anomalies in peri-articular tissues including ligaments and menisci, can be detected with its assistance. (19)

It also makes assessing the amount of bone resorption surrounding the knee joint easier.

Early diagnostic value may be obtained by precisely evaluating the degree of lesions through the use of quantitative and semi-quantitative analysis of cartilage. (42, 58, 59)

Although quantitative T2-weighted MRI scans have limited use due to the difficulty in differentiating between degenerative osteoarthritic changes and inflammatory arthritic changes, they may be useful as a sign for prompt evaluation and diagnosis of Knee OA. (20, 43)

Popliteal cysts, cartilage lesions, and joint exudation can all be seen with an ultrasound examination.

Plain radiographs continue to be the gold standard imaging modality for identifying knee OA and excluding out other potential causes of knee pain, despite recent advancements in a number of alternative imaging modalities. [21]

Assessment of severity of OA using pain scores

It is necessary to take into account a number of parameters while rating the clinical severity of knee OA. Acute pain can be rated using numerical or visual analogue ratings.

In 1921, Hayes and Patterson presented the visual analog scale (VAS), a technique for measuring pain.

A solitary point is positioned at one end of a 10-cm line, symbolizing a continuum between the two extremes of the scale: the left end (0 cm) denotes "no pain," while the right end (10 cm) signifies "worst pain." Based on a self-reported symptom assessment, the score is calculated.

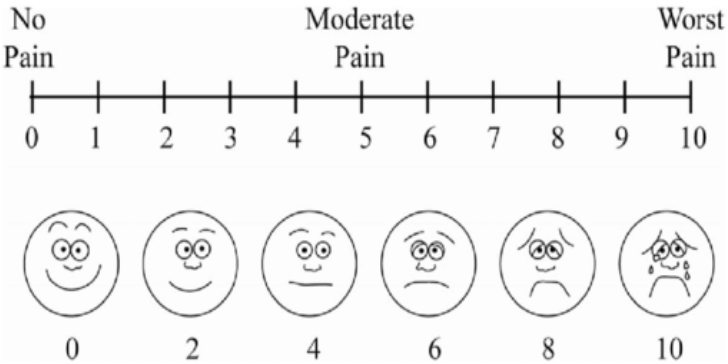


Figure 16: Visual Analogue Scale (VAS)

Degree of pain	VAS score range
NO pain	Score = 0
Mild Pain	Score = 1 to 3
Moderate Pain	Score = 4 to 7
Severe Pain	Score = 8 to 10

Table 1: Interpretation of VAS score

The patient's pain score is calculated by measuring in centimeters from the left end of the scale, which serves as the beginning point, to their markings. [22]

A more comprehensive grading system, such as the Western Ontario and McMaster Osteoarthritis Index (WOMAC) [60], is required for chronic pain and functional impairment. It offers an exhaustive evaluation of the effect and severity of osteoarthritis (OA) in the knee. [56]

Pain

	None	Slight	Moderate	Severe	Extreme
Pain – Walking	☐	☐	☐	☐	☐
Pain – Stair climbing	☐	☐	☐	☐	☐
Pain – Nocturnal	☐	☐	☐	☐	☐
Pain – Rest	☐	☐	☐	☐	☐
Pain – Weightbearing	☐	☐	☐	☐	☐

Stiffness:

Morning Stiffness	☐	☐	☐	☐	☐
Stiffness occuring during the day	☐	☐	☐	☐	☐

Level of difficulty performing the following functions, on average, during the last 48 hours:

	None	Slight	Moderate	Severe	Extreme
Descending stairs	☐	☐	☐	☐	☐
Ascending stairs	☐	☐	☐	☐	☐
Rising from sitting	☐	☐	☐	☐	☐
Standing	☐	☐	☐	☐	☐
Bending to the floor	☐	☐	☐	☐	☐
Walking on flat	☐	☐	☐	☐	☐
Getting in/out of a car	☐	☐	☐	☐	☐
Going shopping	☐	☐	☐	☐	☐
Putting on socks	☐	☐	☐	☐	☐
Rising from bed	☐	☐	☐	☐	☐
Taking of socks	☐	☐	☐	☐	☐
Lying in bed	☐	☐	☐	☐	☐
Getting in/out of bath	☐	☐	☐	☐	☐
Sitting	☐	☐	☐	☐	☐
Getting on/off toilet	☐	☐	☐	☐	☐
Performing heavy domestic duties	☐	☐	☐	☐	☐
Performing light domestic duties	☐	☐	☐	☐	☐

The WOMAC parameters are:
0 – none, 1 – slight, 2 – moderate, 3 – severe, 4 – extreme.
The index is out of a total of 96 possible points, with 0 being the best and 96 being the worst

Figure 17: WOMAC score components

Various articles discussing radiological and clinical and correlation of inferences in knee osteoarthritis (OA)

Results from a cross-sectional study by Oana SerbN et al. showed that “as the K&L grade increased, substantially higher VAS and WOMAC ratings were recorded”.

In their research, Divya Sanghi et al. found that “when radiological characteristics other than those in the K&L grades were present, pain, stiffness, and disability all significantly correlated with radiographic images; stiffness and pain were also positively correlated with articular incongruity of the joint; and functional impairment was clinically and strongly associated with juxta-articular osteopenia”.

A cohort research by Parsons et al. found a “moderate degree of agreement between self-report techniques and knee OA diagnosed by radiography and clinical examination”.[(23)]

According to a cohort research conducted by Tuhina Neogi et al., it was ascertained that “a solid structure-symptom association exist for knee osteoarthritis”.[(24)]

Lethbridge-Çejku et al.'s long term research data demonstrated “an absolute link between pain intensity and all radiographically measured degrees of severity of OA”.[(25)]

A continuous concurrence of less than 10% was found in the radiological and clinical diagnosis of osteoarthritis knee, according to a meta-analysis.

Relevant to earlier research, it has been demonstrated that "there is a moderate degree of agreement between radiographic tibio-femoral OA, which is defined as a K&L grade of greater than or equal to 2, and clinical diagnosis of OA knee, as determined by the ACR criteria[14]".[5]

The prevailing consensus is that structural radiography alterations and clinical symptoms of OA are not consistent. [17] .Increased pain intensity can be correlated with minimal radiological findings, or vice versa.

As radiography is widely accessible, affordable, and well-liked by patients, it continues to be the mainstay for getting an image-based diagnosis of osteoarthritis.

With this method of imaging, features like osteophytes formation, decreased joint space, sclerosis of sub-chondral bone, or sub-chondral cysts may be clearly seen in the early stages of the illness.
Antero-posterior (weight-bearing), lateral, and views are frequently advised. [68, 69]

With regard to osteoarthritis (OA) of the knee, ultrasonography has demonstrated its capacity to identify and assess a broad range of antero-superior articular cartilage, synovial tissue, joint effusion, and bony cortex structural abnormalities.

When it came to identifying tibio-femoral osteophytes, extrusion of medial meniscal, and medial compartment cartilage degradation, ultrasonography fared as well as or better than radiography. [17].

Radiographic features and clinical symptoms of osteoarthritis were favorably linked with the results of ultrasonography assessments of extruded medial meniscal bulge, effusions, and Baker's cyst. [17].

The association between radiological and clinical manifestations of osteoarthritis (OA knee), significant disease process outcomes, and the most effective ways to identify individuals who are more vulnerable to disease progression are some of the issues that need to be investigated in this specific area of research.[5, 57]

Materials and Methods

Source of data : Individuals with complaints of knee pain and difficulty in walking coming to the Out-patient department of Orthopedics or hospitalized –at the KLE Dr. Prabhakar Kore Charitable Hospital & Research Centre, Belgaum over a duration of 1 year starting from 1st October 2022 to 30th September 2023.

Study Design: A cross-sectional research study conducted in a tertiary level hospital.

Study Period: 1st October 2022 to 30th September 2023.

Sample Size: The minimum sample size determined, on the basis of prevalence rate is-

$$n = \frac{z_\alpha^2 P(1-P)}{d^2}$$

Where the letters "d" stand for the percentage probability difference in prevalence and "P" for the prevalence rate.

Zα is correlated with significance level. At a significance level of 5%, Zα = 1.960
The factor considered for calculation is the highest prevalence rate in Indian population for osteoarthritis knee.

With P = 39% and d = 25% of P = 9.75%, the sample size calculated amounts to 96.

For relevance and significance point of view, the sample population size collected was improvised to **109**.

Sampling Method: Simple Random Sampling

Selection of subjects

Inclusion Criteria:

- Patients satisfying the ACR (American College of Rheumatology) recommendations for primary OA knee and were > 50 years of age.

- Painful knee joint

PLUS any 3 of the subsequent features:

1. Age at least 50 years of age
2. Early morning stiffness of knee for a duration of < 30 min
3. Bony tenderness
4. Bony crepitus on active movement
5. No palpable warmth
6. Bony enlargement

Exclusion criteria:

- Patients diagnosed with secondary knee OA (inflammatory, traumatic, metabolic, septic causes) were excluded.

- Patients with knee pathology due to systemic or other local causes causing knee pain were excluded.

- Operated cases of knee pathology were excluded.

- Patients not willing to give informed or written consent or not willing to undergo the advised investigations.

Study Protocol:

The research examined 109 individuals who satisfied the inclusion and exclusion parameters and complained of knee discomfort and trouble walking, when they attended KLE's Dr. Prabhakar Kore Charitable Hospital & Research Centre, Belgaum.

The patients received a thorough explanation of the research procedure and were asked to sign a voluntary written informed consent form.

After the patient has officially completed a voluntary written informed consent form, additional clinical evaluations and imaging are performed.

The developed questionnaire was used to examine the symptoms' severity. Symptoms measured using the knee-specific WOMAC index, which uses a 5-point scoring system to evaluate knee stiffness (2 items), pain (5 items), and function (17 items). (0–none; 1-moderate; 2-severe; 3-extreme); 4-none).

The VAS scale was also used to quantify knee pain; a higher score indicated a worse grade.

Weight-bearing antero-posterior (AP) and lateral views X-rays were obtained during the study's patient recruitment process using standard procedures. An orthopaedic surgeon and radiologist who were blind to the patient's diagnosis and clinical profile reported the radiographs in order to eliminate bias.

OA is described as having K&L grade more than or equal to 2 in at least one knee.

In case of bilateral involvement of knee, the more painful knee considered as the indicator knee.

Statistical Analysis

For quantitative data that were continuous, mean and standard deviation were computed.

Data collected for VAS, WOMAC and OA Grades for different age groups, gender, occupation, clinical diagnosis, etc.

Descriptive statistics of VAS, WOMAC scores calculated (mean ± standard deviation (SD) to examine variability of the values for confidence interval at 95% confidence level to ascertain that there is no overlapping of VAS and WOMAC scores for the three OA grades (grade 2, grade 3 and grade 4) and certainty of VAS and WOMAC scores is established with respect to grade of OA.

Single way ANOVA test was performed to find whether mean values of VAS and WOMAC scores are same or different.

Correlation between VAS/WOMAC scores and OA grades were determined by utilizing Spearman rank correlation test.

The correlation coefficient was found having strong positive linear correlation for both VAS and WOMAC scores for different OA grades.

For all the tests the value of p less than 5 percent (0.05) was considered significant.

Results

109 patients fulfilling inclusion/exclusion criteria and willing to be part of study were included.

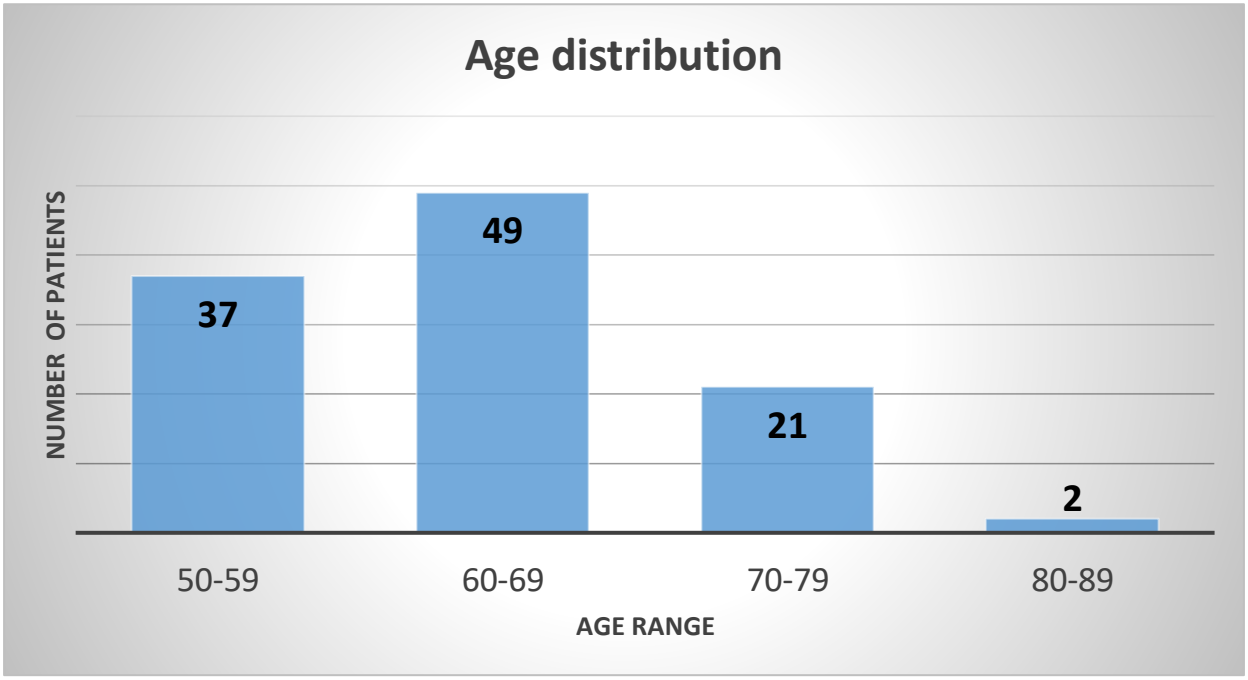


Figure 18: Bar graph showing age distribution pattern of the study population

Age groups	Number of patients	Percentage of patients (%)
50-59 years	37	34
60-69 years	49	45
70-79 years	21	19
80-89 years	2	2

Table 2: Age distribution of patient

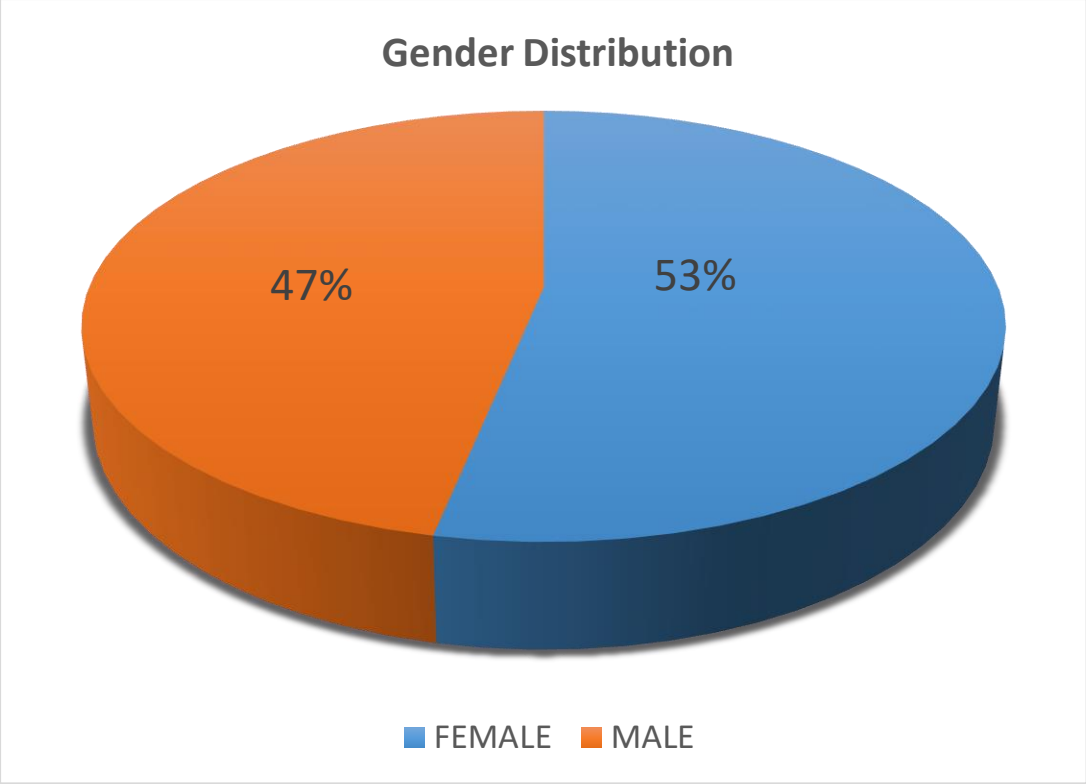


Figure 19: Pie-chart depicting gender distribution

Gender	Frequency Distribution	Percentage (%) of distribution
MEN (Male)	58	53
WOMEN(Female)	51	47
TOTAL	109	100

Table 3: Gender distribution of study population

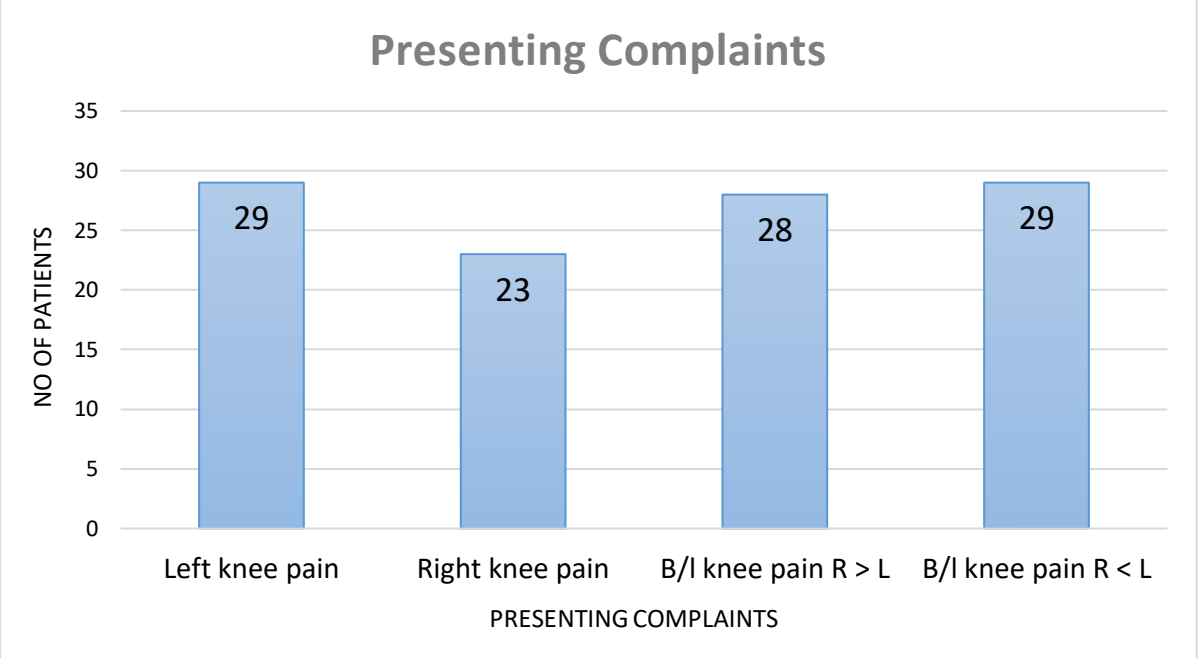


Figure 20: Bar graph showing frequency distribution of patients with presenting complaints of knee pain

Presenting complaints	No. of patients
Left knee pain	29
Right knee pain	23
B/L knee pain Right > Left	28
B/L knee pain Left > Right	29
Total	109

Table 4: Frequency distribution of patients with presenting complaints of knee pain

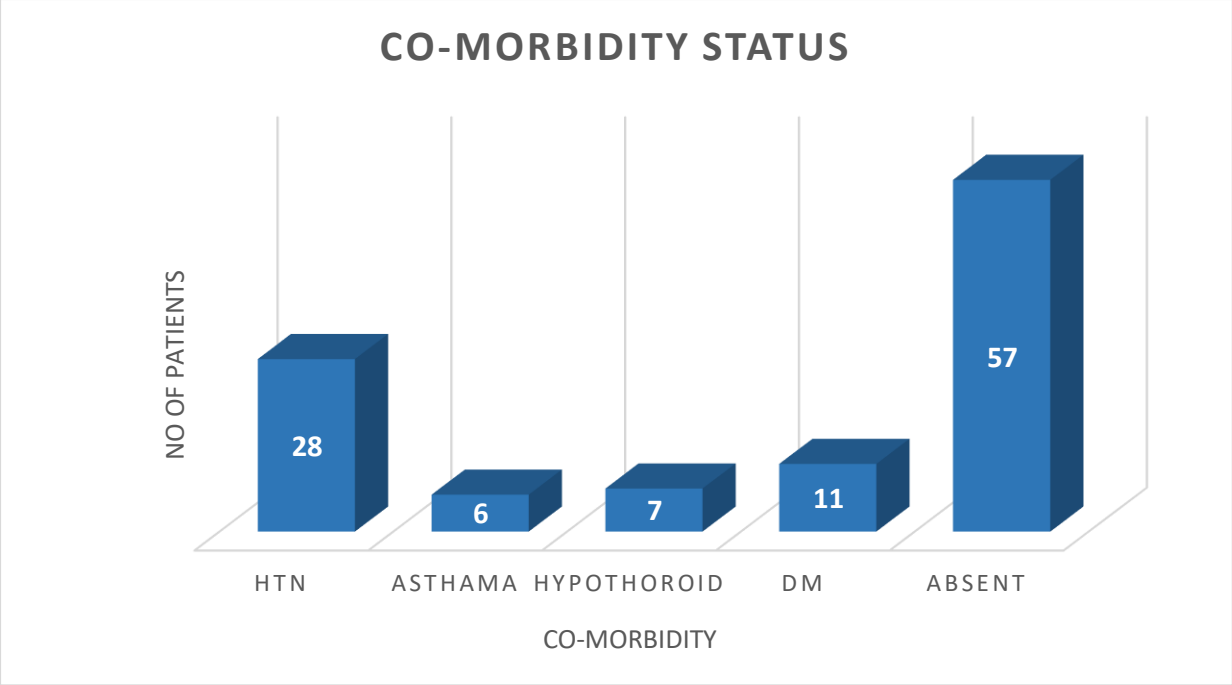


Figure 21: Graph representing co-morbidity status in study population

Co-morbidity status	**Frequency of distribution**
Hypertension (HTN)	28
Asthma	6
Hypothyroidism	7
Diabetes mellitus (DM)	11
Nil	57
Total:	109

Table 5: Co-morbidity status of the study population

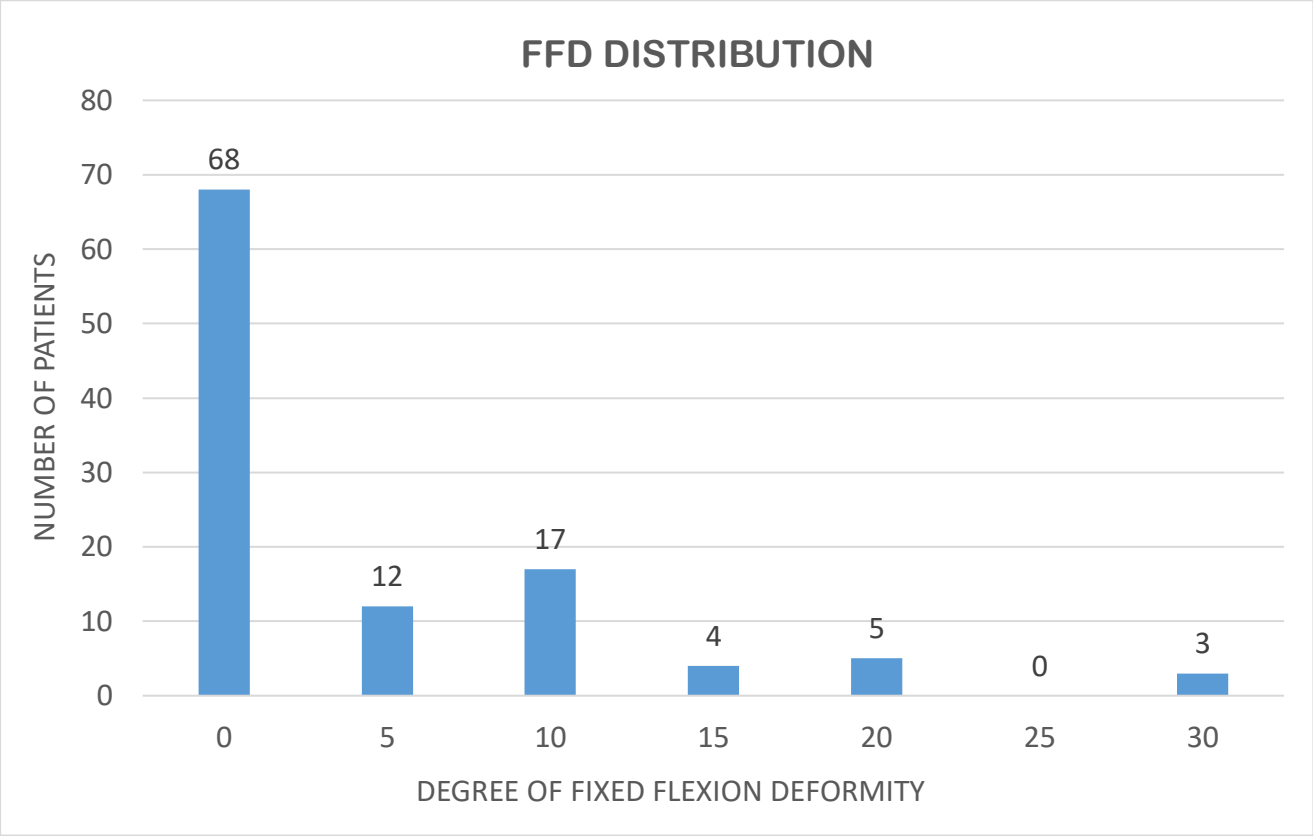


Figure 22: Bar graph representing frequency of distribution with degree of Fixed Flexion Deformity in study population

Degree of Fixed Flexion Deformity	Frequency distribution of patients
0	68
5	12
10	17
15	4
20	5
25	0
30	3

Table 6: Frequency distribution of degree of Fixed Flexion Deformity (FFD) in study population

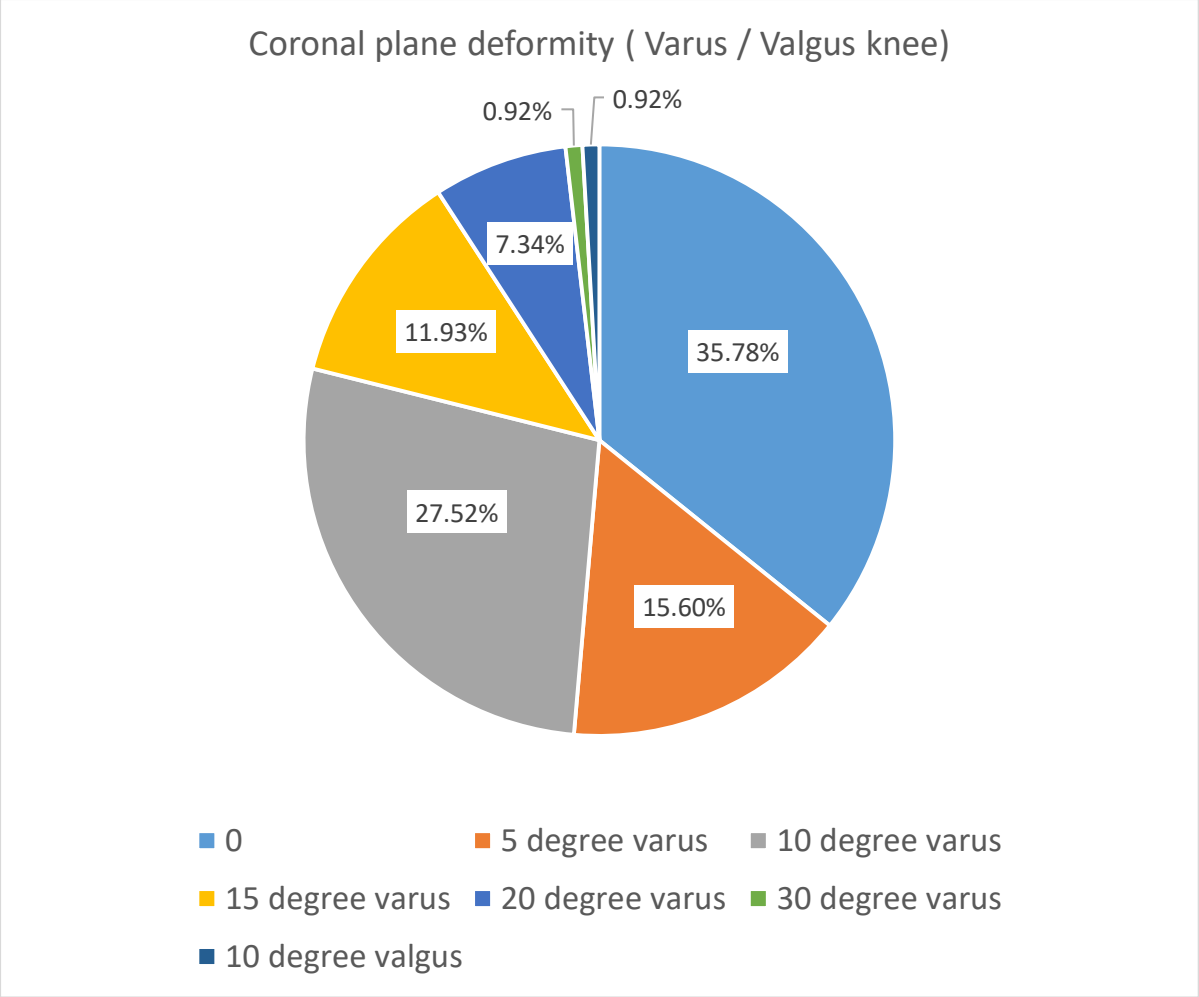


Figure 23: Pie-chart representation of degree of Coronal plane deformity in study population

Varus / Valgus Deformity	Frequency distribution	Percentage (%) distribution
0	39	35.78%
5 degree varus	17	15.60%
10 degree varus	30	27.52%
15 degree varus	13	11.93%
20 degree varus	8	7.34%
30 degree varus	1	0.92%
10 degree valgus	1	0.92%

Table 7: Frequency distribution of Degree of Coronal plane deformity in study population

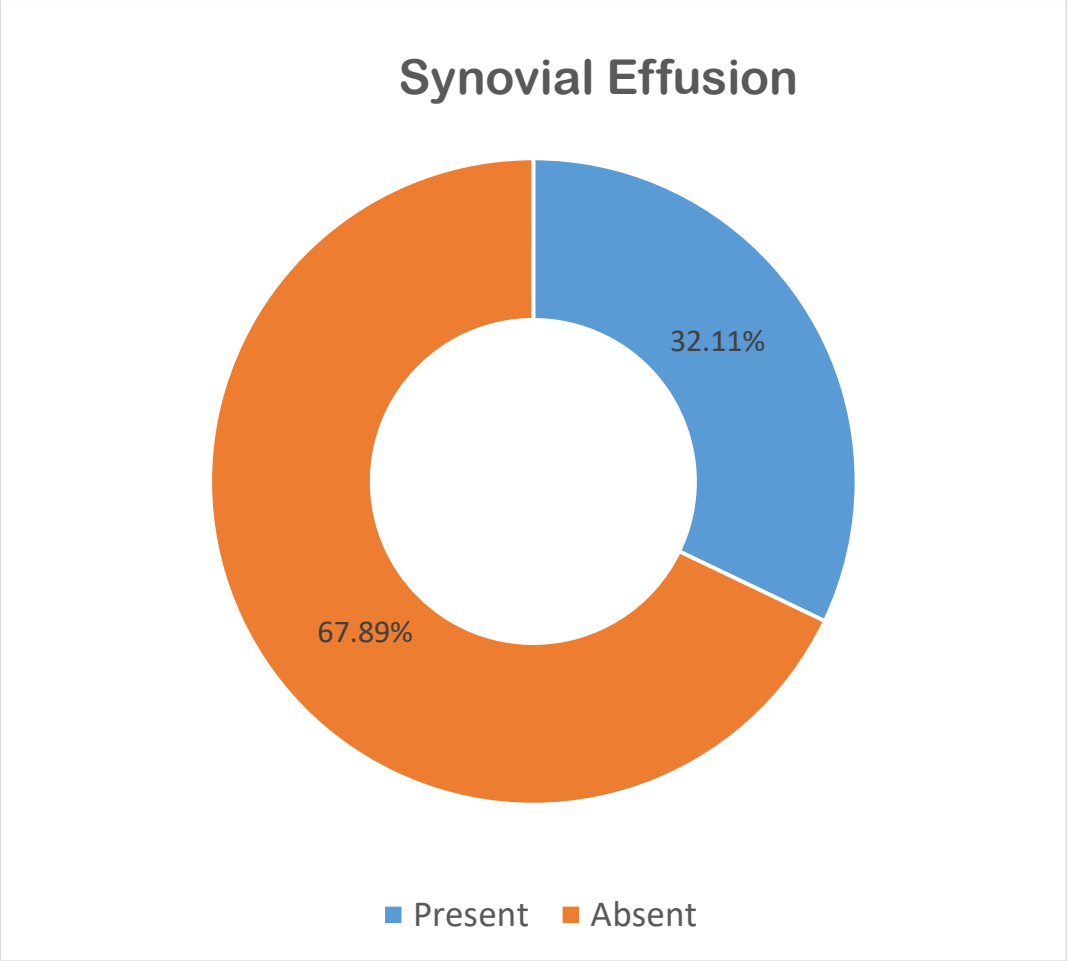


Figure 24: Doughnut chart representing presence / absence of synovial effusion in study population

Synovial effusion	Frequency of distribution	Percentage (%) of distribution
Present	35	32.11
Absent	74	67.89

Table 8: Frequency Distribution of presence of synovial effusion in study population

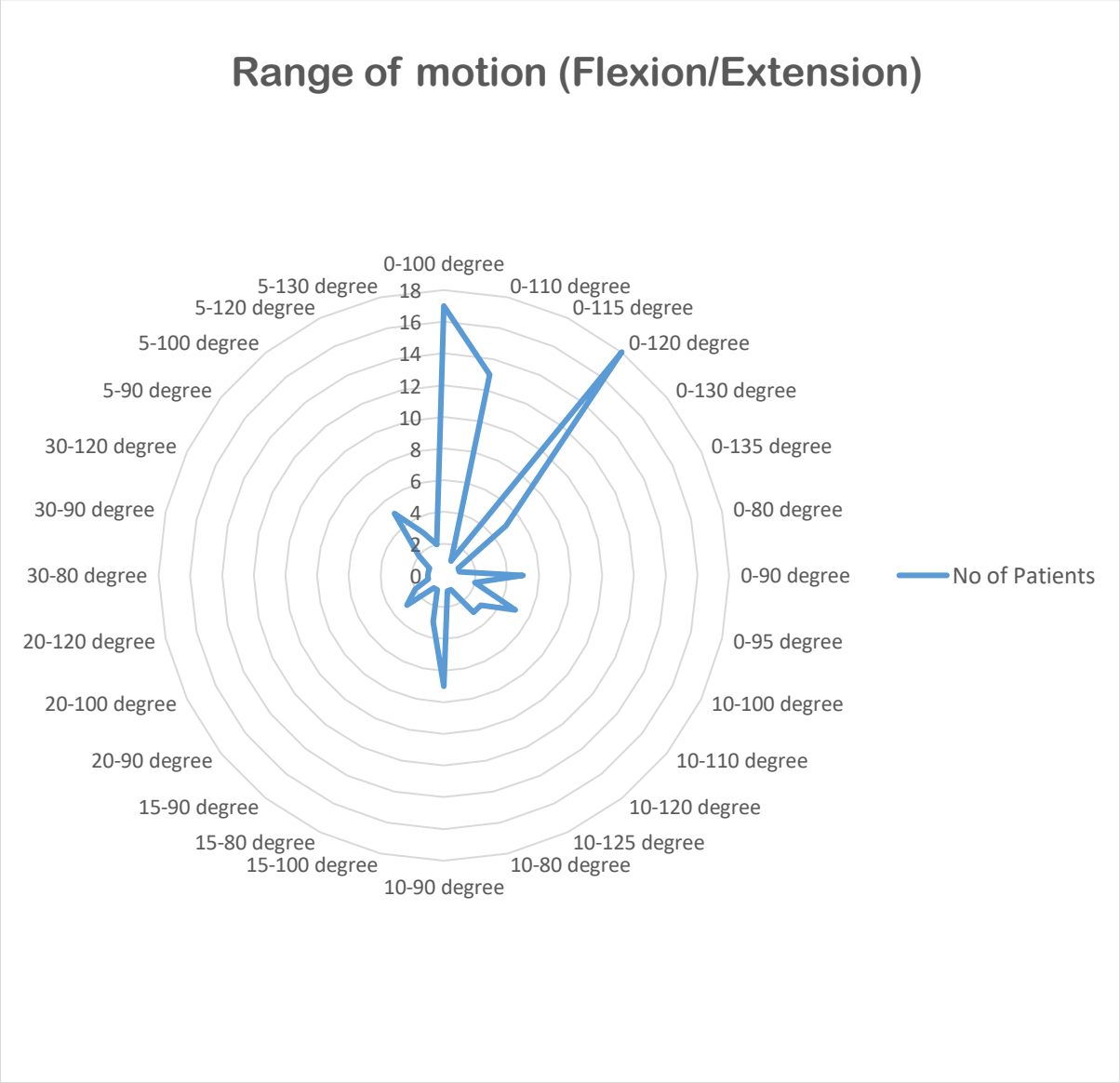


Figure 25: Radar graph representing range of movement of knee (flexion/extension) in study population

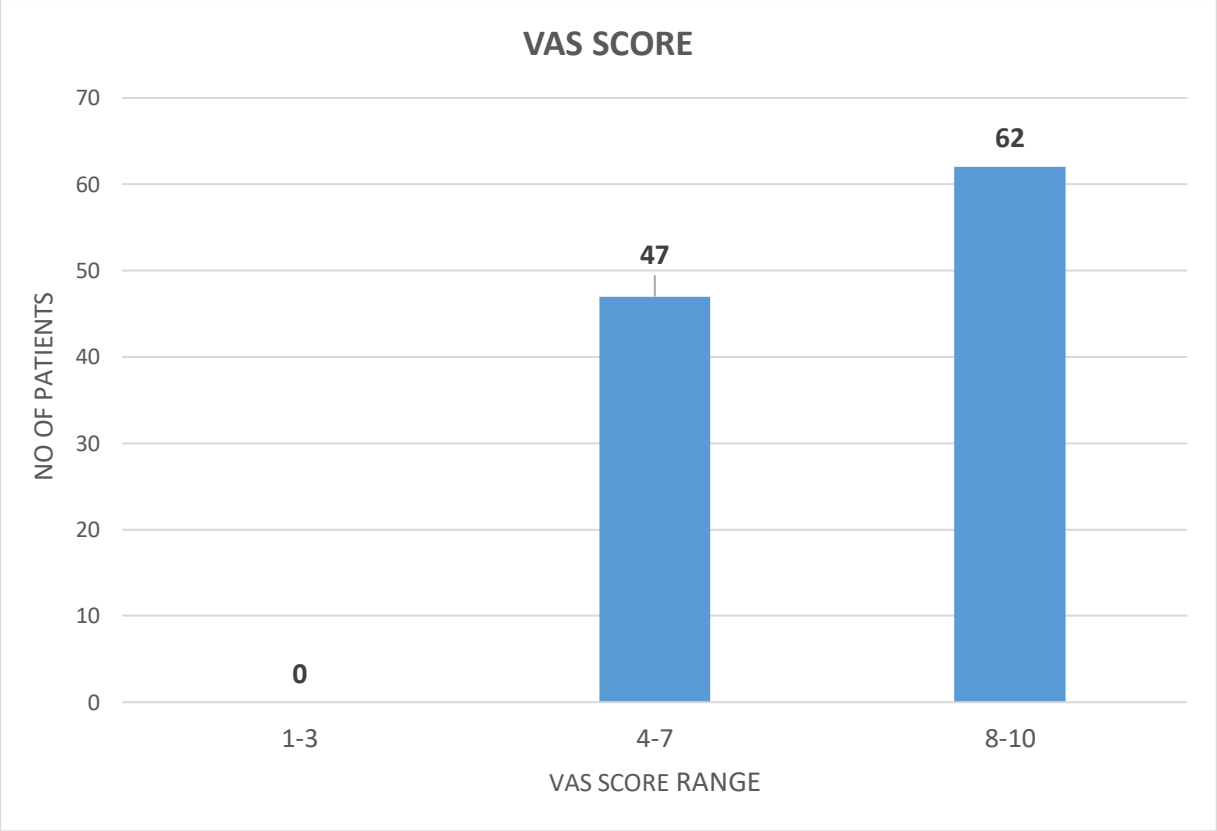


Figure 26: Frequency distribution of study population with VAS score

VAS score for pain	Frequency distribution
MILD (range = 1 to 3)	0
MODERATE (range = 4 to7)	47
SEVERE (range = 8 to10)	62

Table 9: Frequency distribution of study population with corresponding VAS score

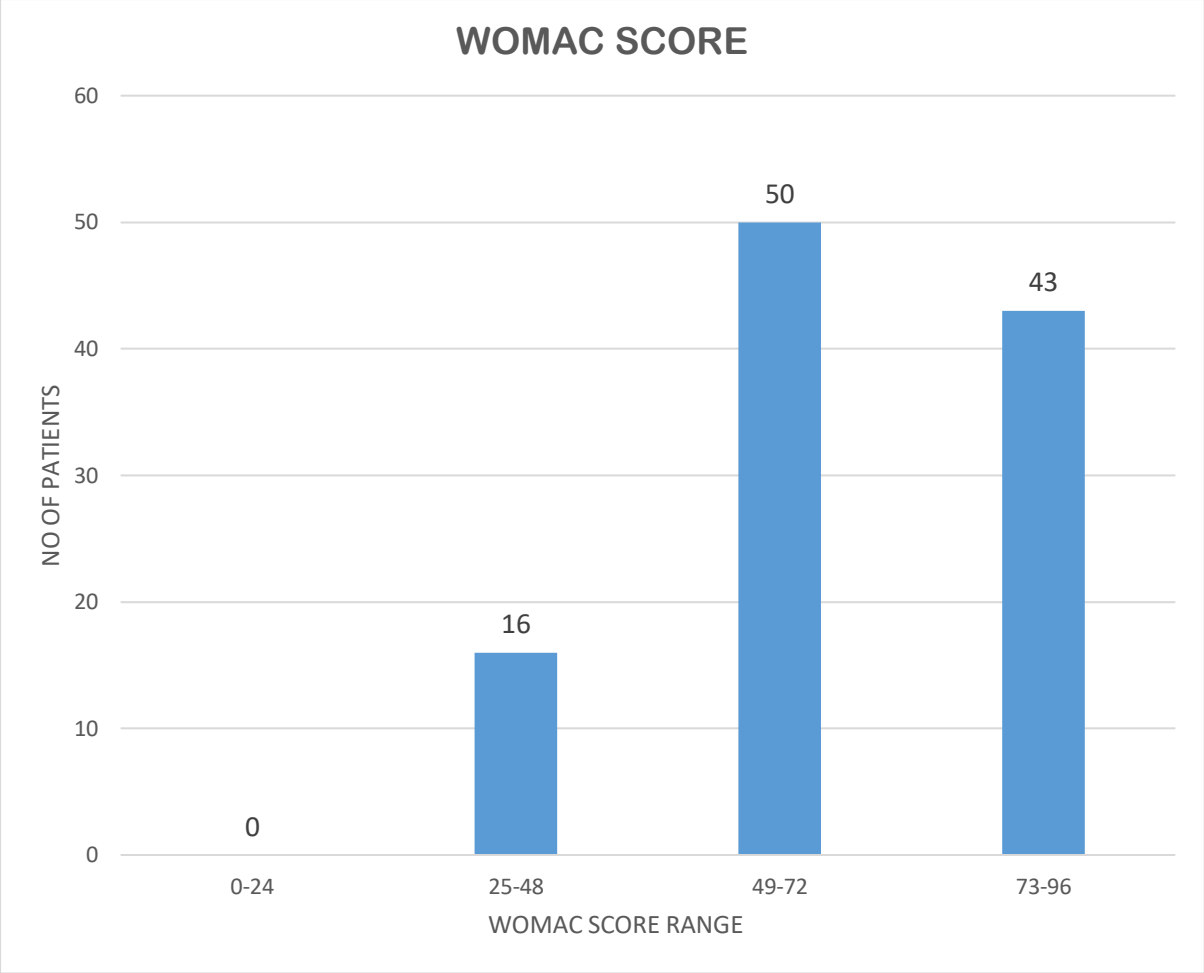


Figure 27: Frequency distribution of study population with WOMAC score

WOMAC score	Frequency of distribution
0-24	0
25-48	16
49-72	50
73-96	43

Table 10: Frequency distribution of study population with corresponding WOMAC score

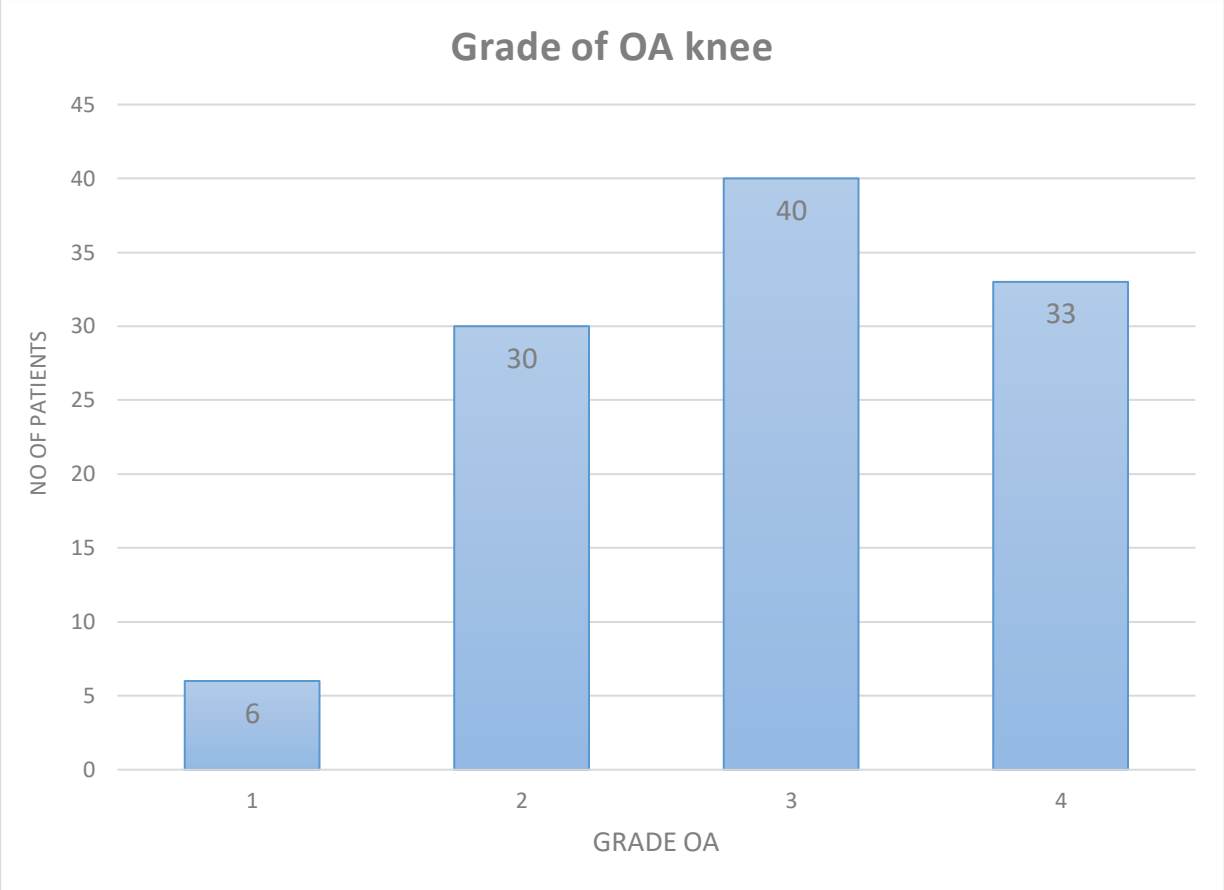


Figure 28: Frequency distribution of different grades of OA knee in study population

KL GRADE of OA knee	NO. OF PATIENTS
1	6
2	30
3	40
4	33

Table 11: Frequency distribution of no. of patients in study with corresponding to K&L classification of OA knee

K&L Grade	Max. (VAS)	Min. (VAS)	Range	Mean (VAS)	Std. Deviation	EBM	Variance
2	8.00	5.00	3.00	6.87	0.90	0.32	0.8
3	10.00	5.00	5.00	7.65	1.19	0.37	1.4
4	10.00	8.00	2.00	9.18	0.85	0.29	0.7

Table 12: Correlation of K-L grade with VAS score

SOURCE OF VARIATION	SUM OF SQUARES (SS)	DEGREE OF FREEDOM (dF)	MEAN SQUARES (MS)	F RATIO	p VALUE	F CRITICAL
Between Groups	88.7	2.00	44.4	43.7	0.000	3.1
Within Groups	101.5	100.00	1.0			
Total	190.2	102.00				

Table 13: ANOVA single-way test for VAS score

$p<0.05$ signifies that we can reject the hypothesis of all the means being same.

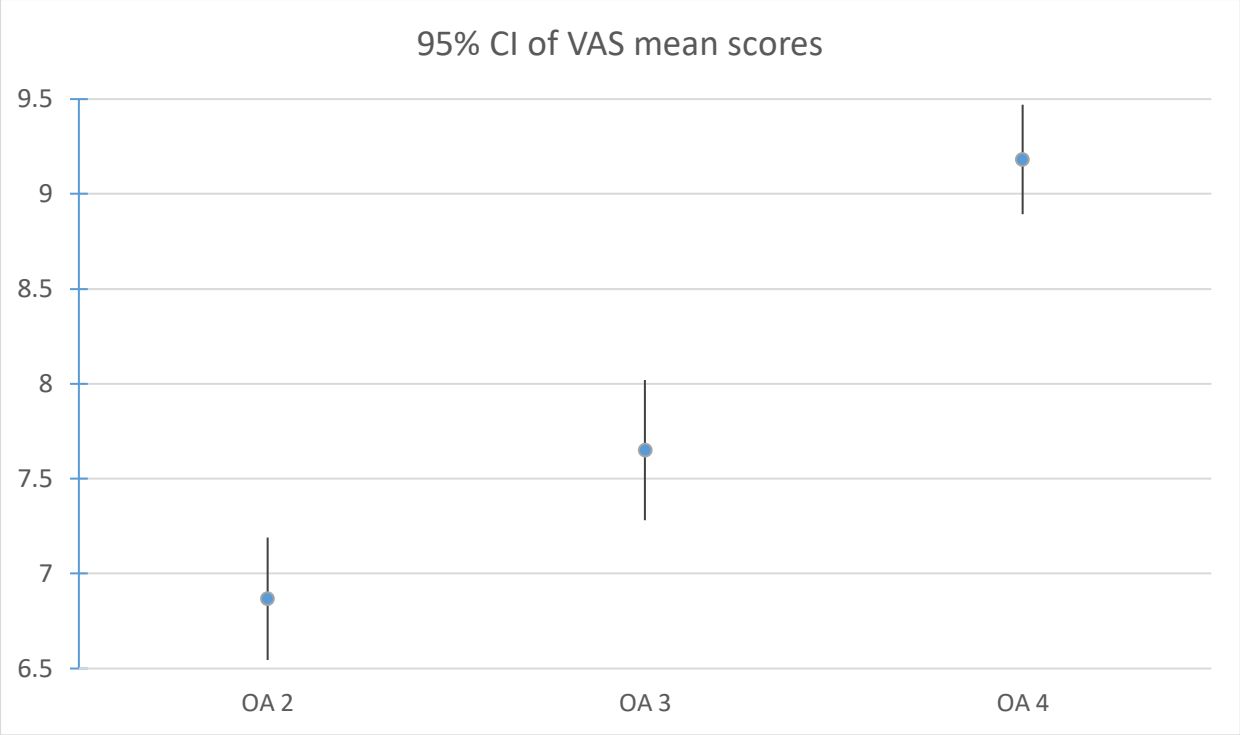


Figure 29: Graphical representation of 95% Confidence interval of mean VAS score

K-L Grade	Max. (WOMAC)	Min. (WOMAC)	Range	Mean (WOMAC)	Std. Deviation	EBM	Variance
2	78.00	36.00	42.00	55.10	9.91	3.55	98.3
3	91.00	40.00	51.00	67.80	12.77	3.96	163.1
4	92.00	59.00	33.00	80.06	8.88	3.03	78.8

Table 14: Correlation of K-L grade with WOMAC score

SOURCE OF VARIATION	SUM OF SQUARES (SS)	DEGREE OF FREEDOM (dF)	MEAN SQUARES (MS)	F RATIO	p VALUE	F CRITICAL
Between Groups	9793.9	2.00	4897.0	41.7	0.000	3.1
Within Groups	11735.0	100.00	117.3			
Total	21528.9	102.00				

Table 15: ANOVA one-way test for WOMAC score

$p<0.05$ signifies that we can reject the hypothesis of all the means being same

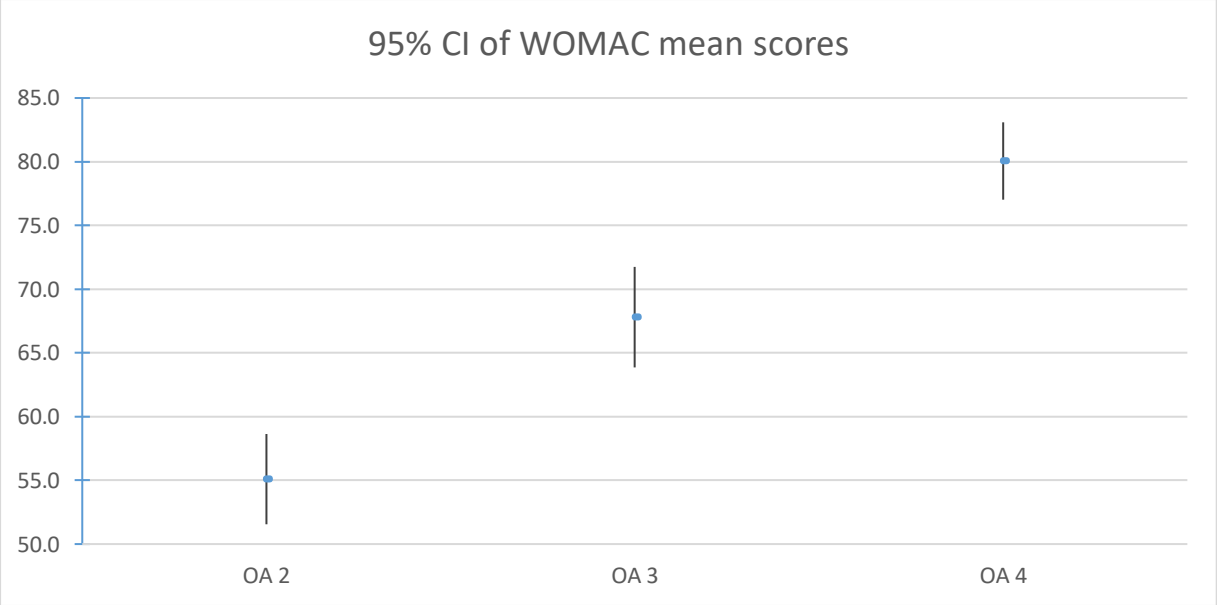


Figure 30: Graphical representation of 95% Confidence interval of mean WOMAC score

K-L Grade	Confidence Interval (VAS)	Confidence Interval (WOMAC)
2	7.19	58.65
	6.54	51.55
3	8.02	71.76
	7.28	63.84
4	9.47	83.09
	8.89	77.03

Table 16: Confidence interval of VAS scale & WOMAC score with corresponding K&L grade of knee OA

	VAS & Grade of severity of OA	WOMAC & Grade of severity of OA
Coefficient	0.704	0.722
N	109	109

Table 17: Spearman Rank Correlation Coefficient

Discussion

Regardless of how early, the nature of symptoms, how frequently, or how severe the limitation, elderly individuals who report knee pain are almost certain to have radiographic osteoarthritis results.

When all 6 of the clinical signs—bony enlargement, restricted range of motion, and bony crepitus—combined with the three symptomatic indicators—continuous knee pain, limited duration of morning stiffness, and functional limitation—it appears to be a useful diagnostic tool for osteoarthritis of the knee, a degenerative joint disease. The likelihood of radiographic evidence of osteoarthritis is increased with more positive features, up to 99% when all six clinical indicators are present. *(26)*

In India, Osteoarthritis of knee has become a significant burden with substantial impact over the society and has progressively increased to 62.35 million in 2019 *(27).*

The major objective of the study was to explore whether a strong correlation can be established amid clinical symptoms and physical findings with radiological findings in a study population 0f 109 patients fulfilling inclusion criteria willing to be part of study were included. Majority of population (44.5%) were observed to be of the age group 60-69 years out of which 53% were females and 47% males respectively.

In the research population with knee discomfort, effusion, joint line tenderness, functional limitations; a linear, substantial positive correlation was discovered using VAS and WOMAC questionnaire with radiographic K&L grading of OA knee utilizing ANOVA analysis and Spearman coefficient.

The mean VAS (6.87 ± 0.90) for KL grade 2, (7.65 ± 1.19) for KL grade 3 and (9.18 ± 0.85) for KL grade 4 OA knee.

Similarly, mean WOMAC score was found to be (55.10 ± 9.91) for KL grade 2, (67.80 ± 12.77) for KL grade 3 and (80.06 ± 8.88) for grade 4 OA knee with (p value 0.000).

Spearman co-efficient corresponding 0.704 for VAS with grade of OA and 0.722 for WOMAC score with grade of OA shows that the grade of K-L 2 or more was associated with increased VAS and WOMAC scores.

According to three distinct parameters—frequency, type, and intensity of knee pain—a study by Neogi Tet al. found “a strong relationship between the severity of radiographic knee osteoarthritis and knee pain”. Furthermore, even for the early, mild phases of osteoarthritis, they were able to illustrate these correlations. *(24)*

Cobb S et al. came to similar conclusions and proposed that “individuals with longer-lasting symptoms were more likely to have radiographic osteoarthritis with increasing severity.”*(28)*

Severe radiographic osteoarthritis was shown to be substantially correlated with high WOMAC ratings for stiffness, pain

severity, and functional impairment. Radiographic osteoarthritis was more significantly correlated with the particular WOMAC categories pertaining to pain and disability associated with weight-bearing mobility. [29]

According to a research by Lanyon P et al., "the best radiographic characteristic associated with knee discomfort is the presence of osteophytes." [30]

The current investigation was backed by the findings of a study by Lethbridge-Çejku et al., which discovered a direct correlation between knee pain and all parameters of radiographic osteoarthritis severity. [25]

McAlindon TE et al. shown that factors other than radiographic severity of knee osteoarthritis that significantly predict functional impairment in senior people include age, quadriceps muscular strength, and knee discomfort. [31]

Larger-scale systematic review research revealed that knee pain depends on the radiological views utilized for diagnosis rather than being a particular indicator of radiographic knee osteoarthritis. [39, 40]

As a result, in evaluating specific patients who report knee discomfort, radiographic images shouldn't be utilized in isolation, and alternative explanations should be clinically checked out. [32]

Similarly, radiographic knee osteoarthritis is not a reliable indicator of the likelihood of knee discomfort or functional difficulties. The definition of pain employed and the research population it is applied to have an impact on the correlations that are discovered.

Conclusion

The present study is successful in rejecting the null hypothesis and confirmed by having a significant P-value < 0.05 (0.000) for all the tests that clinical and radiological findings of osteoarthritis knee can be correlated.

It was proven with both CI (Confidence interval) test and ANOVA test that mean WOMAC scores for the three OA grades are different with no overlapping and corresponds to each other at 95% confidence level with certainty.

The correlation coefficient was found having strong positive linear correlation for both VAS and WOMAC scores with KL radiological grade of OA.

Summary

A cross-sectional research study conducted in KLE Dr. Prabhakar Kore Medical Charitable-Hospital & Research Centre, Belgaum, among patients visiting the Out-patient department or hospitalized with complaints of knee pain and difficulty in walking during 1 year period from 1st October 2022 to 30th September 2023.

Patients were explained about the study and the severity of the symptoms were analyzed based knee specific WOMAC index and VAS scale.

Antero-posterior (AP) and lateral view X-rays were obtained during the patient's recruitment process when the patient was standing and bearing weight. OA is defined as the presence of K&L grade more than or equal to 2 in at least one knee.

In case of bilateral involvement of knee, more agonizing knee was considered.

The primary purpose with which the study was conducted was to establish an association amid clinical symptom of painful knee described by the patient and clinical signs with radiological diagnosis of OA knee.

Total of 109 patients fulfilling inclusion criteria and willing to be part of study were included of which 33.95 % population were observed in age group of 50-59 years, 44.95% in 60-69 years

age group, 19.2% in age group 70-79 years group and 1.83% in 80-89 years of age group.

Among them, a female preponderance was observed with 53% patients of study population in comparison to 47% male patients.

Single-way ANOVA test was performed to find whether mean values of VAS and WOMAC scores are same or different.

To determine if any correlation exists between VAS / WOMAC scores with OA grades, Spearman correlation test was applied.

The correlation coefficient was found having strong positive linear correlation for both VAS (Spearman Coefficient = 0.704) and WOMAC (Spearman Coefficient = 0.722) scores for different grades of OA.

For all the tests the value of p less than 5 percent (0.05) was considered significant.

Limitations of the study

1) Patients with patella-femoral causes of knee pain were not accounted for in the study.

2) Sample size should be increased to check for confidence interval at 95% confidence limit.

3) Only antero-posterior weight bearing and lateral views accounted for in the study and Rosenberg view, Skyline view were not included for accurate assessment of the degree of tri-compartmental involvement.

Bibliography

1. Sharma L, Kapoor D, Moskowitz RW, Altman RD, Hochberg MC, Buckwalter JA, et al. Osteoarthritis: diagnosis and medical/surgical management. Philadelphia: Saunders Com. 2007.

2. Loeser RF. OTHER FORMATS PDF (305K) ACTIONS Cite Collections SHARE RESOURCES Similar articles Cited by other articles Links to NCBI Databases FOLLOW NCBI Connect with NLM National Library of Medicine 8600 Rockville Pike Bethesda. MD 20894 Web Policies FOIA HHS Vulnerability Disclosure Help Accessibility Careers NLM NIH HHS USA.gov. 2010;26:371–86

3. Ahlbäck S. Osteoarthrosis of the knee. A radiographic investigation. Acta Radiol Diagn (Stockh). 1968;Suppl 277:7-7

4. TalicTanovic A, Hadziahmetovic Z, MadjarSimic I, Papovic A. Comparison of clinical and radiological parameters at knee osteoarthritis. Med Arch [Internet]. 2017;71(1):48. Available from: http://dx.doi.org/10.5455/medarh.2017.71.48-51

5. Parsons C, The EPOSA Research Group, Fuggle NR, Edwards MH, Goulston L, Litwic AE, et al. Concordance between clinical and radiographic evaluations of knee osteoarthritis. Aging Clin Exp Res [Internet]. 2018;30(1):17–25. Available from: http://dx.doi.org/10.1007/s40520-017-0847-z

6. Geng R, Li J, Yu C, Zhang C, Chen F, Chen J, et al. Knee osteoarthritis: Current status and research progress in treatment (Review). Exp Ther Med [Internet]. 2023;26(4). Available from: http://dx.doi.org/10.3892/etm.2023.12180

7. Cui A, Li H, Wang D, Zhong J, Chen Y, Lu H. Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population-based studies. EClinicalMedicine [Internet]. 2020;29–30(100587):100587. Available from: http://dx.doi.org/10.1016/j.eclinm.2020.100587

8. Steinmetz JD, Culbreth GT, Haile LM, Rafferty Q, Lo J, Fukutaki KG, et al. Global, regional, and national burden of osteoarthritis, 1990–2020 and projections to 2050: a systematic analysis for the Global Burden of Disease Study 2021. Lancet Rheumatol [Internet]. 2023;5(9):e508–22. Available from: http://dx.doi.org/10.1016/s2665-9913(23)00163-7

9. Singh A, Das S, Chopra A, Danda D, Paul BJ, March L, et al. Burden of osteoarthritis in India and its states, 1990–2019: findings from the Global Burden of disease study 2019. Osteoarthritis Cartilage [Internet]. 2022;30(8):1070–8. Available from: http://dx.doi.org/10.1016/j.joca.2022.05.004

10. Aurich M, Squires GR, Reiner A, Mollenhauer JA, Kuettner KE, Poole AR, et al. Differential matrix degradation and turnover in early cartilage lesions of human knee and ankle joints. Arthritis Rheum [Internet]. 2005;52(1):112–9. Available from: http://dx.doi.org/10.1002/art.20740

11. Ma B, Hottiger MO. Crosstalk between Wnt/β-Catenin and NF-κB Signaling Pathway during Inflammation. Front Immunol [Internet]. 2016;7. Available from: http://dx.doi.org/10.3389/fimmu.2016.00378

12. Grazio S, Balen D. Obesity: risk factor and predictor of osteoarthritis. Lijec Vjesn. 2009;131(12):22–6.

13. Zhang W, Doherty M, Peat G, Bierma-Zeinstra MA, Arden NK, Bresnihan B, et al. EULAR evidence-based recommendations for the diagnosis of knee

osteoarthritis. Ann Rheum Dis [Internet]. 2010;69(3):483–9. Available from: http://dx.doi.org/10.1136/ard.2009.113100

14. Altman R, Alarcón G, Appelrouth D, Bloch D, Borenstein D, Brandt K, et al. The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hand. Arthritis Rheum [Internet]. 1990;33(11):1601–10. Available from: http://dx.doi.org/10.1002/art.1780331101

15. Osteoarthritis care and management in adults. National Institute for Health and Care Excellence. London; 2014.

16. Kellgren JH, Lawrence JS. Radiological assessment of osteoarthritis. Ann Rheum Dis. 1957;16:494–501.

17. Wang X, Oo WM, Linklater JM. What is the role of imaging in the clinical diagnosis of osteoarthritis and disease management? Rheumatology (Oxford) [Internet]. 2018;57(suppl_4):iv51–60. Available from: http://dx.doi.org/10.1093/rheumatology/kex501

18. Sen R, Hurley JA. Osteoarthritis. StatPearls Publishing; 2023.

19. Watson PJ, Carpenter TA, Hall LD, Tyler JA. Cartilage swelling and loss in a spontaneous model of osteoarthritis visualized by magnetic resonance imaging. Osteoarthritis Cartilage [Internet]. 1996;4(3):197–207. Available from: http://dx.doi.org/10.1016/s1063-4584(96)80016-1

20. Blumenkrantz G, Department of Radiology, University of California San Francisco, San Francisco, CA, Majumdar S. Quantitative magnetic resonance imaging of articular. eCM [Internet]. 2007;13:76–86. Available from: http://dx.doi.org/10.22203/ecm.v013a08

21. Sakellariou G, Conaghan PG, Zhang W, Bijlsma JWJ, Boyesen P, D'Agostino MA, et al. EULAR recommendations for the use of imaging in the

clinical management of peripheral joint osteoarthritis. Ann Rheum Dis [Internet]. 2017;76(9):1484–94. Available from: http://dx.doi.org/10.1136/annrheumdis-2016-210815

22. Delgado DA, Lambert BS, Boutris N, McCulloch PC, Robbins AB, Moreno MR, Harris JD. Validation of Digital Visual Analog Scale Pain Scoring With a Traditional Paper-based Visual Analog Scale in Adults. J Am Acad Orthop Surg Glob Res Rev. 2018 Mar 23;2(3):e088. doi: 10.5435/JAAOSGlobal-D-17-00088. PMID: 30211382; PMCID: PMC6132313.

23. Parsons C, Clynes M, Syddall H, Jagannath D, Litwic A, van der Pas S, et al. How well do radiographic, clinical and self-reported diagnoses of knee osteoarthritis agree? Findings from the Hertfordshire cohort study. Springerplus [Internet]. 2015;4(1):177. Available from: http://dx.doi.org/10.1186/s40064-015-0949-z

24. Neogi T, Felson D, Niu J, Nevitt M, Lewis CE, Aliabadi P, et al. Association between radiographic features of knee osteoarthritis and pain: results from two cohort studies. BMJ [Internet]. 2009;339(aug21 1):b2844. Available from: http://dx.doi.org/10.1136/bmj.b2844

25. Lethbridge-Çejku M, Scott WW, Reichle R, Ettinger WH, Zonderman A, Costa P, et al. Association of radiographic features of osteoarthritis of the knee with knee pain: Data from the baltimore longitudinal study of aging. Arthritis Rheum [Internet]. 1995;8(3):182–8. Available from: http://dx.doi.org/10.1002/art.1790080311

26. Zhang W, Doherty M, Peat G. EULAR evidence based recommendations for the diagnosis of knee osteoarthritis. Ann Rheum Dis. 2010;69:483–9.

27. Singh A, Das S, Chopra A, Danda D, Paul BJ, March L, et al. Burden of osteoarthritis in India and its states, 1990–2019: findings from the Global Burden of disease study 2019. Osteoarthritis Cartilage [Internet].

2022;30(8):1070–8. Available from: http://dx.doi.org/10.1016/j.joca.2022.05.004

28. Cobb S, Merchant WR, Rubin T. The relation of symptoms to osteoarthritis. J Chronic Dis [Internet]. 1957;5(2):197–204. Available from: http://dx.doi.org/10.1016/0021-9681(57)90135-2

29. Duncan R, Peat G, Thomas E, Hay E, McCall I, Croft P. Symptoms and radiographic osteoarthritis: not as discordant as they are made out to be? Ann Rheum Dis [Internet]. 2007;66(1):86–91. Available from: http://dx.doi.org/10.1136/ard.2006.052548

30. Lanyon P, O'Reilly S, Jones A, Doherty M. Radiographic assessment of symptomatic knee osteoarthritis in the community: definitions and normal joint space. Ann Rheum Dis [Internet]. 1998;57(10):595–601. Available from: http://dx.doi.org/10.1136/ard.57.10.595

31. McAlindon TE, Cooper C, Kirwan JR, Dieppe PA. Determinants of disability in osteoarthritis of the knee. Ann Rheum Dis [Internet]. 1993;52(4):258–62. Available from: http://dx.doi.org/10.1136/ard.52.4.258

32. Özden F, Nadiye Karaman Ö, Tuğay N, Yalın Kilinç C, Mihriban Kilinç R, Umut Tuğay B. The relationship of radiographic findings with pain, function, and quality of life in patients with knee osteoarthritis. J Clin Orthop Trauma [Internet]. 2020;11:S512–7. Available from: http://dx.doi.org/10.1016/j.jcot.2020.04.006

33. Litwic A, Edwards MH, Dennison EM, Cooper C. Epidemiology and burden of osteoarthritis. Br Med Bull [Internet]. 2013;105:185–99. Available from: http://dx.doi.org/10.1093/bmb/lds038

34. Cooper C, Snow S, Mcalindon TE. Risk factors for the incidence and progression of radiographic knee osteoarthritis. Arthritis Rheum [Internet]. 2000;43:995–1000. Available from: http://dx.doi.org/10.1002/1529-0131

35. Dennison E, Cooper C. Osteoarthritis: epidemiology and classification. Mosby R, editor. New York; 2003.

36. Altman R, Alarcón G, Appelrouth D, Bloch D, Borenstein D, Brandt K, et al. The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hand. Arthritis Rheum [Internet]. 1990;33(11):1601–10. Available from: http://dx.doi.org/10.1002/art.1780331101

37. 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 [Internet]. 1986;29(8):1039–49. Available from: http://dx.doi.org/10.1002/art.1780290816

38. Altman RD, Gold GE. Atlas of individual radiographic features in osteoarthritis, revised. Osteoarthritis Cartilage [Internet]. 2007;15 Suppl A:A1-56. Available from: http://dx.doi.org/10.1016/j.joca.2006.11.009

39. Bedson J, Croft PR. The discordance between clinical and radiographic knee osteoarthritis: a systematic search and summary of the literature. BMC Musculoskelet Disord [Internet]. 2008;9(1):116. Available from: http://dx.doi.org/10.1186/1471-2474-9-116

40. Kinds MB, Welsing PMJ, Vignon EP, Bijlsma JWJ, Viergever MA, Marijnissen ACA, et al. A systematic review of the association between radiographic and clinical osteoarthritis of hip and knee. Osteoarthritis Cartilage [Internet]. 2011;19(7):768–78. Available from: http://dx.doi.org/10.1016/j.joca.2011.01.015

41. Duncan RC, Hay EM, Saklatvala J, Croft PR. Prevalence of radiographic osteoarthritis-it all depends on your point of view. Rheumatology. 2006;45:757–60.

42. Podlipská J, Guermazi A, Lehenkari P, Niinimäki J, Roemer FW, Arokoski JP, et al. Erratum: Comparison of diagnostic performance of semi-quantitative knee ultrasound and knee radiography with MRI: Oulu knee osteoarthritis study. Sci Rep [Internet]. 2016;6(1). Available from: http://dx.doi.org/10.1038/srep33109

43. Malas FÜ, Kara M, Kaymak B, Akıncı A, Özçakar L. Ultrasonographic evaluation in symptomatic knee osteoarthritis: clinical and radiological correlation. Int J Rheum Dis [Internet]. 2014;17(5):536–Available from: http://dx.doi.org/10.1111/1756-185X.12190

44. Chan KKW, Sit RWS, Wu RWK, Ngai AHY. Clinical, radiological and ultrasonographic findings related to knee pain in osteoarthritis. PLoS One [Internet]. 2014;9(3):e92901. Available from: http://dx.doi.org/10.1371/journal.pone.0092901

45. Kim J-R, Yoo J, Kim H. Therapeutics in osteoarthritis based on an understanding of its molecular pathogenesis. Int J Mol Sci [Internet]. 2018;19(3):674. Available from: http://dx.doi.org/10.3390/ijms19030674 [Original source: https://studycrumb.com/alphabetizer]

46. Wojdasiewicz P, Poniatowski ŁA, Szukiewicz D. The role of inflammatory and anti-inflammatory cytokines in the pathogenesis of osteoarthritis. Mediators Inflamm [Internet]. 2014;2014:1–19. Available from: http://dx.doi.org/10.1155/2014/561459

47. Wang Q, Pan X, Wong HH, Wagner CA, Lahey LJ, Robinson WH, et al. Oral and topical boswellic acid attenuates mouse osteoarthritis. Osteoarthritis Cartilage [Internet]. 2014;22(1):128– Available from: http://dx.doi.org/10.1016/j.joca.2013.10.012

48. Yoshida A, Morihara T, Matsuda K-I, Sakamoto H, Arai Y, Kida Y, et al. Immunohistochemical analysis of the effects of estrogen on intraarticular neurogenic inflammation in a rat anterior cruciate ligament transection model of osteoarthritis. Connect Tissue Res [Internet]. 2012;53(3):197–206. Available from: http://dx.doi.org/10.3109/03008207.2011.628059

49. Yao Q, Wu X, Tao C, Gong W, Chen M, Qu M, et al. Osteoarthritis: pathogenic signaling pathways and therapeutic targets. Signal Transduct Target Ther [Internet]. 2023;8(1). Available from: http://dx.doi.org/10.1038/s41392-023-01330-w

50. Bijlsma JWJ, Berenbaum F, Lafeber FP. Osteoarthritis: an update with relevance for clinical practice. Lancet [Internet]. 2011;377(9783):2115–26. Available from: http://dx.doi.org/10.1016/s0140-6736(11)60243-2

51. Bousson V, Lowitz T, Laouisset L, Engelke K, Laredo J-D. CT imaging for the investigation of subchondral bone in knee osteoarthritis. Osteoporos Int [Internet]. 2012;23(S8):861–5. Available from: http://dx.doi.org/10.1007/s00198-012-2169-5

52. Zhang Y, Hunter DJ, Nevitt MC, Xu L, Niu J, Lui L-Y, et al. Association of squatting with increased prevalence of radiographic tibiofemoral knee osteoarthritis: the Beijing Osteoarthritis Study. Arthritis Rheum [Internet]. 2004;50(4):1187–92. Available from: http://dx.doi.org/10.1002/art.20127

53. Felson DT. The epidemiology of knee osteoarthritis: results from the Framingham Osteoarthritis Study. Semin Arthritis Rheum. 1990;20(3):42–50.

54. Lawrence JS, Bremner JM, Bier F. Osteo-arthrosis. Prevalence in the population and relationship between symptoms and x-ray changes. Ann Rheum Dis [Internet]. 1966;25(1):1–24. Available from: http://dx.doi.org/10.1136/annrheumd00506-0006

55. Davis MA, Ettinger WH, Neuhaus JM, Barclay JD, Segal MR. Correlates of knee pain among US adults with and without radiographic knee osteoarthritis. J Rheumatol. 1992;19(12):1943–9.

56. Jordan JM, Luta G, Renner JB, Linder GF, Dragomir A, Hochberg MC, et al. Self-reported functional status in osteoarthritis of the knee in a rural southern community: the role of socio demographic factors, obesity, and knee pain. Arthritis Care Res. 1996;9(4):273–8.

57. Szebenyi B, Hollander AP, Dieppe P, Quilty B, Duddy J, Clarke S, et al. Associations between pain, function, and radiographic features in osteoarthritis of the knee. Arthritis Rheum [Internet]. 2006;54(1):230–5. Available from: http://dx.doi.org/10.1002/art.21534

58. Brandt KD, Radin EL, Dieppe PA, van de Putte L. Yet more evidence that osteoarthritis is not a cartilage disease. Ann Rheum Dis [Internet]. 2006;65(10):1261–4. Available from: http://dx.doi.org/10.1136/ard.2006.058347

59. Jones G, Ding C, Scott F, Glisson M, Cicuttini F. Early radiographic osteoarthritis is associated with substantial changes in cartilage volume and tibial bone surface area in both males and females. Osteoarthritis Cartilage. 2004;12(2):169–74.

60. Bellamy N. Osteoarthritis index A users guide. London; 1996.

61. Pua Y-H, Cowan SM, Wrigley TV, Bennell KL. Discriminant validity of the Western Ontario and McMaster Universities Osteoarthritis index physical functioning subscale in community samples with hip osteoarthritis. Arch Phys Med Rehabil [Internet]. 2009;90(10):1772–7. Available from: http://dx.doi.org/10.1016/j.apmr.2009.04.011

62. Kellgren JH, Lawrence JS. Atlas of standard radiographs of arthritis. II. IN: The epidemiology of chronic rheumatism. Davis FA, editor. Philadelphia, PA; 1963.

63. Cimen OB, Incel NA, Yapici Y, Apaydin D, Erdoğan C. Obesity related measurements and joint space width in patients with knee osteoarthritis. Ups J Med Sci [Internet]. 2004;109(2):159–64. Available from: http://dx.doi.org/10.3109/2000-1967-105

64. Colebatch AN, Hart DJ, Zhai G, Williams FM, Spector TD, Arden NK. Effective measurement of knee alignment using AP knee radiographs. Knee [Internet]. 2009;16(1):42–5. Available from: http://dx.doi.org/10.1016/j.knee.2008.07.007

65. Claessens AA, Schouten JS, van den Ouweland FA, Valkenburg HA. Do clinical findings associate with radiographic osteoarthritis of the knee? Ann Rheum Dis [Internet]. 1990;49(10):771–4. Available from: http://dx.doi.org/10.1136/ard.49.10.771

66. Grotle M, Hagen KB, Natvig B, Dahl FA, Kvien TK. Obesity and osteoarthritis in knee, hip and/or hand: an epidemiological study in the general population with 10 years follow-up. BMC Musculoskelet Disord [Internet]. 2008;9(1):132. Available from: http://dx.doi.org/10.1186/1471-2474-9-132

67. Hannanl MT, Felson DT. Analysis of discordance between radiographic change and knee pain in osteoarthritis of the knee. J Rheumatol. 2000;27(6):1513–7.

68. Anderson-MacKenzie JM, Quasnichka HL, Starr RL, Lewis EJ, Billingham MEJ, Bailey AJ. Fundamental subchondral bone changes in spontaneous knee osteoarthritis. Int J Biochem Cell Biol [Internet]. 2005;37(1):224–36. Available from: http://dx.doi.org/10.1016/j.biocel.2004.06.016

69. Sowers MF, Hayes C, Jamadar D, Capul D, Lachance L, Jannausch M, et al. Magnetic resonance-detected subchondral bone marrow and cartilage defect characteristics associated with pain and X-ray-defined knee osteoarthritis. Osteoarthritis Cartilage [Internet]. 2003;11(6):387–93. Available from: http://dx.doi.org/10.1016/s1063-4584(03)00080-3

70. Chang CB, Han I, Kim SJ, Seong SC, Kim TK. Association between radiological findings and symptoms at the patellofemoral joint in advanced knee osteoarthritis. J Bone Joint Surg Br [Internet]. 2007;89(10):1324–8. Available from: http://dx.doi.org/10.1302/0301-620X.89B10.19120

ANNEXURE I

INFORMED CONSENT

"CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS-SECTIONAL STUDY"

Name of Student/Principal Investigator:

Name of Guide/Co Investigators:

Objective: Aim of the study is to establish if the knee pain reported by the patient can be correlated with radiological findings with painful knee OA.

Introduction:

Osteoarthritis (OA) is a disease characterized by degeneration of cartilage and its underlying bone within a joint commonly referred as "wearing" of joints. It is the most common form of arthritis affecting and a leading cause of pain and disability among elderly population.

Knee OA (KOA) is of particular importance in view of high prevalence.

The basic investigation used for the diagnosis of OA is X-ray radiograph which identifies marginal osteophytes, narrowing of joint

space, and assessing the severity of disease progression but limitation of visualization of soft tissue and indirect evidence of cartilaginous damage.

From clinical practice it is observed that the patients with painful knee condition reduce their physical activities to relieve symptoms hence possible painful knee becomes painless and patient does not describe accurate level of pain.

Thus there is a need to conduct a study to explore and establish a relationship between clinical symptoms of knee pain reported by the patient, physical findings and radio logically confirmed knee OA.

Explanation of procedure:

Patients with complaints of knee pain and difficulty in walking will be selected for the study and informed written consent will be taken.

Once patients have signed the informed consent, necessary personal information and detailed medical history will be taken by the investigator.

After being clinically evaluated they will be suggested to undergo X-ray AP/Lateral view of the affected knee joint and radiological grading of the disease will be done based on suitable parameters of K&L grading scale.

Patients will be provided with a questionnaire which has to be diligently filled to calculate for functional impairment using

WOMAC score and the pain intensity be evaluated based on VAS scale.

Withdrawal from participation in the study: Participation in this study is voluntary. You will be free to decide whether to participate in this study or continue participation once enrolled. In case you decide to withdraw your participation, you are free to do so. However, please convey the decision to the principal investigator.

Possible benefits from participating in the study: Thorough clinical evaluation and confirmation of the diagnosis by radiological evaluation (X-ray AP/Lateral of affected knee) will benefit the patient as follows: Severity of disease progression can be identified and if needed, medical or surgical line of management can be chosen at the earliest.

Possible risks from participating in the study: There are no risks involved in participating in this study.

Privacy and confidentiality: The information collected from you will be coded, to prevent any person from identifying you. Your identity will never be revealed. The data collected from you will be kept confidential and only processed or aggregated data will be used for publication.

Financial incentives: You will not receive any payment for participating in this study.

Authorization for publication of aggregated data: Results obtained after processing of the aggregated data will be published for scientific purposes and or presented to scientific groups. However, your identity will never be revealed.

Questions: In case of any questions with regard to this study, you are free to contact

Dr Harsha Hegde, Chairperson, Ethical committee of JNMC, 0831-2473777 Extension 4052.

Legal rights: By signing this consent form, we are not waving any of your legal rights.

CONSENT STATEMENT

I am making a voluntary decision to participate in the study "**CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS-SECTIONAL STUDY**".

My signature below indicates that I have decided to participate and I have read the information provided above or the information provided above has been read to me in the language that I understand best.

I was given the opportunity to ask questions and that they have been answered to my satisfaction.

I will be given a copy of this consent form.

I understand that I am participating in the study **"CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS-SECTIONAL STUDY"**.

I confirm that I have read and understood the information in the patient information sheet.

Procedure is explained to me in detail along with information about the advantages/disadvantages of taking part in the study.

I have been given the opportunity to discuss all the aspect of trials, to ask questions and hereby consent to participation in the study outlined above.

I understand that the decision to take part in the study is completely voluntary and I am aware that I can choose to withdraw from the study at any point of time.

I consent to the Photographing/ Video recording of the procedure to be performed including appropriate portions of my body for medical, scientific or educational purposes provided my identity is not revealed in the pictures or by the descriptive texts.

I understand that there is no significant risk involved in the test that would be done in this study.

No guarantee or assurance is given by anyone as to the results that may be obtained.

My signature on this form signifies that I have willingly decided to participate after understanding the above information.

Name of the participant:

Signature or left thumb impression of the participant:

Name of the witness:

Signature or left thumb impression of the witness:

Name of the investigator:

Signature of the investigator:

Date:
Place:

ANNEXURE II

PROFORMA

CORRELATION BETWEEN CLINICAL EXAMINATION AND RADIOGRAPHY FINDINGS IN EVALUATION OF KNEE OSTEOARTHRITIS – A PROSPECTIVE CROSS-SECTIONAL STUDY

HISTORY AND DEMOGRAPHY:

Patient number: **OP/IP Number:**

Patient name:

Age:

Sex:

Address:

Occupation:

Phone Number:

Chief complaints:

Past history:

Personal history:

Clinical Examination:

General Physical Examination-

Built: Well/Moderate/Poor

Temperature:

Pulse:

Blood Pressure:

Respiratory Rate:

Pallor Lymphadenopathy:

Cyanosis:

Icterus:

Clubbing:

Pedal oedema:

Systemic Examination -

Cardiovascular System Examination:

Respiratory System Examination:

Per Abdomen Examination:

Central Nervous System Examination

Local Examination – Knee joint

Inspection: Deformity / Swelling / Scar / Skin over the joint / Muscle wasting

Palpation: Local rise of temp. / Effusion / Joint line tenderness / Crepitus

Range of motion:

Ligament laxity:

Measurements:

Special tests:

Radiological Investigation:

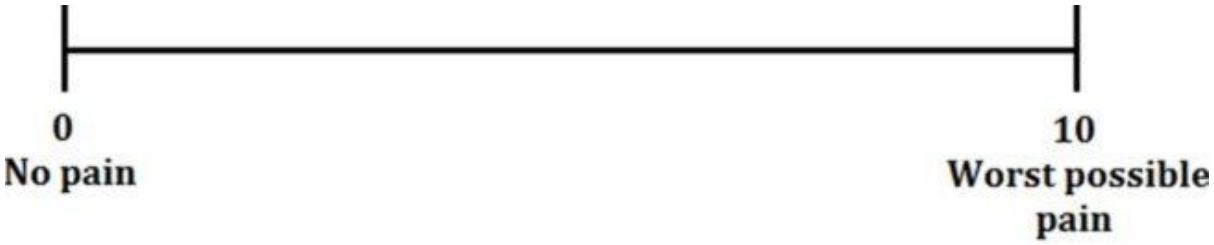
X- Ray of the affected Knee Joint

Standing AP/ Lateral view

X-ray serial number:

Final Diagnosis:

Visual Analog Scale:



NOTE: A mark is placed on the line at the point that represents the level of pain observed. This is measured in millimeter from the left anchor 'no pain' to generate a pain score.
The word 'distress' replaces 'pain' to create a distress scale

VAS score of the patient -

WOMAC score:

PATIENT NAME	DOB

WESTERN ONTARIO AND MCMASTER OSTEOARTHRITIS INDEX (WOMAC)

Please circle the appropriate rating for each item.

RATE YOUR PAIN WHEN...	NONE	SLIGHT	MODERATE	SEVERE	EXTREME	HOSPITAL USE ONLY
Walking	0	1	2	3	4	
Climbing stairs	0	1	2	3	4	
Sleeping at night	0	1	2	3	4	
Resting	0	1	2	3	4	
Standing	0	1	2	3	4	TOTAL

RATE YOUR STIFFNESS IN THE...	NONE	SLIGHT	MODERATE	SEVERE	EXTREME	HOSPITAL USE ONLY
Morning	0	1	2	3	4	
Evening	0	1	2	3	4	TOTAL

RATE YOUR DIFFICULTY WHEN...	NONE	SLIGHT	MODERATE	SEVERE	EXTREME	HOSPITAL USE ONLY
Descending stairs	0	1	2	3	4	
Ascending stairs	0	1	2	3	4	
Rising from sitting	0	1	2	3	4	
Standing	0	1	2	3	4	
Bending to floor	0	1	2	3	4	
Walking on even floor	0	1	2	3	4	
Getting in/out of car	0	1	2	3	4	
Going shopping	0	1	2	3	4	
Putting on socks	0	1	2	3	4	
Rising from bed	0	1	2	3	4	
Taking off socks	0	1	2	3	4	
Lying in bed	0	1	2	3	4	
Getting in/out of bath	0	1	2	3	4	
Sitting	0	1	2	3	4	
Getting on/off toilet	0	1	2	3	4	
Doing light domestic duties (cooking, dusting)	0	1	2	3	4	
Doing heavy domestic duties (moving furniture)	0	1	2	3	4	TOTAL

PATIENT SIGNATURE	DATE
REVIEWED BY PHYSICAL THERAPIST	DATE

WOMAC TOTAL SCORE /96

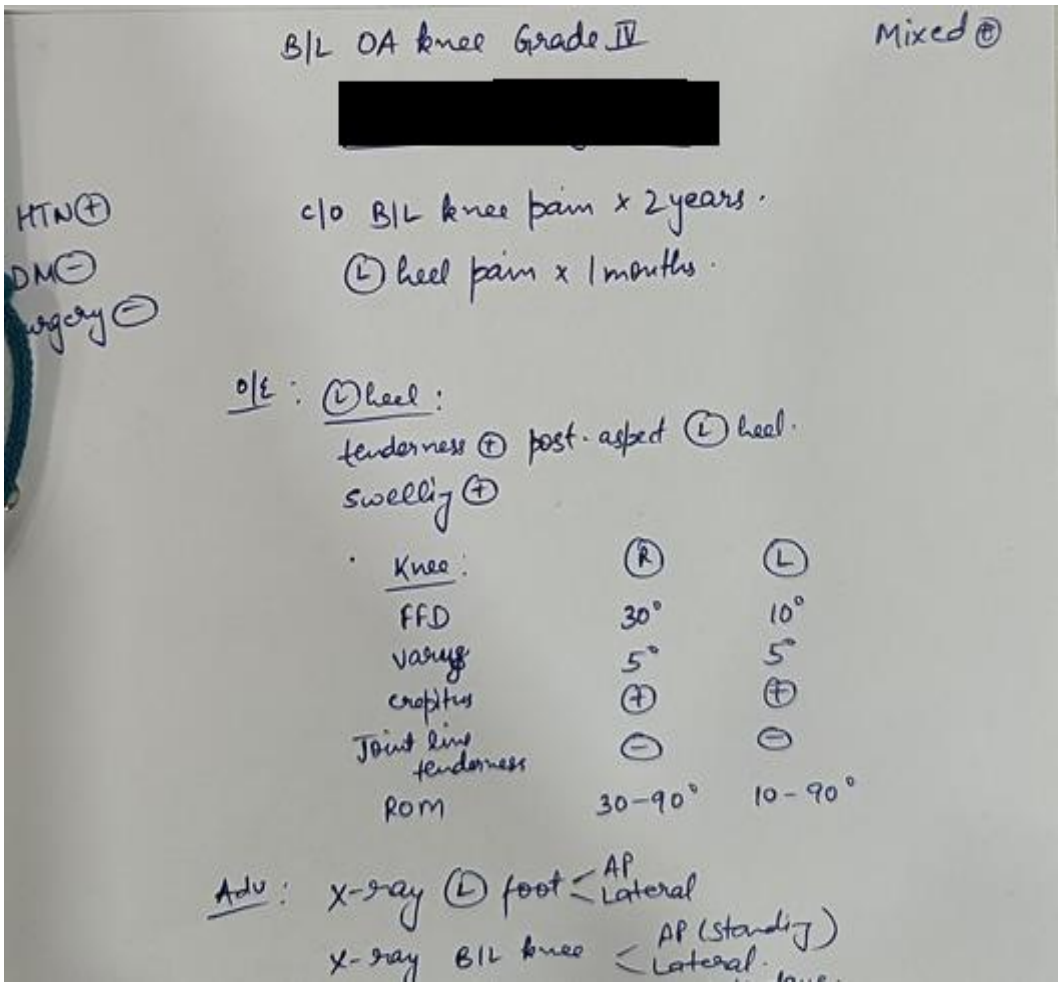
WOMAC OSTEOARTHRITIS INDEX QUESTIONNAIRE

REHABILITATION SERVICES
PT THA/TKA WOMAC QUESTIONNAIRE
MR-1433 (11/15)

WOMAC score of the patient -

ANNEXURE III

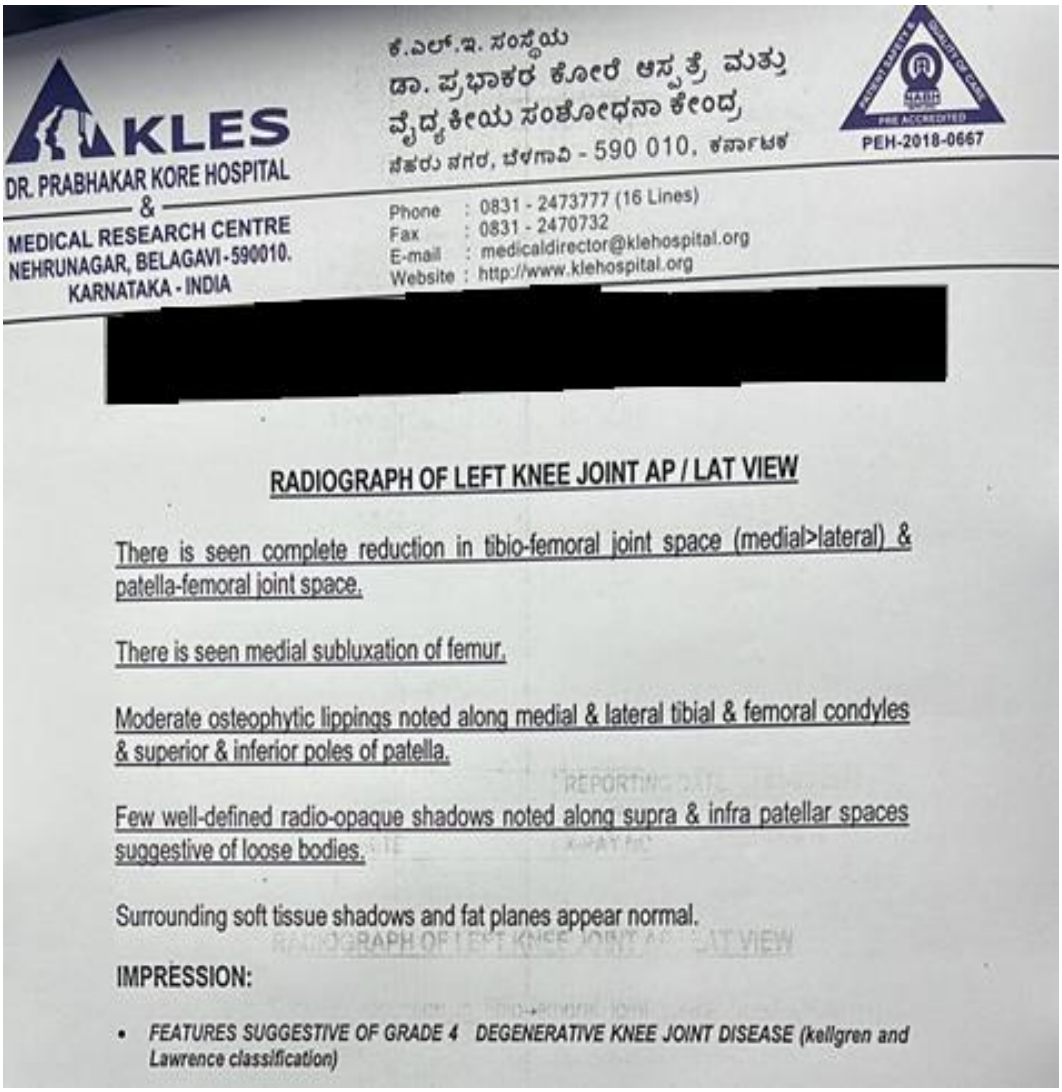
PHOTOGRAPHS



OPD card of a patient visiting with complaints of knee pain

Weight bearing AP view of a patient with Left OA knee

Lateral view of a patient with Left OA knee



KLES
DR. PRABHAKAR KORE HOSPITAL
&
MEDICAL RESEARCH CENTRE
NEHRUNAGAR, BELAGAVI-590010.
KARNATAKA - INDIA

ಕೆ.ಎಲ್.ಇ. ಸಂಸ್ಥೆಯ
ಡಾ. ಪ್ರಭಾಕರ ಕೋರೆ ಆಸ್ಪತ್ರೆ ಮತ್ತು
ವೈದ್ಯಕೀಯ ಸಂಶೋಧನಾ ಕೇಂದ್ರ
ನೆಹರು ನಗರ, ಬೆಳಗಾವಿ - 590 010. ಕರ್ನಾಟಕ

PEH-2018-0667

Phone : 0831 - 2473777 (16 Lines)
Fax : 0831 - 2470732
E-mail : medicaldirector@klehospital.org
Website : http://www.klehospital.org

[redacted]

RADIOGRAPH OF LEFT KNEE JOINT AP / LAT VIEW

There is seen complete reduction in tibio-femoral joint space (medial>lateral) & patella-femoral joint space.

There is seen medial subluxation of femur.

Moderate osteophytic lippings noted along medial & lateral tibial & femoral condyles & superior & inferior poles of patella.

Few well-defined radio-opaque shadows noted along supra & infra patellar spaces suggestive of loose bodies.

Surrounding soft tissue shadows and fat planes appear normal.

IMPRESSION:

- ***FEATURES SUGGESTIVE OF GRADE 4 DEGENERATIVE KNEE JOINT DISEASE (kellgren and Lawrence classification)***

X-ray reporting by a radiologist for a patient with Left Grade IV OA knee

ANNEXURE IV

MASTERCHART

	Name	Age	Sex	Occupation	IP/OP no.	hief complain	Co-morbidities	FFD	Varus / Valgus	Effusion	ROM knee	Crepitus	Joint line tenderness	Diagnosis	VAS	WOMAC	Grade OA
1	Name	Age	Sex	Occupation	IP/OP no.	hief complain	Co-morbidities	FFD	Varus / Valgus	Effusion	ROM knee	Crepitus	Joint line tenderness	Diagnosis	VAS	WOMAC	Grade OA
2	Ambavva Bagali	50	F	Anganwadi worker	6006547	Left knee pain	Nil	0	0	Absent	0-135 degree	Present	Medial and lateral joint line tenderness	Left knee OA	6	38	1
3	Anjali Dhavalashwar	62	F	Housewife	1150175	Bil knee pain R>L	HTN+	0	10 degree varus	Absent	10-100 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	8	62	3
4	Ankita Sawant	58	F	Business	1171918	Right knee pain	HTN+DM+	5	5 degree varus	Absent	5-90 degree	Present	Medial and lateral joint line tenderness	Right knee OA	7	58	3
5	Annappa Balagavi	60	M	Farmer	1140703	Bil knee pain R>L	HTN+	10	10 degree varus	Absent	10-90 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	10	74	4
6	Annapurana Hallikeri	59	F	Maid	1146108	Left knee pain	DM+	0	10 degree varus	Present	10-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	7	60	3
7	Anuraya Kadagi	62	F	Farmer	1790036	Bil knee pain R>L	Nil	10	15 degree varus	Absent	10-80 degree	Present	Medial joint line tenderness	Bil. knee OA	9	80	3
8	Apparao Kurhade	69	M	Farmer	7206215	Left knee pain	Nil	0	10 degree varus	Present	0-80 degree	Present	Medial joint line tenderness	Left knee OA	8	49	3
9	Aryana Kittur kar	62	F	Housewife	1186046	Bil knee pain R>L	HTN+DM+Hypothyroid+	5	0	Absent	5-120 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	8	72	4
10	Ayyappa Hadpad	53	M	Shopkeeper	1186403	Left knee pain	DM+	0	10 degree varus	Present	10-110 degree	Present	Medial and lateral joint line tenderness	Left knee OA	7	64	3
11	Babu Khandagave	75	M	Labour	1171560	Bil knee pain R>L	Nil	0	0	Absent	0-120 degree	Present	Medial joint line tenderness	Bil. knee OA	8	80	3
12	Bapu Kharagade	57	M	Salesman	7852149	Left knee pain	Nil	0	10 degree varus	Present	0-95 degree	Present	Medial joint line tenderness	Left knee OA	10	73	4
13	Basappa Pujari	52	M	Farmer	1197161	Right knee pain	Nil	0	10 degree varus	Absent	0-100 degree	Present	Medial and lateral joint line tenderness	Right knee OA	9	82	3
14	Basavaraj Murgad	65	M	Labour	1178892	Bil knee pain R>L	DM+	5	10 degree varus	Absent	10-120 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	6	59	3
15	Bebi Tai Marathe	67	F	Labour	6571410	Bil knee pain R>L	HTN+	20	10 degree valgus	Present	20-120 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	8	79	4
16	Beeranha Khilari	50	F	Fruit seller	1187074	Bil knee pain R>L	Nil	0	0	Absent	0-120 degree	Present	Lateral joint line tenderness	Bil. knee OA	7	45	2
17	Bhairu Anandache	75	M	Labour	1186931	Bil knee pain R>L	HTN+DM+	0	15 degree varus	Absent	15-100 degree	Present	Lateral joint line tenderness	Bil. knee OA	10	85	4
18	Bhimrao Kumbar	69	M	Retired	1150594	Left knee pain	HTN+	0	5 degree varus	Absent	5-120 degree	Present	Medial and lateral joint line tenderness	Left knee OA	8	67	2
19	Chanbasava Kandaguri	72	F	Farmer	1162373	Left knee pain	Nil	0	0	Absent	0-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	9	69	3
20	Chandrakant Chikadi	57	M	Labour	1190362	Right knee pain	Nil	0	10 degree varus	Present	10-110 degree	Present	Medial and lateral joint line tenderness	Right knee OA	8	73	3
21	Chandrashekar Patil	69	M	Retired	1179041	Left knee pain	Nil	0	0	Absent	0-90 degree	Present	Medial joint line tenderness	Left knee OA	7	58	3
22	Draupadi Dovar	55	F	Housewife	1149051	Left knee pain	Nil	0	0	Absent	0-100 degree	Present	Medial joint line tenderness	Left knee OA	7	62	2
23	Channagavda Patil	65	M	Retired	7029998	Bil knee pain R>L	HTN+	20	5 degree varus	Absent	30-90 degree	Present	Medial joint line tenderness	Bil. knee OA	9	90	4
24	Dyneshwar Filankar	53	M	Business	1204388	Bil knee pain R>L	Nil	0	0	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	7	53	2
25	Fhakeerappa Limbagi	60	M	Shopkeeper	1009824	Left knee pain	DM+	0	0	Absent	0-100 degree	Present	Lateral joint line tenderness	Left knee OA	7	62	2
26	Girija Kiramath	54	F	Nursing	1179568	Bil knee pain R>L	HTN+DM+	10	20 degree varus	Present	20-100 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	10	79	4
27	Gulshan Mulkani	55	M	IT professional	1186751	Left knee pain	Nil	0	5 degree varus	Present	0-110 degree	Present	Medial and lateral joint line tenderness	Left knee OA	9	59	3
28	Gurulingappa Manahalli	69	M	Farmer	1190999	Right knee pain	Nil	0	10 degree varus	Present	0-95 degree	Present	Medial joint line tenderness	Right knee OA	10	81	4
29	Hanmant Malakar	64	M	Farmer	1178462	Bil knee pain R>L	Nil	0	0	Absent	0-110 degree	Present	Medial joint line tenderness	Bil. knee OA	5	53	3
30	Haseenabegum Mulla	56	F	Housewife	1198613	Bil knee pain R>L	HTN+DM+Hypothyroid+	10	10 degree varus	Absent	10-90 degree	Present	Medial joint line tenderness	Bil. knee OA	8	65	3
31	Hirabai Lande	72	F	Housewife	11034236	Left knee pain	Nil	0	0	Absent	0-110 degree	Present	Medial and lateral joint line tenderness	Left knee OA	5	48	2
32	Hulappa Chikkre	64	M	Retired	1200760	Bil knee pain R>L	Nil	0	0	Absent	0-100 degree	Present	Lateral joint line tenderness	Bil. knee OA	7	72	3
33	Ikbal Ahmad Baravanar	60	M	Shopkeeper	1194450	Right knee pain	DM+	10	10 degree varus	Present	10-90 degree	Present	Lateral joint line tenderness	Right knee OA	9	88	3
34	Irappa Gauda	67	M	Farmer	1138163	Left knee pain	Nil	5	15 degree varus	Absent	5-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	8	71	4
35	Jayadevamma Hiremath	82	M	Retired	1179049	Left knee pain	HTN+DM+	20	0	Present	20-90 degree	Present	Medial and lateral joint line tenderness	Left knee OA	9	88	3
36	Jayaram Venkatramy	59	M	Labour	1176045	Bil knee pain R>L	Nil	5	10 degree varus	Absent	5-100 degree	Present	Lateral joint line tenderness	Bil. knee OA	10	85	3
37	Jayshree Barabar	51	F	Housewife	1176225	Bil knee pain R>L	Nil	20	5 degree varus	Present	20-90 degree	Present	Lateral joint line tenderness	Bil. knee OA	8	59	4
38	Juliyan Laha	65	M	Retired	1164786	Left knee pain	Nil	0	0	Present	0-120 degree	Present	Lateral joint line tenderness	Left knee OA	8	45	2
39	Kadappa Dasaphal	65	M	Labour	1146688	Bil knee pain R>L	Nil	10	15 degree varus	Absent	10-100 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	10	78	4
40	Kallappa Kivad	68	M	Shopkeeper	1198211	Left knee pain	Nil	0	10 degree varus	Absent	0-90 degree	Present	Medial and lateral joint line tenderness	Left knee OA	8	86	4
41	Karuni Patil	52	F	Maid	55941724	Bil knee pain R>L	Hypothyroid+	0	0	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	7	72	2
42	Kalkotanur Shrimati	70	F	Retired	1552953	Bil knee pain R>L	DM+	10	10 degree varus	Absent	10-90 degree	Present	Medial joint line tenderness	Bil. knee OA	8	61	4
43	Krishna Jarhi	65	M	Retired	1177791	Bil knee pain R>L	HTN+	0	0	Present	0-100 degree	Present	Medial joint line tenderness	Left knee OA	7	52	2
44	Lakappa Shilavar	53	M	Farmer	1189065	Right knee pain	Nil	0	0	Present	0-120 degree	Present	Medial and lateral joint line tenderness	Right knee OA	8	45	2
45	Lakshmibai Patil	64	F	Housewife	6192165	Bil knee pain R>L	HTN+	0	0	Present	0-115 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	8	74	2
46	Lalita Patil	67	F	Housewife	1153362	Bil knee pain R>L	HTN+Hypothyroid+	0	20 degree varus	Absent	0-90 degree	Present	Medial and lateral joint line tenderness	Left knee OA	8	79	3
47	Laxmi Pujari	63	F	Labour	10002144	Bil knee pain R>L	HTN+DM+	0	10 degree varus	Absent	0-100 degree	Present	Medial joint line tenderness	Bil. knee OA	9	80	3
48	Leena Kamgannavar	58	F	Housewife	1185724	Bil knee pain R>L	Nil	0	0	Absent	0-120 degree	Present	Lateral joint line tenderness	Bil. knee OA	9	80	3
49	M. Ramchandra Gauda	62	M	Professor	1181185	Bil knee pain R>L	DM+	5	5 degree varus	Absent	5-130 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	7	51	3
50	Mahadevi Baragave	71	F	Labour	1151191	Bil knee pain R>L	Hypothyroid+	0	10 degree varus	Absent	0-110 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	10	91	3
51	Mahadevi Maganni	59	F	Farmer	1180978	Bil knee pain R>L	Nil	0	5 degree varus	Absent	0-100 degree	Present	Lateral joint line tenderness	Bil. knee OA	7	48	2
52	Mahadevi Parit	62	F	Labour	1147426	Bil knee pain R>L	Hypothyroid+	10	0	Present	10-100 degree	Present	Lateral joint line tenderness	Bil. knee OA	6	40	3
53	Mahadevi Patil	50	F	Farmer	1126615	Bil knee pain R>L	Nil	0	10 degree varus	Absent	0-100 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	8	63	2
54	Mallappa Naik	64	M	Labour	1151186	Right knee pain	Nil	0	0	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Right knee OA	7	63	2
55	Manjula Kerwad	51	F	Farmer	1176750	Bil knee pain R>L	Nil	0	5 degree varus	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	6	54	2
56	Mariyappa Shirale	63	M	Farmer	10035457	Bil knee pain R>L	Nil	20	5 degree varus	Absent	20-90 degree	Present	Medial and lateral joint line tenderness	Bil. knee OA	10	83	4

55	Manjula Korvad	51	F	Farmer	1176750	B/l knee pain R>L	Nil	0	5 degree varus	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	6	54	2
56	Mariyappa Shirale	63	M	Farmer	1035457	B/l knee pain R<L	Nil	20	5 degree varus	Absent	20-90 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	10	83	4
57	Meenakshi Hugar	77	F	Housewife	1170962	B/l knee pain R>L	HTN+	10	15 degree varus	Absent	10-120 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	9	77	4
58	Namdev Patil	61	M	Retired	1117219	Right knee pain	Nil	0	0	Absent	0-110 degree	Present	Medial and lateral joint line tenderness	Right knee OA	6	49	2
59	Naushad Ali	59	M	Retired army officer	1001102	B/l knee pain R<L	HTN+	0	10 degree varus	Absent	0-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	7	68	3
60	Parvati Charantimathh	64	F	Housewife	1190462	B/l knee pain R<L	HTN+DM+	10	15 degree varus	Absent	0-110 degree	Present	Medial joint line tenderness	B/L knee OA	6	55	2
61	Parvati Varpe	60	F	Shopkeeper	1186711	Right knee pain	Asthma+	0	5 degree varus	Present	0-120 degree	Present	Medial joint line tenderness	Right knee OA	8	58	2
62	Pushpa Talikoti	73	F	Labour	1153278	Left knee pain	Nil	0	0	Absent	0-110 degree	Present	Medial and lateral joint line tenderness	Left knee OA	7	67	3
63	Rajesh Halarankar	54	M	Salesman	1146467	Left knee pain	Nil	0	0	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Left knee OA	6	47	2
64	Ratnavva Hubbali	65	F	Housewife	1167435	B/l knee pain R>L	Nil	15	10 degree varus	Absent	15-90 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	8	89	4
65	Ravasaheb Patil	70	M	Farmer	1180164	Left knee pain	Nil	30	15 degree varus	Absent	30-80 degree	Present	Medial and lateral joint line tenderness	Left knee OA	9	86	4
66	Rehmansaab Kalkar	56	M	Retired	1126970	Right knee pain	Nil	10	0	Absent	10-120 degree	Present	Medial and lateral joint line tenderness	Right knee OA	6	53	3
67	Renuka Gaudanaikar	70	F	Housewife	1177196	Right knee pain	HTN+	0	10 degree varus	Present	0-100 degree	Present	Medial and lateral joint line tenderness	Right knee OA	8	78	2
68	Rudrappa Bovin	61	M	Shopkeeper	1167352	Left knee pain	Nil	5	5 degree varus	Present	5-120 degree	Present	Lateral joint line tenderness	Left knee OA	7	47	2
69	Sahebbi Shaikh	61	F	Housewife	1199922	Left knee pain	Hypothyroid+	0	5 degree varus	Present	0-130 degree	Present	Medial and lateral joint line tenderness	Left knee OA	7	63	2
70	Sanjay Patil	63	M	Retired	1135008	B/l knee pain R>L	Nil	0	0	Present	0-100 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	6	72	3
71	Sankavva Hullur	50	F	Housewife	1180044	Right knee pain	Nil	0	0	Absent	0-120 degree	Absent	Medial and lateral joint line tenderness	Right knee OA	5	39	1
72	Sarfunissa Shaikhali	72	F	Housewife	1191849	B/l knee pain R>L	Asthma+Hypothyroid+	10	20 degree varus	Present	10-90 degree	Present	Medial and lateral joint line tenderness	B/l knee OA	10	71	4
73	Satish Savadi	55	M	Lecturer	7899521	Right knee pain	Nil	0	0	Absent	0-110 degree	Present	Medial line tenderness	Right knee OA	6	56	2
74	Savita Kadam	54	F	Housewife	1217692	B/l knee pain R>L	HTN+	0	20 degree varus	Present	0-90 degree	Present	Medial line tenderness	B/l knee OA	9	87	4
75	Savitramma T S	65	F	Labour	1181657	Right knee pain	Hypothyroid+	0	10 degree varus	Absent	0-100 degree	Present	Medial line tenderness	Right knee OA	9	90	4
76	Shaila Prabhu	68	F	Retired	1172053	Right knee pain	DM+Asthma+	5	15 degree varus	Absent	5-90 degree	Present	Medial and lateral joint line tenderness	Right knee OA	10	84	4
77	Shakuntala Munnavali	57	M	Housewife	1169964	B/l knee pain R<L	Asthma+	0	0	Absent	0-120 degree	Absent	Medial and lateral joint line tenderness	B/L knee OA	5	27	1
78	Shankar Savdatti	58	M	Farmer	1194325	B/l knee pain R<L	Nil	10	15 degree varus	Absent	10-90 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	7	54	3
79	Shanta Kalimath	74	F	Housewife	1172011	Left knee pain	HTN+	15	15 degree varus	Absent	15-80 degree	Present	Lateral joint line tenderness	B/L knee OA	10	82	4
80	Shantaram Vitarkar	60	M	Professor	5045627	Right knee pain	HTN+	0	0	Present	0-130 degree	Present	Medial and lateral joint line tenderness	Right knee OA	6	36	2
81	Shantavva Chatanavvar	56	F	Shopkeeper	7029367	Left knee pain	Nil	0	5 degree varus	Present	0-120 degree	Present	Medial and lateral joint line tenderness	Left knee OA	8	45	2
82	Sharabadi Patiul	57	F	Housewife	1127054	Right knee pain	Nil	0	0	Present	0-100 degree	Present	Medial and lateral joint line tenderness	Right knee OA	5	47	2
83	Sharada Agaragi	52	F	Nursing	1179249	B/l knee pain R>L	Nil	0	0	Absent	0-120 degree	Present	Medial joint line tenderness	B/L knee OA	7	67	3
84	Shashikala Shantakke	58	F	Maid	1178997	B/L knee pain R<L	Asthma+	0	0	Absent	0-110 degree	Absent	Medial and lateral joint line tenderness	B/L knee OA	6	32	1
85	Shashvita Hiremath	73	F	Housewife	1189601	Left knee pain	Hypothyroid+	20	15 degree varus	Absent	20-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	9	79	4
86	Sheela Ghate	65	F	Retired	1169422	B/l knee pain R>L	HTN+	5	5 degree varus	Present	5-100 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	8	65	4
87	Shekhavva Dhupadal	53	F	Housewife	1008030	B/l knee pain R>L	Nil	0	20 degree varus	Present	0-110 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	7	73	3
88	Shobha Biraje	59	F	Housewife	5951723	B/l knee pain R>L	Nil	10	10 degree varus	Absent	10-90 degree	Present	Medial and lateral joint line tenderness	Right knee OA	9	87	4
89	Siddarayappa Badiger	88	M	Farmer	1127806	B/l knee pain R>L	DM+	0	0	Absent	0-120 degree	Absent	Medial and lateral joint line tenderness	B/L knee OA	5	25	1
90	Sidawwa Savadi	62	F	Housewife	1146316	B/l knee pain R<L	HTN+	10	10 degree varus	Absent	10-110 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	8	82	3
91	Subhash Naik	67	M	Retired	1217715	Left knee pain	Nil	0	0	Present	0-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	6	54	2
92	Sulbha Shiradkar	72	F	Retired	1156297	Left knee pain	DM+Asthma+	5	20 degree varus	Absent	5-100 degree	Present	Medial and lateral joint line tenderness	Left knee OA	10	90	4
93	Sulochana Shivpajimath	65	F	Farmer	1114999	B/l knee pain R<L	Hypothyroid+	10	30 degree varus	Present	10-100 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	9	79	4
94	Sureshappa Kanaji	60	M	Labour	1001114	Right knee pain	Nil	0	20 degree varus	Present	0-100 degree	Present	Medial and lateral joint line tenderness	Right knee OA	10	92	4
95	Sunita Pawashi	62	F	Housewife	1172365	B/l knee pain R<L	HTN+	0	10 degree varus	Present	0-110 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	8	66	4
96	Sushila Kamble	65	F	Retired	1115038	B/l knee pain R<L	Nil	0	20 degree varus	Absent	0-90 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	10	86	4
97	Sushila Pawar	75	F	Housewife	1180468	B/l knee pain R<L	HTN+DM+	15	10 degree varus	Absent	15-100 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	7	59	3
98	Sushilabai Babar	60	F	Labour	1147825	B/l knee pain R<L	Nil	0	10 degree varus	Absent	0-110 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	8	76	3
99	Swati Landhe	61	F	Housewife	1193819	Right knee pain	Asthma+	0	5 degree varus	Absent	0-130 degree	Present	Medial and lateral joint line tenderness	Right knee OA	7	49	2
100	Tulasa Sawant	62	F	Labour	6992858	B/l knee pain R> L	Nil	20	0	Present	20-120 degree	Present	Medial joint line tenderness	B/L knee OA	9	82	4
101	Ulvappa Deyannavar	76	M	Retired	1195718	Left knee pain	Nil	0	0	Absent	0-130 degree	Absent	Medial joint line tenderness	Left knee OA	8	51	1
102	Vijaya Kagatikar	65	M	Retired	1156215	Right knee pain	Nil	15	15 degree varus	Present	15-100 degree	Present	Medial and lateral joint line tenderness	Right knee OA	10	90	4
103	Vimal Tumari	70	F	Housewife	1182028	B/l knee pain R>L	Nil	5	5 degree varus	Absent	5-120 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	7	49	3
104	Virupaxayya Shindalimat	78	M	Retired	1176571	B/l knee pain R<L	Nil	0	15 degree varus	Absent	0-100 degree	Present	Lateral joint line tenderness	B/L knee OA	9	72	3
105	Yallangauda Patil	71	M	Farmer	1171077	Left knee pain	Nil	0	5 degree varus	Absent	0-110 degree	Present	Medial and lateral joint line tenderness	Left knee OA	6	52	2
106	Yallappa Gauda	78	M	Labour	1176320	Left knee pain	Nil	0	10 degree varus	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Left knee OA	7	64	2
107	Yallavva Aglanavar	51	F	Housewife	1182408	Right knee pain	Asthma+	0	10 degree varus	Absent	0-120 degree	Present	Lateral joint line tenderness	Right knee OA	8	79	3
108	Yallavva Mathad	73	F	Housewife	1198498	B/l knee pain R<L	HTN+DM+	5	10 degree varus	Absent	5-100 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	10	89	4
109	Yashavant Khanapur	60	M	Labour	1203241	B/l knee pain R<L	HTN+	10	0	Absent	10-125 degree	Present	Medial and lateral joint line tenderness	B/L knee OA	6	49	3
110	Yakub Ibrahim Khan	57	M	[illegible]	[illegible]	Right knee pain	DM+	0	0	Absent	0-120 degree	Present	Medial and lateral joint line tenderness	Right knee OA	7	67	3