ISSN: 2321-5690
IJOPT
INDIAN JOURNAL OF PHYSICAL THERAPY
AN INTERNATIONAL JOURNAL
INDIAN JOURNAL OF PHYSICAL THERAPY
AN INTERNATIONAL JOURNAL
editor.ijopt@gmail.com

Evidence-Based Assessment of the Knee Joint in Osteoarthritis: A Comprehensive Approach to Diagnosis, Monitoring, and Treatment Planning for Physiotherapists

Mohammed Amjad Khan[1], Saad Ali Suheimi[2]
[1,2]Physioplans Physiotherapy and Rehabilitation Centre, Medina Al Munawwarah, 42224, Saudi Arabia.

DOI: https://doi.org/10.63299/ijopt.060103

ABSTRACT

Background: Knee osteoarthritis (OA) is a prevalent musculoskeletal disorder that causes chronic pain, reduced mobility, and decreased quality of life. Given its progressive nature, an accurate, evidence-based assessment approach is essential for guiding diagnosis, monitoring disease progression, and informing treatment decisions. Traditional assessment methods often vary among clinicians and may lack standardization, potentially affecting patient outcomes. A structured framework that integrates clinical reasoning, validated tools, and imaging can improve the consistency and accuracy of knee OA evaluation.

Objective: This study aims to develop a comprehensive, evidence-based assessment framework for knee OA, offering physiotherapists a standardized yet adaptable approach to diagnosis and treatment planning.

Methods: The assessment framework was developed through a combination of current clinical practices, expert recommendations, and validated assessment tools. It includes subjective history-taking, physical examination, and functional outcome measures such as the Knee Injury and Osteoarthritis Outcome Score (KOOS) and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The role of imaging in specific cases was also considered, with clinical reasoning emphasized to distinguish OA from other knee pathologies. Practitioner feedback was used to evaluate the framework's practicality and effectiveness.

Results: The structured framework improves the accuracy and consistency of knee OA assessment by incorporating essential clinical components. It allows for individualized adaptations while maintaining standardized evaluation criteria. Physiotherapists reported increased confidence in diagnosing and monitoring knee OA with this approach.

Conclusion: The evidence-based assessment framework standardizes the evaluation of knee OA, aiding early diagnosis, disease monitoring, and treatment planning. Future research should validate its clinical applicability and investigate additional factors, such as psychosocial influences, on OA progression.

Keywords: Knee osteoarthritis, evidence-based assessment, physiotherapy, clinical reasoning, diagnosis, outcome measures.

INTRODUCTION

Osteoarthritis (OA) is a predominant contributor to chronic pain and disability on a global scale, with the knee joint frequently being one of the most affected areas [1]. Global Burden of Disease Study data reveals osteoarthritis as a major source of disability, impacting mobility, well-being, and healthcare systems worldwide. [1]. The expanding burden of knee osteoarthritis, fueled by an aging population, rising obesity rates, and evolving lifestyle factors, necessitates a heightened emphasis on timely and accurate diagnostic assessment.[2].

Evidence-based evaluation is key for osteoarthritis diagnosis, severity assessment, and treatment planning.[3]. To optimize osteoarthritis management, current clinical recommendations stress the importance of a comprehensive evaluation, integrating patient history, physical examination, imaging, and validated outcome measures to accurately assess pain, stiffness, functional limitations, and disease progression. [3,4]. NICE guidelines specify that the combined use of clinical assessment tools and patient-reported outcome measures is essential for the accurate diagnosis and evidence-based management of knee osteoarthritis.[3]. Additionally, the evolution of clinical practice in osteoarthritis pain management necessitates the integration of pain assessment methodologies capable of discerning nociceptive, neuropathic, and central sensitization pathways, resulting in enhanced treatment precision [4].

Patient history and physical examination remain fundamental to osteoarthritis diagnosis [5]. Key components include assessing knee pain onset, location, and characteristics; identifying aggravating and relieving factors; and evaluating functional limitations.[5]. The clinical examination procedure should involve the systematic evaluation of joint deformities through inspection, the assessment of tenderness and effusion through palpation, the measurement of range of motion, the quantification of muscle strength, and the application of special tests to exclude alternative diagnoses. [5,6]. While clinical diagnosis is often sufficient, radiographic imaging serves as a valuable adjunct in confirming structural manifestations of osteoarthritis, including joint space narrowing, osteophyte formation, and subchondral sclerosis, especially in instances of diagnostic uncertainty [6].

A comprehensive evaluation extends beyond mere diagnosis, serving a crucial function in tracking the advancement of disease and the effectiveness of treatment. The application of standardized outcome measures, including the Knee Injury and Osteoarthritis Outcome Score (KOOS) and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), enables healthcare professionals to quantify symptoms, monitor functional deterioration, and refine intervention strategies to meet the specific requirements of each patient.[4]. When clinical differentiation between osteoarthritis and other arthritides remains challenging, laboratory investigations, including the measurement of inflammatory biomarkers, are indicated to refine diagnostic accuracy.[6].

The incorporation of evidence-based assessment methods by physiotherapists contributes to

improved patient outcomes, reduced disability, and enhanced quality of life in individuals with knee osteoarthritis. The evolving advancement of these assessment methods is a key priority in the effective clinical management of osteoarthritis [2,5].

Despite the high prevalence of knee osteoarthritis (OA), a standardized, evidence-based assessment framework integrating clinical reasoning, validated instruments, and patient-specific factors remains a critical need. This manuscript presents a comprehensive, evidence-based framework for knee OA assessment, designed to facilitate accurate diagnosis, effective monitoring, and personalized treatment planning for physiotherapists.

METHODOLOGY

Materials and Methods

This section describes the approach used to develop an evidence-based framework for knee osteoarthritis (OA) assessment. The methodology reflects a structured, yet pragmatic process aimed at providing physiotherapists with a clinically relevant and evidence-supported assessment framework. While not a systematically structured process, this framework integrates existing literature and clinical expertise to ensure practical applicability.

Framework Development Process

The framework was developed based on a combination of existing knowledge and clinical expertise. The steps involved were as follows:

Literature Review: A focused review of relevant literature was conducted to identify key components of osteoarthritis of the knee joint assessment. While this was not a systematic review, studies, clinical guidelines, and established practices were evaluated to inform the framework. 12 studies were included, categorized as shown in Tables 1 and 2, which summarize the studies, their factors contributing to the development of this framework for osteoarthritis of the knee joint assessment, and their respective levels of evidence.

Clinical Experience: The framework draws significantly on clinical experience and observations from daily practice. Physiotherapists with experience in managing knee OA contributed practical insights, which were incorporated into the framework.

Key Components of the Framework

The following components form the basis of the framework: as outlined in Table 3

- **Subjective Assessment**: A series of questions regarding patient history and symptoms were developed, though no standardized questionnaire was used. This component is flexible and adaptable to clinical needs.
- **Physical Examination**: The framework includes standard physical examination procedures, but no formalized or validated protocol was followed. A basic set of tests and observations (such as joint inspection, ROM, strength testing, and palpation) were used based on common clinical practices.
- **Outcome Measures**: A selection of outcome measures, including the KOOS and WOMAC, was incorporated into the framework, though their use is optional and based on clinical judgment. These measures were included as they are commonly used and provide useful information, but they

were not consistently implemented in all clinical settings.

- **Diagnostic Imaging**: While imaging is suggested for difficult or uncertain cases, the use of specific imaging modalities (e.g., X-rays, MRIs, or ultrasounds) is not mandated within the framework. The decision to use imaging was left to the discretion of the clinician.
- **Clinical Reasoning**: The framework includes a general process for differential diagnosis, but no formal clinical guidelines were followed in its development. Instead, it is based on clinical reasoning informed by the practitioner's experience.

Framework Testing and Feedback

The framework was informally tested through its application in clinical settings, where it was used by physiotherapists to assess patients with knee OA. Feedback was gathered from physiotherapists on its usability and applicability, which led to minor refinements to the framework. However, no formal pilot study or validation process was conducted.

Reproducibility

While the framework is designed to be practical and applicable in a wide range of clinical settings, its reproducibility is dependent on the clinician's judgment and available resources. As there were no standardized protocols followed in the development process, the framework may require adaptation based on individual clinical circumstances or patient populations.

What is Evidence-Based Assessment?

Evidence-based assessment refers to the use of the best available scientific evidence, clinical expertise, and patient preferences to guide the process of evaluating and diagnosing health conditions. In the context of knee osteoarthritis (OA), this approach involves:

- **Utilizing Research and Validated Tools**: Evidence-based practice relies on research findings, clinical guidelines, and validated outcome measures to make informed decisions about diagnosis and treatment. These tools ensure that the assessment process is reliable, reproducible, and scientifically supported.
- **Clinical Expertise:** Physiotherapists combine evidence-based research with their clinical experience and professional judgment to interpret findings, assess conditions, and develop tailored treatment plans that address each patient's unique needs. This integration of evidence and expertise ensures that interventions are both effective and personalized, optimizing patient outcomes in the management of knee osteoarthritis and other musculoskeletal conditions.
- **Patient-Centered Approach**: Evidence-based assessment also considers the patient's individual experiences, preferences, and goals. This helps to ensure that interventions are tailored to improve not just clinical outcomes but also the patient's overall quality of life.
- **Ongoing Monitoring**: Evidence-based assessment is not a one-time event; it involves regular monitoring of a patient's

progress and the continual adaptation of treatment plans based on new evidence and clinical findings.

Why Evidence-Based Assessment Matters

An evidence-based assessment ensures that we:

- Accurately diagnose osteoarthritis and rule out other conditions [2].
- Understand the severity and functional impact of the condition [3].
- Tailor interventions to the individual's needs [2,4].
- Monitor progress and adjust treatment plans as needed [2].

RESULTS

The key components of an evidence-based assessment for knee osteoarthritis.

This includes:

1. Subjective and objective Assessment.
2. Physical Examination.
3. Outcome Measures.
4. Diagnostic Imaging (when necessary).

1. Subjective and Objective Assessment

The subjective and objective assessment is the foundation of our evaluation. It involves gathering information about the patient's history, symptoms, and functional limitations [2]. Key areas to explore include.

- **Pain assessment:** Visual Analog Scale [9].
- **Functional Mobility:** Using Modified Time up and Go test, ascending and descending stairs 15 cm step [9].
- **Health Status:** using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC LK3.0)**,** a widely used tool to assess pain, stiffness, and physical function in OA patients [9].
- **Psychosocial Factors:** The impact of pain on cognitive factors such as pain catastrophizing, self-efficacy, cognitive dysfunction, perceived control, expectations of recovery, and attention to pain [9].

2. Physical Examination

The physical examination provides objective data to support our diagnosis. Key components include:

- **Observation:** Look for swelling, deformities, and static knee alignment [3].
- **Range of Motion (ROM):** Assess active and passive knee flexion and extension [6]. When assessing ROM, ensure the patient is in a comfortable position and use a goniometer for accurate measurement [9].
- **Palpation:** Check for tenderness, warmth, or joint effusion [12].
- **Strength Testing:** Evaluate quadriceps and hamstring strength, as weakness is common in knee OA [9].
- **Special Tests:** Perform tests like the Patellofemoral Compression Test or McMurray's Test to rule out other conditions [13].

- **Gait Analysis:** Observe the patient's walking pattern for abnormalities like a limp or reduced knee flexion [14].

3. Outcome Measures

Using validated outcome measures is a critical part of evidence-based practice. These tools help quantify the severity of symptoms and track progress over time. Commonly used measures for knee OA include:

- KOOS (Knee Injury and Osteoarthritis Outcome Score): Assesses pain, symptoms, activities of daily living, sports, and quality of life [9].
- WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index): Focuses on pain, stiffness, and physical function, providing insight into the functional limitations of knee OA [9].
- VAS (Visual Analog Scale): Measures pain intensity [9].
- 30-s and 5-time Sit to Stand test to assess functional mobility and strength [16].
- 6-Minute Walk Test: Evaluates functional capacity [17].

4. Diagnostic Imaging

Clinical assessment is frequently sufficient for diagnosing knee osteoarthritis (OA); however, in complex clinical presentations**,** diagnostic imaging can offer supplementary information [2]. Common imaging modalities include:

- **X-rays:** To assess joint space narrowing, osteophytes, and subchondral sclerosis [18].
- **MRI:** To evaluate soft tissue structures like cartilage, ligaments, and menisci [19].
- **Ultrasound:** To detect synovitis or effusion [20].

Clinical Reasoning and Differential Diagnosis

An evidence-based assessment requires clinical reasoning to accurately differentiate knee OA from other conditions with similar presentations. These include:

Rheumatoid arthritis: A systemic autoimmune condition that can present with joint pain and stiffness, often affecting multiple joints symmetrically. Unlike OA, it typically involves inflammation and can affect younger individuals [12].

Meniscal tears: Damage to the cartilage in the knee, which may cause pain, swelling, and mechanical symptoms like locking or instability. Unlike OA, meniscal tears are often linked to acute injury and can be evaluated with imaging [12].

Ligamentous injuries: Injuries to the ACL, PCL, MCL, or LCL can cause knee instability and pain, particularly during movement. These injuries can be differentiated through specific clinical tests and imaging [12].

Patellofemoral pain syndrome: Characterized by anterior knee pain, often aggravated by activities like squatting, running, or prolonged sitting. This condition is distinct from OA, as it typically involves the patellofemoral joint rather than the knee joint's overall structure [12].

Referred pain from the hip or lumbar spine: Pain originating from the hip or lower back can radiate to the knee, mimicking symptoms of knee OA. A

thorough assessment and differential diagnosis can help rule out these non-articular sources of pain [12].

DISCUSSION

Knee osteoarthritis represents a multifaceted degenerative joint disease characterized by progressive cartilage degradation, subchondral bone remodeling, and chronic synovitis, ultimately leading to significant functional impairment and pain in a substantial global population.[21]. This paper presents an evidence-based assessment framework designed to enhance diagnostic accuracy, monitor condition progression, and enable personalized physiotherapy interventions. Integrating current clinical guidelines with recent advances in musculoskeletal health, this approach emphasizes the use of validated assessment tools to inform clinical reasoning. One of the key takeaways from this approach is the importance of subjective assessment**.** A detailed patient history provides critical clinical information regarding the onset, progression, and functional limitations associated with knee osteoarthritis [22]. Acknowledging the patient's subjective experience of pain and functional limitations, this approach emphasizes the development of personalized treatment plans that incorporate both subjective and objective assessments [23]. Understanding the patient's experience allows clinicians to take a holistic view of their condition, which is crucial for determining the most effective interventions.

Physical examination is essential in the assessment of knee osteoarthritis (OA) [24]. Evaluation of joint function, including range of motion, strength, and specialized tests, provides key diagnostic information and aids in differential diagnosis [24]. Significantly, this framework highlights the importance of psychosocial factors within the clinical examination of knee osteoarthritis (OA), an aspect often overlooked in standard assessments. This is essential for understanding OA's comprehensive impact on patient-reported outcomes, specifically mental well-being and quality of life.

Validated outcome measures, including the KOOS and WOMAC, provide a standardized approach to quantifying pain, stiffness, functional limitations, and quality of life in knee osteoarthritis (OA) [9, 10]. These tools support diagnosis and enable monitoring of treatment efficacy and disease progression. In clinical practice, serial assessment using these measures allows physiotherapists to track changes, modify treatment, and optimize patient outcomes in the management of chronic knee OA [23]. The implementation of outcome measures facilitates an evidence-based, patient-centered approach to knee osteoarthritis (OA) management, ensuring both treatment efficacy and individualized care[23].

A critical component of the evidence-based assessment framework is the integration of diagnostic imaging. While clinical assessment often provides sufficient diagnostic information for knee osteoarthritis (OA), imaging modalities such as radiographs and magnetic resonance imaging (MRI) offer complementary clarity, particularly in complex cases where diagnostic uncertainty persists [16]. Imaging facilitates the visualization of structural changes characteristic of OA, including joint space narrowing, osteophyte formation, and cartilage degeneration [16]. This supplemental diagnostic

information enhances clinical decision-making, enabling accurate and timely treatment interventions to mitigate further joint damage and disability [25].

This paper emphasizes the critical role of clinical reasoning in the differential diagnosis of knee osteoarthritis (OA). Conditions such as rheumatoid arthritis, meniscal tears, and patellofemoral pain syndrome present with overlapping symptomatology but necessitate distinct therapeutic approaches [26]. Subsequently, clinical reasoning is paramount in ensuring accurate diagnosis and tailored interventions. The integration of evidence-based tools with clinical judgment empowers physiotherapists to navigate the complexities of knee osteoarthritis (OA) and provide personalized care that optimizes functional outcomes.

Despite the strengths of this evidence-based assessment framework, limitations in the current research necessitate further investigation. While validated outcome measures and clinical tools are supported by evidence, variability exists in their application and interpretation. Healthcare accessibility, clinician expertise, and patient adherence can also influence outcomes. Future research should evaluate the framework's effectiveness in diverse settings and explore additional tools for assessing psychosocial factors and quality of life in knee osteoarthritis (OA) patients.

Key Takeaways:

To summarize, an evidence-based assessment for knee osteoarthritis involves:

- A thorough subjective history to understand the patient's experience.
- A detailed physical examination to assess joint function.
- Validated outcome measures to quantify symptoms and function.
- Diagnostic imaging when necessary to confirm the diagnosis or rule out other conditions.
- Clinical reasoning to ensure an accurate diagnosis and tailored treatment plan.

CONCLUSION

In conclusion, the evidence-based assessment framework for knee OA presented in this manuscript is a vital tool for physiotherapists. By combining clinical reasoning, patient-Centered care, validated assessment tools, and diagnostic imaging, this framework enhances the accuracy of diagnosis, facilitates ongoing monitoring, and enables tailored treatment planning. As research in the field of musculoskeletal health continues to evolve, this comprehensive approach will likely serve as a foundational model for improving the care of individuals living with knee OA, ultimately enhancing both short- and long-term outcomes.

Conflict of interest

The authors declare no conflict of interest.

REFERENCES

1. Vos T, Barber RM, Bell B, Bertozzi-Villa A, Biryukov S, Bolliger I, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188

countries, 1990–2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2015;386(743–800). doi:10.1016/S0140-6736(15)60692-4.

2. National Institute for Health and Care Excellence (NICE). Osteoarthritis in over 16s: Diagnosis and management (NICE Guideline No. 226) [Internet]. 2022 Oct 19. Available from: https://www.ncbi.nlm.nih.gov/books/NBK588843/

3. Thirumaran AJ, Deveza LA, Atukorala I, Hunter DJ. Assessment of pain in osteoarthritis of the knee. *J Pers Med*. 2023;13(7):1139. doi:10.3390/jpm13071139.

4. Hinton R, Moody RL, Davis AW, Thomas SF. Osteoarthritis: Diagnosis and therapeutic considerations. *Am Fam Physician*. 2002;65(5):841–8.

5. Calmbach WL, Hutchens M. Evaluation of patients presenting with knee pain: Part I. History, physical examination, radiographs, and laboratory tests. *Am Fam Physician*. 2003;68(5):907–12.

6. Magee DJ. *Orthopedic physical assessment*. 4th ed. Saunders; 2002. p. 661–763.

7. Bennell KL, Hunt MA, Wrigley TV, Lim BW, Hinman RS. Role of muscle in the genesis and management of knee osteoarthritis. *Rheum Dis Clin North Am*. 2008;34(3):731–54. doi:10.1016/j.rdc.2008.05.005.

8. Darabian S, Badii M, Wade S. How to approach the diagnosis of knee osteoarthritis. *BC Med J*. 2024;65(4):113–7.

9.Coleman, S., Briffa, N.K., Carroll, G. *et al.* A randomised controlled trial of a self-management education program for osteoarthritis of the knee delivered by health care professionals. *Arthritis Res Ther* **14**, R21 (2012). https://doi.org/10.1186/ar3703

10.Yang SY, Woon EYS, Griva K, Tan BY. A Qualitative Study of Psychosocial Factors in Patients With Knee Osteoarthritis: Insights Learned From an Asian Population. Clin Orthop Relat Res. 2023 May 1;481(5):874-884. doi: 10.1097/CORR.0000000000002526.

11.Teichtahl AJ, Davies-Tuck ML, Wluka AE, Jones G, Cicuttini FM. Change in knee angle influences the rate of medial tibial cartilage volume loss in knee osteoarthritis. Osteoarthritis Cartilage. 2009 Jan;17(1):8-11. doi: 10.1016/j.joca.2008.05.013.

12.Bunt CW, Jonas CE, Chang JG. Knee Pain in Adults and Adolescents: The Initial Evaluation. Am Fam Physician. 2018 Nov 1;98(9):576-585. PMID: 30325638.

13.Duffaut CJ, Goldman J, Miller EM. Clinical Evaluation of the Knee Arthritis Patient. Tech Vasc Interv Radiol. 2023 Mar;26(1):100876. doi: 10.1016/j.tvir.2022.100876.

14.Li H, Hu S, Zhao R, Zhang Y, Huang L, Shi J, Li P, Wei X. Gait Analysis of Bilateral Knee Osteoarthritis and Its Correlation with Western Ontario and McMaster University Osteoarthritis Index Assessment. Medicina (Kaunas). 2022 Oct 9;58(10):1419. doi: 10.3390/medicina58101419.

15.Roos EM, Roos HP, Lohmander LS, Ekdahl C, Beynnon BD. Knee Injury and Osteoarthritis Outcome Score (KOOS)--development of a self-administered outcome measure. J Orthop Sports Phys Ther. 1998 Aug;28(2):88-96. doi: 10.2519/jospt.1998.28.2.88.

16.Khuna L, Soison T, Plukwongchuen T, Tangadulrat N. Reliability and concurrent validity of 30-s and 5-time sit-to-stand tests in older adults with knee osteoarthritis. Clin Rheumatol. 2024 Jun;43(6):2035-2045. doi: 10.1007/s10067-024-06969-6.

17.Da Silva EB, Molinari CV, Cazarini C, Alves VLDS. FUNCTIONAL CAPACITY IN PATIENTS WITH KNEE OSTEOARTHRITIS: CROSS-SECTIONAL STUDY. Acta Ortop Bras. 2024 May 6;32(spe1):e272993. doi: 10.1590/1413-785220243201e272993.

18.Gupta KB, Duryea J, Weissman BN. Radiographic evaluation of osteoarthritis. Radiol Clin North Am. 2004 Jan;42(1):11-41, v. doi: 10.1016/S0033-8389(03)00169-6.

19.Ehmig J, Engel G, Lotz J, Lehmann W, Taheri S, Schilling AF, Seif Amir Hosseini A, Panahi B. MR-Imaging in Osteoarthritis: Current Standard of Practice and Future Outlook. Diagnostics (Basel). 2023 Aug 3;13(15):2586. doi: 10.3390/diagnostics13152586.

20.Hall M, Doherty S, Courtney P, Latief K, Zhang W, Doherty M. Synovial pathology detected on ultrasound correlates with the severity of radiographic knee osteoarthritis more than with symptoms. Osteoarthritis Cartilage. 2014 Oct;22(10):1627-33. doi: 10.1016/j.joca.2014.05.025.

20. Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, et al. The global burden of hip and knee osteoarthritis: Estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis*. 2014;73(7):1323–30. doi:10.1136/annrheumdis-2013-204763.

21. Hsu H, Siwiec RM. Knee osteoarthritis. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2024 Feb 17]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK507884/

22. Hunter DJ, Bierma-Zeinstra S. Osteoarthritis. *Lancet*. 2019;393(10182):1745–59. doi:10.1016/S0140-6736(19)30417-9.

23. 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. *Arthritis Rheum*. 1986;29(8):1039–49. doi:10.1002/art.1780290816.

24. Dobson F, Hinman RS, Roos EM, Abbott JH, Stratford P, Davis AM, et al. OARSI recommended performance-based tests to assess physical function in people diagnosed with hip or knee osteoarthritis. *Osteoarthritis Cartilage*. 2013;21(8):1042–52. doi:10.1016/j.joca.2013.05.002.

25 . Hunter DJ, Arden N, Conaghan PG, Eckstein F, Gold G, Grainger A, et al. Definition of osteoarthritis on MRI: Results of a Delphi exercise. *Osteoarthritis Cartilage*. 2011;19(8):963–9. doi:10.1016/j.joca.2011.04.017.

26. Felson DT, Zhang Y. An update on the epidemiology of knee and hip osteoarthritis with a view to prevention. *Arthritis Rheum*. 1998;41(8):1343–55. doi:10.1002/1529-0131(199808)41:8<1343::AID-ART3>3.0.CO;2-9.

Table 1. Summary of Included Studies in the Development of the Evidence-Based Framework for Knee Osteoarthritis Assessment.

Study Type	Number of studies
Randomized Controlled Trial (RCT)	1
Qualitative Study	1
Observational Cohort Study	1
Review Articles	4
Observational Study	1
Developmental Study	1
Cross-Sectional Studies	2
Multiple Group Case-Control Study	1
Total	12

Table 2. Summary of Studies and Their Factors Contributing to the Development of the Framework for Osteoarthritis Assessment.

WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index.**VAS:** Visual Analog Scale, **KOOS:** Knee injury and Osteoarthritis Outcome Score**, MRI:** Magnetic Resonance Imaging

Sl.No	Author and Year	Type of Study	Factors for the framework	Level of Evidence
1	Coleman et.al [9],2012	Randomized Controlled Trial	Pain assessment (WOMAC &VAS), Functional Mobility, and Health Status. Range of Motion and strength testing	Level II
2	Yang et. al [10], 2023	Qualitative Study	Psychosocial Factors	Level V
3	Teichtahl et.al [11], 2009	Observational Cohort Study	Observation	Level II
4	Bunt et.al [12], 2018	Review Article	Palpation and differential diagnosis	Level V
5	Duffaut et.al [13],2023	Review Article	Special Tests	Level V
6	Li H et.al [14],2022	Observational study	Gait analysis	Level III
7	Roos et.al [15], 1998	Developmental study	Outcome Measures: (KOOS) Assesses pain, symptoms, activities of daily living, sports, and quality of life	Level IV
8	Khuna et.al [16],2024	Cross Sectional Study	30-second and 5-time sit-to-stand tests	Level III
9	Da Silva et.al [17],2024.	Cross Sectional Study	6-Minute Walk Test:	Level III
10	Gupta et al. [18],2004	Review Article	X-rays	Level V
11	Ehmig et.al [19],2023	Review Article	MRI	Level V
12	Hall et. al [20],2014.	Multiple group case-control study	Ultrasound	Level III

Table 3: Core Components of the Evidence-Based Assessment Framework for Knee Osteoarthritis (OA).

Component	Description	Purpose
Subjective and objective Assessment	Patient history, symptoms, functional limitations	Understand the patient's experience and tailor interventions
Physical Examination	Joint inspection, ROM, strength testing, palpation	Assess joint function and rule out other conditions
Outcome Measures	KOOS, WOMAC, VAS, 30-s Sit-to-Stand Test	Quantify symptoms and track progress over time
Diagnostic Imaging	X-rays, MRIs, ultrasounds (used in uncertain cases)	Confirm diagnosis and assess structural changes
Clinical Reasoning	Differential diagnosis based on practitioner expertise	Ensure accurate diagnosis and tailored treatment