Brief Report

Proportion of patients with hip osteoarthritis in primary care identified by differing clinical criteria: a cross-sectional study of 4699 patients

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S U M M A R Y

Objective: Differing clinical criteria for hip osteoarthritis (OA) are applied in primary care, but little is known regarding the utility of these criteria. The aim of this study was to evaluate and compare the proportion of patients in a primary care setting with hip OA fulfilling the American College of Rheumatology (ACR), the National Institute for Health and Care Excellence (NICE), and the Danish Health Authority (DHA) criteria.
Design: A cross-sectional analysis of baseline data from the Good Life with osteoArthritis in Denmark (GLA:D®) program, a treatment program for patients with symptoms or functional limitations associated with hip OA. The prevalence of hip OA according to the ACR, NICE, and DHA criteria was calculated in all patients and in a subgroup of patients with self-reported radiographic hip OA.
Results: 4699 patients were included in the analysis. Mean age (SD) was 66.8 (9.7) years and 71% of the patients were female. 64%, 80%, and 94% fulfilled the ACR, DHA, and NICE criteria, respectively. In those self-reporting radiographic hip OA, the corresponding numbers were 66%, 81%, and 94%. A limited number of patients (4%) did not fulfill any of the criteria.
Conclusions: The NICE criteria identified the most patients that were treated because of their symptoms or functional limitations. The DHA and especially the ACR criteria did not identify a significant proportion of these patients. The results suggest the NICE criteria are appropriate to identify individuals treated for hip OA in primary care.

1. Introduction

Clinical diagnosis of hip osteoarthritis (OA) without the use of imaging is now considered the standard diagnostic procedure [1–3]. Common clinical features of OA include pain, functional limitation, reduced range of motion, stiffness, crepitus, instability, and muscle weakness [2]. However, no consensus exists on the clinical criteria that should define hip OA [1,4,5].

The most commonly used clinical criteria are those from the American College of Rheumatology (ACR) [4], while the National Institute for Health and Care Excellence (NICE) [1] and Danish Health Authority (DHA) [5] have also published guideline recommendations. The ACR criteria were developed in a secondary care rheumatology setting [6] and

the NICE criteria were created through a clinical guideline development process and have not been validated [1]. Thus, these criteria may be of limited use in primary care.

Identification of early-stage disease has been put forward as a research priority [7]. Unfortunately, the ACR criteria have been shown to better identify advanced-disease and do not capture a significant proportion of those with hip pain and OA [8,9]. The utility of clinical criteria should be evaluated across the entire spectrum of symptomatic hip OA, not only among those with advanced disease. An informal search did not identify any publications evaluating the NICE or DHA criteria in cohorts inclusive of individuals with early-stage hip OA.

As all patients with hip OA should initially be managed using interventions typically delivered in primary care settings [1], it is

important to understand the utility of clinical criteria in this health care setting and across the spectrum of disease. Therefore, the objective of this report was to describe the proportion of hip OA patients identified by three clinical criteria in a cohort of individuals treated in primary care for their hip symptoms. Additionally, the proportion of patients identified by these criteria was also compared in a subgroup of patients with self-reported radiographic hip OA.

2. Methods

2.1. Design and participants

This was a cross-sectional study of patients participating in Good Life with osteoArthritis in Denmark (GLA:D®) [10] with symptoms and/or functional limitations related to hip OA. GLA:D® is a group-based education and exercise intervention for patients with hip and knee OA that is administered throughout Denmark [10]. Patients are eligible for GLA:D® if they seek healthcare due to their hip or knee joint problems, understand Danish and do not have another diagnosis that better explains their joint problems or another condition with more severe symptoms [10]. Patients with a primary complaint from the hip and available data on the clinical criteria were included in this report.

This report conforms to the STROBE statement for reporting observational studies [11]. Ethical approval of this study was waived by the ethics committee of the North Denmark Region and GLA:D® has been approved by the Danish Data Protection Agency (SDU; 10.084). All patients provided informed consent to report their data in the GLA:D® registry.

2.2. Clinical criteria

The clinical criteria were assessed by clinical examination of patients at baseline by the enrolling physiotherapist (693 physiotherapists in 357 clinics), prior to initiation of the GLA:D® intervention.

2.2.1. ACR criteria

The ACR clinical classification decision tree for hip OA was used [4]. Patients were classified as having hip OA if they fulfilled one of the following groups of criteria:

1. Hip pain, internal rotation less than $15°$, and flexion less than or equal to $115°$
2. Hip pain, internal rotation greater than or equal to $15°$, painful internal rotation, morning stiffness lasting 60 min or less, and age above 50 years

The second group of criteria is used to identify additional patients who do not qualify under the first set of criteria due to normal hip internal rotation. Therefore, the total number of patients fulfilling the ACR criteria was calculated as the number of individuals fulfilling criteria set one plus the number fulfilling criteria set two. In this study, reduced internal rotation and reduced flexion were recorded as "yes" or "no" since specific degrees of motion were not recorded. Stiffness after inactivity (yes/no) was used to define morning stiffness, as duration of morning stiffness is not available in the GLA:D® registry.

2.2.2. DHA criteria

The DHA criteria recommend patients be diagnosed with hip OA if they have activity-related hip pain and reduced hip mobility [5]. For this study, activity-related hip pain was defined as hip pain (yes/no). Patients were considered to have reduced hip mobility if either reduced hip flexion or internal rotation was present, since these criteria do not specify which hip movements should be evaluated.

2.2.3. NICE criteria

The NICE criteria state that hip OA can be diagnosed if the patient is

45 years or older, has activity-related joint pain, and has either no morning stiffness or morning stiffness lasting 30 min or less [1]. Again, activity-related joint pain was defined as hip pain (yes/no) and morning stiffness was excluded from the analyses as it is evaluated as "yes" or "no" in the GLA:D® registry.

2.2.4. Self-reported radiographic hip OA

Patients were classified at baseline as having self-reported radiographic hip OA if they answered "yes" to having both received a radiograph of their hip and if the radiograph showed changes associated with hip OA.

2.3. Statistical analysis

Clinical criteria were assessed in newly enrolled patients beginning February 07, 2017 and this analysis included data until December 31, 2018. Frequency of endorsement for each criterion from the ACR, DHA, and NICE criteria were calculated. The number and proportion of patients satisfying each set of criteria were calculated. The same analyses were performed in the patient subgroup with self-reported radiographic hip OA.

A sensitivity analysis excluding patients with self-reported rheumatoid arthritis was performed to evaluate the effect of co-morbid rheumatoid arthritis. The duration of morning stiffness is not assessed in GLA:D® and prolonged morning stiffness is a typical feature of rheumatoid arthritis [1,4]. Therefore, the analyses were repeated while excluding those with rheumatoid arthritis to evaluate any effects on the results. All statistical analyses were performed in Stata 15.1 (StataCorp LLC, College Station, USA).

3. Results

4699 patients with a primary complaint of hip pain and/or functional limitations and available clinical criteria data were included in the analysis. 3845 (82%) patients reported having had a hip radiograph showing OA changes. The demographic and clinical characteristics are presented in Table 1.

A total of 64% of patients met the ACR criteria for hip OA, as 57% fulfilled set one and an additional 7% met set two. 80% of patients met the DHA criteria while 94% satisfied the NICE criteria. Table 2 shows the

Table 1

Sample characteristics of patients in GLA:D® and those with self-reported OA changes on radiographs.

Variable	Hip as primary complaint, (n = 4699)	Self-reported hip OA changes on radiographs, (n = 3845)
Age, mean (SD) in years	66.8 (9.7)	66.5 (9.7)
Female, n (%)	3317 (70.6)	2667 (69.4)
Body mass index, mean (SD) in kg/m^2	27.2 (4.8)	27.2 (4.8)
Bilateral hip symptoms, n (%)	1005 (25.5)	868 (26.7)
Duration of symptoms, median (IQR) in months	12 (6–36)	12 (6–36)
Previous joint injury, n (%)	500 (10.6)	411 (10.7)
Pain intensity on a 0–100 mm visual analogue scale, mean (SD)	47.1 (21.7)	47.4 (21.7)
Self-reported rheumatoid arthritis, n (%)	189 (4.8)	160 (4.9)
Missing	763 (16.2)	598 (15.6)
Self-reported radiographs of hip taken, n (%)	4145 (88.2)	
Did not know	28 (0.6)	
Self-reported OA changes on radiograph, n (%)	3845 (81.8)	
Did not know	132 (3.2)	

GLA:D® = Good Life with osteoArthritis in Denmark; OA = osteoarthritis; IQR = interquartile range.

Table 2
Frequency of patient endorsement of criteria and prevalence of hip osteoarthritis according to different sets of clinical criteria.

Clinical criteria Item, n (%)	Patients fulfilling criteria, ($n = 4699$)	Patients with self-reported OA changes on radiographs fulfilling criteria, ($n = 3845$)
ACR criteria		
Set one	2676 (56.9)	2284 (59.4)
Hip pain	4528 (96.4)	3714 (96.6)
Hip internal rotation <15°	3540 (75.3)	2976 (77.4)
Hip flexion ≤115°	3075 (65.4)	2584 (67.2)
Set two[a]	343 (7.3)	259 (6.7)
Hip pain	4528 (96.4)	3714 (96.7)
Pain on hip internal rotation	3515 (74.8)	2923 (76.0)
Morning stiffness of the hip ≤60 min	3871 (82.4)	3190 (83.0)
Age above 50 years	4418 (94.0)	3598 (93.6)
Danish Health Authority criteria	3746 (79.7)	3120 (81.1)
Activity-related joint pain	4528 (96.4)	3714 (96.6)
Reduced hip mobility	3864 (82.2)	3214 (83.6)
NICE criteria	4429 (94.3)	3626 (94.3)
Age 45 years or over	4598 (97.9)	3755 (97.7)
Activity-related joint pain	4528 (96.4)	3714 (96.6)

* ACR = American College of Rheumatology; NICE = National Institute for Health and Care Excellence.

[a] Identifies additional patients with hip osteoarthritis who do not fulfill set one.

number of patients fulfilling each set of criteria and endorsement for individual items. 4% of patients did not fulfill any criteria, while 58% fulfilled all three. A Venn-diagram illustrating the overlap between criteria can be found in Supplementary file 1. Among those with self-reported radiographic OA, 66%, 81%, and 94% fulfilled the ACR, DHA, and NICE criteria, respectively.

The sensitivity analysis excluding patients with self-reported rheumatoid arthritis (n = 189) found similar proportions, namely 64%, 80%, and 95% met the ACR, DHA, and NICE criteria, respectively. The corresponding numbers after exclusion of patients with rheumatoid arthritis (n = 160) were 66%, 81%, and 95%.

4. Discussion

This is potentially the first study to compare three sets of clinical criteria for hip OA in a sample of patients in primary care. The results of this study suggest the NICE criteria identify the most patients treated for symptoms associated with hip OA in primary care, as 9 out of 10 patients fulfilled these criteria. Eight out of 10 patients fulfilled the DHA criteria, while only 6 out of 10 met the ACR criteria. Only 4% of patients did not fulfill any of the criteria. Similar results were found in those with self-reported radiographic hip OA and after exclusion of those with self-reported rheumatoid arthritis.

International consensus has not yet been reached on defining clinical hip OA. Since the development of the ACR criteria [4], little has been done to advance our understanding of hip OA definitions [12], especially in comparison to knee OA. For example, the NICE criteria used in this study are not specific to hip OA, but are used to diagnose hip, hand and knee OA [1]. The few studies that have examined definitions for hip OA typically use radiological criteria [12], which are no longer recommended or needed in the diagnosis of hip OA [3]. As such, we are unable to compare our findings for the DHA and NICE criteria to previous literature. However, the NICE and ACR criteria for knee OA performed approximately the same in individuals with symptoms or functional

limitations associated with knee OA in the GLA:D® cohort [13]. In those with knee OA, approximately 50% fulfilled the ACR criteria and 90% satisfied the NICE criteria [13].

Two studies evaluating the utility of the ACR criteria in samples of patients with hip OA were identified. A study combining population-based cohorts from six European countries found the ACR criteria identified 21% and 20% of patients with hip pain and self-reported hip OA, respectively [9]. The low prevalence found in this study may be explained by the sampling of population-based cohorts. The second study also found only 25% of individuals with hip pain or stiffness satisfy the ACR criteria at first presentation to their physician [8]. Interestingly, 40% of those not initially fulfilling the ACR criteria did fulfill the criteria within two years [8]. This suggests that the ACR criteria are not sensitive to early-stage hip OA, which may partly explain why one-third of patients enrolled in GLA:D® were not identified.

The main limitation of this study is the lack of a criterion measure for the diagnosis of hip OA. Without a suitable criterion measure, sensitivity and specificity estimates are not possible. However, this study represents an initial attempt to examine the applicability of clinical criteria in primary care, using a clinical examination by enrolling clinicians as a reference standard. These results should raise skepticism about the common usage of ACR criteria in clinical and research settings, as they suggest the ACR criteria exclude many patients being referred for primary care treatment for hip OA. Our hope is that the findings of this study can be used to develop clinical criteria for use in primary care settings and inform the design of future high-quality diagnostic studies, where sensitivity and specificity estimates can be made, improving our understanding of best practice for the clinical diagnosis of hip OA.

The inability to adhere to the clinical criteria as recommended in the original publications [1,4,5] also limits the findings of this study. For example, duration of morning stiffness is not recorded in the GLA:D®, thus this item was not evaluated in the NICE criteria and stiffness after inactivity was used for the ACR criteria. Therefore, it was not possible to evaluate the utility of the ACR or NICE criteria as originally defined. However, the duration of morning stiffness is primarily used to differentiate OA from rheumatoid arthritis [6]. The sensitivity analysis excluding patients with rheumatoid arthritis showed similar results to the primary analysis, increasing our confidence that the absence of duration of morning stiffness from the ACR and NICE criteria did not significantly affect their performance.

Our findings may not be generalizable to the general population, as diagnostic accuracy can vary in differing populations. The criteria in this study may not be applicable to those with early-stage disease who exhibit less severe symptoms, preventing them from accessing care. Criteria to identify early-stage knee OA have been explored [14], but we are unaware of any such criteria for hip OA, although preliminary work has suggested diagnostic range of motion measurements should be altered or ignored for early-hip OA [15].

In conclusion, our findings suggest the NICE criteria identify more patients being treated for hip pain and functional limitations in the primary care setting than the DHA and ACR criteria. The DHA and especially the ACR criteria seem to be of less value. The utility of all three sets of criteria are relatively unaffected by the presence of self-reported radiographic changes and only a small proportion of patients are not identified by any of the criteria evaluated in this study. Future studies should employ a criterion measure to determine the diagnostic accuracy of these criteria in primary care.

Author contributions

All authors had access to the data in the study and take responsibility for the integrity of the data and accuracy of the data analysis.

Study conception and design. Young, Skou, Koes, Grønne, Roos.

Recruitment of patients: Skou, Roos.

Acquisition of data. Skou, Roos.

Analysis and interpretation of data. Young, Skou, Koes, Grønne,

Roos.

Drafting the article or revising it critically for important intellectual content. Young, Skou, Koes, Grønne, Roos.

Final approval of the article. Young, Skou, Koes, Grønne, Roos.

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Credit author statement

James J. Young: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft. **Søren T. Skou:** Conceptualization, Methodology, Resources, Formal Analysis, Writing – Review and Editing. **Bart W. Koes:** Conceptualization, Methodology, Formal Analysis, Writing – Review and Editing. **Dorte T. Grønne:** Conceptualization, Methodology, Formal Analysis, Writing – Review and Editing. **Ewa M. Roos:** Conceptualization, Methodology, Resources, Formal Analysis, Writing – Review and Editing, Supervision.

Declaration of competing interest

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STS is associate editor of the Journal of Orthopaedic & Sports Physical Therapy, has received grants from The Lundbeck Foundation, personal fees from Munksgaard, all of which are outside the submitted work. He is co-founder of Good Life with Osteoarthritis in Denmark (GLA:D®), a not-for profit initiative hosted at University of Southern Denmark aimed at implementing clinical guidelines for osteoarthritis in clinical practice.

BWK has none to declare.

DTG has none to declare.

EMR is deputy editor of Osteoarthritis and Cartilage, the developer of the Knee injury and Osteoarthritis Outcome Score (KOOS) and several other freely available patient-reported outcome measures and co-founder of GLA:D®, a not-for-profit initiative to implement clinical guidelines for osteoarthritis in primary care.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https ://doi.org/10.1016/j.ocarto.2020.100111.

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