

Prevalence of Radiographic Hip Osteoarthritis in Puerto Rico: A Cross-Sectional Study of Adults Undergoing Pelvic Radiography for Trauma

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Objective: To determine the prevalence and severity of radiographic hip osteoarthritis (HOA) in a sample of adults in Puerto Rico.

Methods: We conducted a cross-sectional study of 300 patients aged ≥ 21 years who underwent anteroposterior pelvic X-rays for trauma at a major medical center in Puerto Rico from January 2024 to June 2024. Radiographs with hip fractures or surgeries affecting interpretation were excluded. HOA was diagnosed using established radiographic criteria and classified by Kellgren-Lawrence (KL) grading. Radiographic HOA was defined as a KL grade ≥ 2 . A musculoskeletal radiologist performed all image evaluations. Bivariate analyses were performed to study the association of HOA with age, sex, and body mass index (BMI).

Results: Radiographic HOA was identified in 27.0% of patients. Most patients had mild HOA based on KL scale. Grade 2 was the most common (60.5%), followed by grade 3 (23.5%). Older age and female sex were significantly associated with HOA presence, while no significant link was observed with body mass index categories.

Conclusion: This study provides the first population-based prevalence of HOA in Puerto Rico with 27% having this condition. Older age and female sex were associated with HOA. However, the study sample was limited to patients undergoing pelvic radiographs for trauma, which may not be representative of the general population. Nevertheless, the findings emphasize the considerable burden of HOA among Puerto Rican patients and highlight the need for further investigation.

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Key words: Hip osteoarthritis, Prevalence, Puerto Rico, Kellgren-Lawrence grading

Osteoarthritis (OA) is the leading form of arthritis affecting adults worldwide, characterized by chronic joint pain, functional impairment, and disability. The disease primarily targets the knees, hands, and hips, with a particular impact on individuals over 60 years of age (1). Hip osteoarthritis (HOA), the second most prevalent form after knee OA, is associated with considerable morbidity and health care burden.

A systematic global analysis spanning 204 countries and territories between 1990 and 2020 estimated a rising trend in HOA prevalence, forecasting a 78.6% increase by 2050 (2). In Puerto Rico, approximately 30,400 HOA cases were estimated in 2020, reflecting a substantial local health concern. Despite this, data on the prevalence and severity of radiographic HOA within Puerto Rican populations remain limited. This study aims to fill this knowledge gap by evaluating the current prevalence and severity of radiographic HOA among patients at a tertiary medical center in Puerto Rico.

Methods

Study design and population

This cross-sectional study included patients evaluated at the Puerto Rico Medical Center from January 2024 to June 2024. Inclusion criteria encompassed patients aged 21 years or older

who underwent pelvic radiography for body trauma. Exclusion criteria were patients aged 20 or younger, those with bilateral hip fractures or surgeries affecting both hips, hip malignancies, hip dysplasia, or avascular necrosis. Unilateral hip fractures or surgeries were included, with evaluation performed on the unaffected contralateral side. Pelvic and hip radiographs were retrieved from the Picture Archiving and Communication System (PACS) of the Puerto Rico Medical Center, San Juan, Puerto Rico. The first 50 eligible consecutive patients of each month of the study period were selected. Duplicates and cases with inadequate imaging or bilateral hip pathology were excluded and replaced accordingly. This study was supported by the Institutional Review Board of the University of Puerto Rico Medical Sciences Campus (Protocol # 2404210271).

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Variables

Age, sex, and body mass index (BMI) categories were determined for each patient. Classification of HOA severity was based on the Kellgren-Lawrence (KL) grading system, a validated radiographic tool grading OA severity from 0 (no OA) to 4 (severe OA) (1). Radiographic HOA was defined as a KL grade ≥ 2 . A subject was classified as having HOA if at least one hip joint was affected. For KL grading, the highest score between the two hips was used for analysis. A musculoskeletal radiologist performed all evaluations to ensure consistency.

Statistical analysis

Data analysis was performed using SPSS. Bivariate analyses using Chi-square test was assessed associations between HOA and age, sex, and BMI categories. Statistical significance was set at $p < 0.05$.

Results

Among 300 evaluated patients, 81 (27.0%) demonstrated radiographic evidence of hip OA. Most patients had mild HOA based on KL scale. Grade 2 was the most common (60.5%), followed by grades 3 (23.5%), and 4 (16.0%). Patients with HOA were significantly older (72.4 ± 15.1 years vs. 46.9 ± 19.4 years, $p < 0.001$) and more likely to be female (58.0% vs. 29.7%, $p < 0.001$) (Table 1). No statistically significant relationship was found between BMI and HOA prevalence ($p = 0.211$).

Discussion

Our study population demonstrated a higher prevalence of radiographic HOA compared to what has been previously reported in the literature. In a systematic review, the global prevalence of HOA diagnosed by KL grade ≥ 2 was estimated at 5.85% (1). A subgroup meta-analysis by continent reported a prevalence of 7.95% (95% CI 1.98–17.36) for North America, suggesting notable regional variability in HOA burden (1). These findings align with other large-scale epidemiologic surveys that further illustrate the growing burden of HOA with age. A population-based prevalence

survey reported an age-standardized estimate of radiographic HOA at 19.6%, with a significant increase in prevalence associated with advancing age ($p < 0.0001$) (3). Similarly, a cross-sectional descriptive study conducted in Mexico City using radiological criteria found a prevalence of 26.5% (95% CI 20.8–32.9) (4). Compared to these findings, our study reports a higher prevalence of 27.0%, underscoring a potentially greater burden of radiographic HOA in the Puerto Rican population.

The prevalence HOA reported in our study is considerably lower than that estimated for Puerto Rico in the Global Burden of Disease Study (2). However, that study relies on administrative databases, which may not accurately reflect true clinical diagnoses, potentially leading to misclassification bias and overestimation or underestimation of the actual prevalence.

In terms of gender distribution, our population showed a higher frequency of HOA among women, which contrasts with findings from Kim et al., who reported a significantly higher prevalence among men (24.7% in men vs. 13.6% in women, $p < 0.0001$) (3). This discrepancy may be influenced by demographic, genetic, or environmental factors specific to the local population.

Furthermore, our analysis did not reveal a significant association between BMI and HOA prevalence. This contrasts with findings from prior epidemiological studies, which have consistently identified higher BMI as a significant risk factor for hip OA. Jiang et al. demonstrated that a 5-unit increase in BMI was associated with an increased risk of HOA (RR: 1.11; 95% CI: 1.07–1.16) (5), and Yuan et al. found a causal relationship between genetically predicted BMI and increased HOA risk (OR = 1.45, 95% CI: 1.04–2.00, $p = 0.02$) (6). These contrasting results suggest that additional factors beyond BMI may play a more prominent role in the development of HOA in our population, warranting further investigation into region-specific risk profiles.

This study has some limitations. First, because the hip radiographs were obtained from patients evaluated for body trauma, the imaging was not necessarily performed in a standardized manner across all individuals. Second, the study sample consisted of patients undergoing pelvic radiographs for trauma, which may not be representative of the general population and could bias prevalence estimates. Third, the presence of symptoms associated with HOA was not assessed; the analysis focused solely on radiographic findings. However, we believe our study provides a more accurate estimate of the true prevalence of HOA, as prior studies may be biased by including only patients with hip symptoms—potentially leading to an overestimation of prevalence. Fourth, aside from age, sex, and BMI, we did not assess other potential risk factors for osteoarthritis, such as family history, occupation, or coexisting inflammatory arthritis. Fifth, radiographic evaluations were performed by a single musculoskeletal radiologist. The inclusion of a second independent musculoskeletal radiologist to confirm findings and assess interobserver reliability would have strengthened the study's

Table 1. Association of radiographic hip osteoarthritis with age, sex, and body mass index categories.

Characteristics	All patients (n= 300)	OA (KL ≥ 2) (n=81)	No OA (KL <2) (n=219)	p-value
Age, mean in years (SD)	53.8 (21.6)	72.4 (15.1)	46.9 (19.4)	<0.001
Sex, n (%) women	112 (37.3)	47 (58.0)	65 (29.7)	<0.001
BMI, n (%) [*]				
Underweight	18 (6.0)	5 (6.2)	13 (5.9)	0.211
Normal	99 (33.0)	35 (43.2)	64 (29.2)	
Overweight	102 (34.0)	24 (29.6)	78 (35.6)	
Obesity	74 (24.7)	15 (18.5)	59 (26.9)	

OA: Osteoarthritis; KL: Kellgren-Lawrence grading; SD: standard deviation; BMI: Body mass index. ^{*}Missing values in 7 cases.

methodology. Finally, we did not capture whether OA was present in the right hip, left hip, or both as we used a person-level unit of analysis rather than an individual joint-based approach. Despite these limitations, this study offers valuable insight into the burden of HOA in Puerto Rico.

In summary, our findings indicate a higher prevalence of radiographic HOA in our study population compared to reports from other countries and a previous study from Puerto Rico that relied on administrative data. These results underscore the significant burden of HOA among women and older adults on the island, highlighting the need for further research and the development of targeted healthcare strategies.

Resumen

Objetivo: Determinar la prevalencia y severidad de la osteoartritis de cadera (HOA, por sus siglas en inglés) radiográfica en una muestra de adultos en Puerto Rico. **Métodos:** Se llevó a cabo un estudio transversal con 300 pacientes, de 21 años o más, que se realizaron radiografías anteroposteriores de pelvis por trauma en un centro médico principal en Puerto Rico entre enero y junio de 2024. Se excluyeron aquellas radiografías con fracturas o cirugías de cadera que pudieran afectar su interpretación. La HOA se diagnosticó utilizando criterios radiográficos establecidos y se clasificó según la escala de Kellgren-Lawrence (KL). La HOA radiográfica se definió como una puntuación de KL ≥ 2 . Un radiólogo musculoesquelético evaluó todas las imágenes. Se realizaron análisis bivariados para estudiar la asociación de HOA con la edad, el sexo y el índice de masa corporal (IMC). **Resultados:** Se identificó HOA radiográfica en el 27.0% de los pacientes. La mayoría de los pacientes presentaron HOA leve según la escala KL. El grado 2 fue el más común (60.5%), seguido del grado 3 (23.5%). La edad avanzada y el sexo femenino se asociaron significativamente

con la presencia de HOA, mientras que no se observó una relación significativa con las categorías de IMC. **Conclusión:** Este estudio proporciona la primera estimación poblacional de la prevalencia de HOA en Puerto Rico, identificando esta condición en el 27% de los pacientes. La edad avanzada y el sexo femenino se asociaron con mayor frecuencia de HOA. Sin embargo, la muestra del estudio se limitó a pacientes que se sometieron a radiografías pélvicas por trauma, lo cual puede no ser representativo de la población general. No obstante, los hallazgos enfatizan la considerable carga de HOA entre los pacientes puertorriqueños y resaltan la necesidad de realizar investigaciones adicionales.

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