

PREVALENCE OF DENSITOMETRIC OSTEOPOROSIS IN WOMEN YOUNGER THAN 65 YEARS WITHOUT INDICATIONS FOR DXA SCREENING

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ABSTRACT

Osteoporosis is the most prevalent metabolic bone disease and is associated with an increased risk of fragility fractures. Current guidelines recommend bone mineral density (BMD) assessment by DXA primarily in women aged ≥ 65 years or in younger women with clinical risk factors. However, DXA is frequently performed in women under 65 years without guideline-based indications. Objective: To describe the prevalence of densitometric osteoporosis in women under 65 years undergoing DXA in the absence of clinical risk factors. Methods: A descriptive cross-sectional study was conducted at a referral center. Women aged 40–65 years consecutively referred for DXA between February and September 2024 were included. Participants with FRAX® clinical risk factors, major osteoporotic fractures, secondary metabolic bone diseases, or dietary restrictions were excluded. BMD was assessed at the lumbar spine, total hip, and femoral neck. Osteoporosis was defined as a T-score ≤ -2.5 . Results: A total of 119 women were included (mean age 53 years; range 43–62). Mean T-scores were -0.9 ± 1.3 at the lumbar spine, -0.9 ± 1.1 at the total hip, and -1.0 ± 1.0 at the femoral neck. BMD values within the osteoporotic range was observed in 13% (n=15) at the lumbar spine and in 7% (n=8) at both the total hip and femoral neck. Overall, 17% (n=20) had BMD values within the osteoporotic range at at least one skeletal site. Conclusion: Densitometric osteoporosis was identified in a relevant proportion of women younger than 65 years without traditional risk factors, supporting an individualized approach to bone health assessment.

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PREVALENCIA DE OSTEOPOROSIS DENSITOMÉTRICA EN MUJERES MENORES DE 65 AÑOS SIN INDICACIÓN DE REALIZAR DENSITOMETRÍA ÓSEA (DXA)

INFO ARTÍCULO

Palabras clave:

osteoporosis, densitometría ósea, DXA, mujeres jóvenes, FRAX®.

RESUMEN

La osteoporosis es la enfermedad metabólica ósea más frecuente y se asocia con un mayor riesgo de fracturas por fragilidad. Las guías actuales recomiendan la evaluación de la densidad mineral ósea (DMO) mediante absorciometría dual de rayos X (DXA) principalmente en mujeres de 65 años o más o en mujeres más jóvenes con factores de riesgo clínicos establecidos. Sin embargo, en la práctica clínica, la DXA se solicita con frecuencia en mujeres menores de 65 años sin indicaciones recomendadas por las guías. **Objetivo:** Describir la prevalencia de osteoporosis densitométrica en mujeres menores de 65 años en ausencia de factores de riesgo clínicos. **Materiales y métodos:** Estudio descriptivo de corte transversal. Se incluyeron mujeres de 40 a 65 años derivadas consecutivamente para DXA entre febrero y septiembre de 2024. Se excluyeron participantes con factores de riesgo clínicos incluidos en FRAX® y no FRAX®. La osteoporosis se definió como T-score $\leq -2,5$. **Resultados:** Se incluyeron 119 mujeres (edad media 53 años; rango 43-62) que no cumplían criterios de tamizaje densitométrico. Los T-scores medios fueron $-0,9 \pm 1,3$ en columna lumbar, $-0,9 \pm 1,1$ en cadera total y $-1,0 \pm 1,0$ en cuello femoral. Se observaron valores en rango de osteoporosis en el 13% (n=15) en columna lumbar y en el 7% (n=8) en cadera total y cuello femoral. Globalmente, el 17% (n=20) presentó osteoporosis densitométrica en al menos un sitio. **Conclusiones:** La osteoporosis densitométrica fue identificada en una proporción relevante de mujeres menores de 65 años sin factores de riesgo tradicionales, lo que resalta la importancia de una evaluación individualizada de la salud ósea.

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INTRODUCTION

Osteoporosis is the most prevalent metabolic bone disease and is associated with an increased risk of fragility fractures, with significant clinical and economic burden at both the individual and population levels [1,2]. The assessment of bone mineral density (BMD) by dual-energy X-ray absorptiometry (DXA) is the gold standard for the diagnosis of osteoporosis and for therapeutic decision-making, in accordance with the criteria established by the World Health Organization (WHO) [3,4]. Current population screening strategies recommend routine DXA testing in women aged 65 years or older in the absence of clinical risk

factors and in younger women only when established risk factors are present [5-7]. However, in routine clinical practice, BMD studies are frequently requested in women younger than 65 years who do not meet the screening criteria established by clinical guidelines [7,8]. This practice may lead to isolated interpretations of BMD values, as well as an increased risk of overdiagnosis and potential overtreatment when findings are not adequately contextualized [9,10].

Although factors such as suboptimal acquisition of peak bone mass and accelerated bone loss during the peri- and postmenopausal transition may contribute to low BMD values in younger women, the

detection of densitometric osteoporosis in this age group does not necessarily imply an immediate indication for pharmacological treatment [11,12]. In this context, expert clinical interpretation is essential to integrate densitometric findings with the overall fracture risk and to avoid inappropriate therapeutic decisions based solely on BMD [6,9,13].

In this context, the present study aimed to describe the prevalence of densitometric osteoporosis in women under 65 years of age who underwent DXA in the absence of clinical risk factors that would justify its indication.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted at a referral center in the Autonomous City of Buenos Aires, Argentina. Women aged 40 to 65 years who were consecutively referred for densitometric evaluation between February and September 2024 were included. DXA examinations were requested by different healthcare professionals outside the referral center as part of routine clinical practice. Menopausal information was collected from clinical records.

Data collection

Clinical risk factors included in the FRAX algorithm, such as smoking status, previous fracture, glucocorticoid exposure, parental history of hip fracture, rheumatoid arthritis, and secondary osteoporosis, were collected from the available medical records when accessible.

Additionally, participants were systematically screened for conditions not included in FRAX®, such as hematologic malignancies, primary hyperparathyroidism, celiac disease, primary ovarian insufficiency, and eating disorders (history of anorexia nervosa and bulimia nervosa).

Bone mineral density

Bone mineral density (BMD, g/cm²) was measured by DXA using a GE Lunar Prodigy densitometer (Madison, WI, USA) at the lumbar spine (LS, L1-L4), total hip (TH), and

femoral neck (FN). TH and FN measurements were obtained from the left hip, unless contraindicated.

At our center, the precision error and least significant change (LSC) were 0.018 g/cm² and 1.74% for LS, 0.015 g/cm² and 1.74% for TH, and 0.012 g/cm² and 1.49% for the FN.

Osteoporosis was diagnosed according to WHO operational definition, defined as a T-score ≤ -2.5 at LS, TH or FN. Osteopenia was defined as a T-score between -1.0 and -2.5 [3,4].

Statistics

Continuous variables were assessed descriptively and are presented as mean ± standard deviation (SD) or median and interquartile range (IQR), according to data distribution. Categorical variables are presented as absolute frequencies and percentages. Given the descriptive design of the study, no inferential statistical analyses were performed. Statistical analyses were performed using R software version 4.3.3.

RESULTS

A total of 119 women who did not meet densitometric screening criteria were included. The mean age was 53 years (range 43-62). The median time since menopause was 4.7 years (IQR 1.2-7.9). A flowchart summarizing patient selection and study inclusion is shown in Figure 1.

Mean BMD at the LS, TH, and FN was 1.071±0.163, 0.890±0.130, and 0.864±0.126 g/cm², respectively (Table 1). Mean T-score values at the LS, TH, and FN were -0.9±1.3, -0.9±1.1, and -1.0±1.0, respectively. LS BMD values within the osteoporotic range were observed in 13% (n=15) of women, while 7% (n=8) and 7% (n=8) had BMD values within the osteoporotic range at the TH and FN, respectively (Figure 2). Overall, 17% (n=20) of the cohort had BMD values within the osteoporotic range at least at one skeletal site.

DISCUSSION

In this cohort of women younger than 65 years without clinical indications for

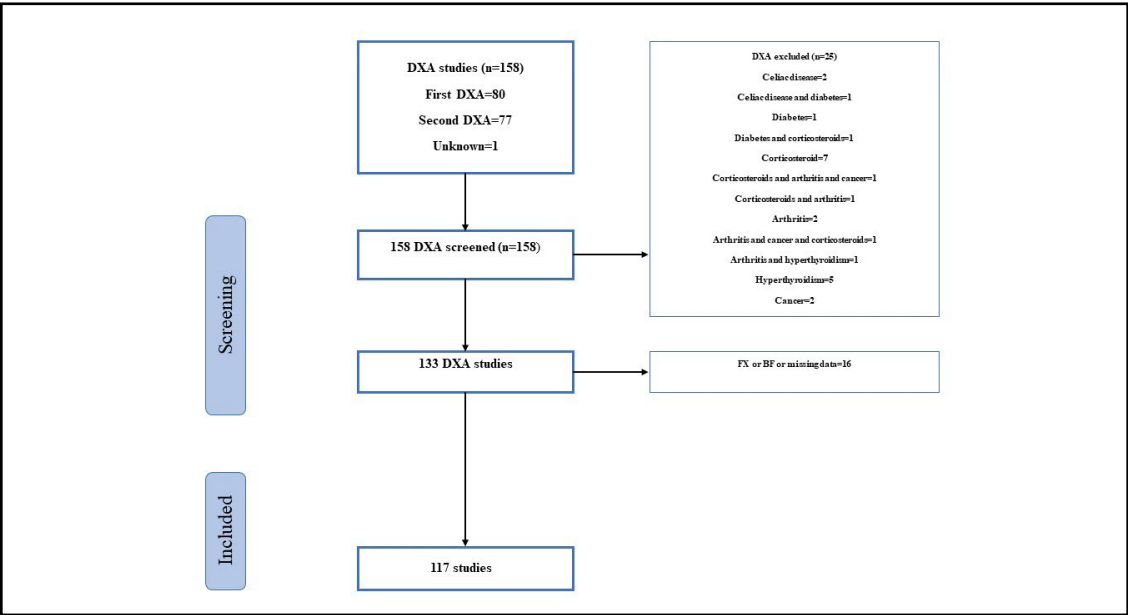


Figure 1. Flow diagram of participant screening, exclusions, and study inclusion.

Table 1. Baseline characteristics of women

	Women (n=119)
Age (year)	53 (43-62)
Height (m)	1.62±0.06
Weight (kg)	60.8 (70.0-87.0)
BMI (kg/m²)	23.4 (26.7-32.6)
L1-L4 (g/cm²)	1.071±0.163
T-score (L1-L4)	-0.9±1.3
Z-score (L1-L4)	-0.3±1.3
TH (g/cm²)	0.890±0.130
T-score (TH)	-0.9±1.1
Z-score (TH)	-0.4±1.1
FN (g/cm²)	0.864±0.126
T-score (FN)	-1.0±1.0
Z-score (FN)	-0.3±1.0

FN: Femoral Neck, **TH:** Total Hip, **BMI:** Body Mass Index

BMD screening according to international guidelines, a relevant prevalence of BMD values within the osteoporotic range was observed [6,16].

According to the recommendations of the International Society for Clinical Densitometry (ISCD), bone mineral density assessment by DXA is routinely indicated in women aged 65

years or older in the absence of clinical risk factors [5,6,16]. However, in clinical practice, these studies are frequently requested in younger women who do not meet these criteria.

Our results highlight a relevant diagnostic paradox. First, the indiscriminate ordering of DXA in women without indication may increase the risk of overinterpretation of isolated BMD findings when evaluated outside a specialized context [9,10]. Conversely, when these same studies are evaluated by experienced specialists, the presence of low BMD does not necessarily translate into an immediate therapeutic indication and may instead appropriately support a conservative approach.

At the same time, the identification of women with BMD values within the osteoporotic range suggests that strict adherence to DXA indications based on official positions may contribute to delayed identification of low bone mass in selected individuals, reflecting the challenge of balancing appropriate resource use with timely identification of skeletal risk. Previous studies have reported similar findings regarding the use of DXA in

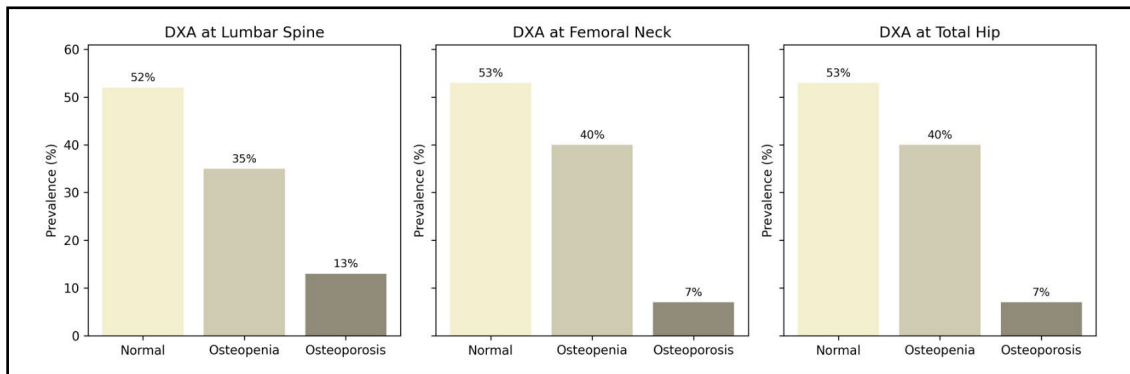


Figure 2. Distribution of bone mineral density categories at the lumbar spine, femoral neck, and total hip.

the clinical practice. Amarnath et al. reported that, in routine clinical practice, DXA was frequently performed even in young women without risk factors, while higher risk women did not always have access to the study, demonstrating both overuse and underuse of BMD screening relative to current guideline recommendations [14]. These studies suggest that performing DXA outside guideline-based indications may increase the risk of overinterpretation of isolated BMD findings, particularly when results are evaluated without specialist involvement [14,15].

In this context, recent position statements and clinical guidelines highlight that the clinical value of DXA depends primarily on its integration with overall fracture risk and on appropriate interpretation by specialists with expertise in metabolic bone diseases, rather than on the isolated T-score value. This approach is particularly relevant in younger women, in whom low BMD does not necessarily translate into an immediate therapeutic indication [6,13].

Therefore, the clinical interpretation of BMD in younger women requires careful integration of quantitative results with each patient's overall clinical context. Age, menopausal status, reproductive history, the presence of subtle comorbidities, and the longitudinal evolution of BMD constitute key elements for appropriate clinical judgment, beyond the isolated T-score value.

Limitations

DXA examinations were requested by healthcare professionals outside the reference center, which limited access to complementary biochemical data and additional clinical information. Additional clinical variables potentially associated with bone mineral density, including hormone therapy use and physical activity, could not be incorporated into the analysis. This limitation reflects the real-world nature of referrals received in routine clinical practice.

Conflict of interest

The authors declare no conflicts of interest.

Authors' contributions

All authors contributed to the development of the work, drafted the manuscript, critically reviewed its content and approved the final version for publication.

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Ethics Statement

The study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Institutional Review Committee of IDIM. Written informed consent was obtained from all participants prior to inclusion in the study.

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