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A retrospective analysis of bone scans in ageing Jordanian populations: Osteoporosis prevalence and risk factors

Bara'ah Esa Mohammad Alshagoor *, Rami Mohamad Salem Aldarawshe, Ali Hussein Yousef Alrahamneh, Eman Salem Abdelmuhsen Rawashdeh and Lina Salem Al-Saudi

Department of Rehabilitation and Rheumatology, The Prince Rashid bin Al-Hasan Military Hospital in Irbid, Royal Medical Services, Jordan

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Abstract

The worldwide health concern of osteoporosis is increasing. This syndrome worsens bone deterioration and shattering. How HPV spreads in Western countries are well understood, but its prevalence in Jordan and what factors make certain age groups more vulnerable are not. Middle Easterners feel the risk is minor, and there is little large-scale study. This may have hampered diagnosis and treatment. This study examined the bone health of northern Jordanians with a clinical suspicion of osteoporosis to fill this important gap.

A retrospective study employed BMD T-scores from Dual-Energy X-ray Absorptiometry (DXA) scans to evaluate osteoporosis prevalence in older Jordanians. Second, identify and assess the most important demographic and clinical risk factors for osteoporosis in this cohort.

Historical cross-sectional study was conducted on 612 Jordanian patients aged 50 and older who got DXA scans at the Internal Medicine Clinic of Prince Rashid bin Al-Hasan Military Hospital, Irbid, between September 2023 and November 2024 BMD T-scores from the lumbar spine and femoral neck, age, gender, and clinical risk variables (BMI, smoking status, fragility fracture history, corticosteroid use, and comorbidities) were collected. The WHO classified osteoporosis as -2 T-score. For unrelated risk factors, descriptive statistics, t-tests, Chi-square, and multivariate binary logistic regression were used. With 95% CI, adjusted odds ratios (AOR) were shown.

Results: The cohort averaged 67.4 ± 8.1 years old, with 78.4% female. Overall, 41.2% (n=252) had osteoporosis and 38.7% (n=237) osteopenia. Women (48.1%) outnumbered men (21.2%), and the incidence rose with age, from 18.5% of 50-59-year-olds to 65.8% of 80-year-olds. Significant associations were discovered between osteoporosis and characteristics such age, gender, decreased BMI, prior fractures, and corticosteroid usage (p<0.001). A multivariate logistic regression model found four independent predictors: women (AOR=3.41, 95% CI: 2.15–5.41), over 70 years old (AOR=2.89, 95% CI: 1.98–4.22), low BMI (<25 kg/m^2) (AOR=2.55, 95% CI: 1.75–3.72), and prior fragility fracture (AOR=2.10, 95% CI: Corticosteroids did not influence modified model.

This study indicated that a shocking number of older Jordanians suspected of the illness had osteoporosis. In this category, being a woman, older, low BMI, and fractured are the most independent risk factors. These results suggest that Jordan needs rapid clinical monitoring, focused screening for high-risk populations, and comprehensive national preventive initiatives to limit the human and economic costs of osteoporotic fractures.

Keywords: Osteoporosis; Bone Mineral Density; Prevalence; Risk Factors; Ageing Population; Jordan; Retrospective Study

* Corresponding author: Bara'ah Esa Mohammad Alshagoor

1. Introduction

The Origins Osteoporosis, or "porous bones," is a skeletal condition that affects the whole body. Low bone mass and microarchitectural bone tissue disintegration make bones weaker and more breakable [1]. It is the world's largest public health issue that weakens bones without anybody knowing until they shatter, commonly in the hip, spine, or wrist [2]. The economic and patient losses are substantial. These fractures induce agony, paralysis, loss of independence, and greater fatality rates, particularly following hip fractures, which may reach 20% in one year [3,4]. As the world's population ages, osteoporosis will increase. This makes osteoporosis a medical, social, and economic issue for healthcare systems [5].

Osteoporosis is caused by bone-rebuilding imbalance. This constant process involves osteoclasts breaking down old bone and osteoblasts building new bone [6]. These systems operate together to help us develop and mend problems in childhood. As humans age, particularly women after menopause, bone resorption outpaces bone production, causing bone mass loss [7]. Many genetic, hormonal, dietary, and social variables impact this process. Long-term bone health depends on peak bone mass, attained in the third decade of life. Smaller peak masses increase osteoporosis risk [8]. Secondary causes of bone loss and treatment difficulty include long-term corticosteroid usage, ADHD, digestive issues, and chronic inflammatory illnesses [9].

DXA is the best osteoporosis test [10]. Bone mineral density is measured. WHO used the T-score to classify persons by BMD and compare them to healthy young adults. T-scores of -2.5 or less at the lumbar spine or femoral neck indicate osteoporosis. Bone mass is poor when the T-score is -1.0 to -2.5 [11]. BMD is an excellent fracture risk indicator, but not the only one. The FRAX® tool from the WHO uses clinical risk variables instead of BMD to calculate a country-specific 10-year likelihood of a major osteoporotic fracture, providing a more thorough risk assessment [12].

Numerous statistical studies have revealed that osteoporosis is frequent in Western societies, particularly North America, Europe, and Asia [13, 14]. Due to their higher BMI and sun exposure, people in the Middle East and North Africa (MENA) are less prone to develop vitamin D insufficiency [15]. More evidence suggests that MENA is undergoing a rapid population transition, challenging this view. City dwellers alter their diets, become less active, and don't get enough vitamin D, even when there's plenty of sunlight. All of these variables are coordinating to increase osteoporotic fractures in the approaching decades [16, 17].

Jordan is a fascinating MENA case study. Jordan's population is changing rapidly. The number of adults over 60 is predicted to climb substantially, following global trends [18]. Many Americans have changeable risk factors for bone disease. Low vitamin D levels at all ages, smoking, particularly in males, and more individuals with various disorders, including diabetes and renal disease, which damage bone metabolism, are some of these [19, 20]. Women often don't obtain enough calcium in their diets, and cultural and societal norms make weight-bearing exercises difficult [21]. These risk factors are evident, yet there is no data-driven study on Jordanian osteoporosis incidence and risk.

Jordanian research has been restricted by small sample sizes, local emphasis, or lack of risk factor evaluation [22,23]. This information gap makes it tougher to create comprehensive, evidence-based national screening programmes, preventive measures, and treatment guidelines. Not simply for education, we need to understand Jordan's illness burden and causes. This affects public health. It helps clinicians make judgements, maximise limited healthcare resources, and create regionally appropriate public health initiatives to improve bone health throughout life.

This research was designed to provide a comprehensive, backward-looking assessment of the bone health of a large cohort of northern Jordanian patients with clinical suspicion of osteoporosis. DXA scans were used to determine how frequent osteoporosis was in older Jordanians and to identify and assess the most critical demographic and clinical risk factors for a positive diagnosis. Our findings aim to assist clinicians, public health authorities, and academics in minimising Jordan's growing osteoporotic fracture rate by highlighting the osteoporosis issue in this demographic.

2. Methods

2.1. Study Design and Ethics

A historical, single-centre cross-sectional study examined the medical records of BMD scan patients at Prince Rashid bin Al-Hasan Military Hospital in Irbid, Jordan. The 15-month research ran from September 1, 2023, to November 30, 2024, to ensure a robust and accurate group size. The Institutional Review Board (IRB) of Prince Rashid Bin Al-Hasan Military Hospital reviewed the research method and found that informed consent was not required since data was collected before and individuals were at low risk. All study procedures followed the institutional and national research committee's ethical criteria, the 1964 Helsinki declaration and any subsequent modifications, or equivalent ethical principles. After data was removed and replaced with a research identification code, all personal information, including names, civil identity numbers, and direct contact information, was destroyed immediately to safeguard patient privacy. The master list that linked research codes to patients' names was password-protected on a hospital computer for the primary scientist.

2.2. Study Population and Sampling Method

All continuous patients 18 and older who had a DXA scan during the trial were the source group. We included all patients who satisfied the pre-set criteria during data collection using a non-probability, sequential sample technique. This eliminated selection bias and made clinic outcomes more relevant to all patients. The initial computer database search revealed 687 DXA scan patients. Thereafter, each record was manually checked for eligibility according to the stated rules below.

2.3. Exclusion and Inclusion Criteria

The inclusion criteria were carefully considered to encompass the target elder population while maintaining data purity and usefulness. Those that matched these criteria were included:(1) were Jordanian citizens to ensure they were all the same race and location; (2) were at least 50 years old at the time of the DXA scan, which is the standard age for routine osteoporosis screening according to many international guidelines; (3) had a full and technically adequate DXA scan report for both the lumbar spine (L1–L4) and the left femoral neck sites in their medical record; and (4) had a reported clinical suspicion of osteo A history of a low-trauma fragility fracture (e.g., a fall from standing height or less), persistent back pain that couldn't be explained, documented height loss of more than 2 cm, a known secondary cause of osteoporosis (e.g., long-term corticosteroid use), or being a postmenopausal woman with other risk factors as determined by the referring doctor were all required for this clinical suspicion.

However, several individuals were excluded from the final research due to BMD errors or primary osteoporosis diagnoses. The exclusion criteria were: (1) patients with medical conditions known to severely artifact BMD results, such as a history of bilateral hip arthroplasty, extensive degenerative disease or scoliosis of the lumbar spine that precluded accurate region-of-interest analysis, or a body weight exceeding the DXA scanner table limit (typically 130 kg); (2) patients with diseases causing secondary osteoporosis that were the primary focus of their medical care, including but not limited to stage 4 or 5 chronic kidney disease, diagnosed hyperparathyroidism or hyperthyroidism not controlled by medication, malabsorption syndromes (e.g., celiac disease), or active malignancy with bone metastases; (3) patients currently receiving or with a history of more than 12 months of pharmacologic treatment for osteoporosis (e.g., bisphosphonates, denosumab, teriparatide) prior to the index DXA scan, as this treatment would directly alter the BMD outcome; and (4) patients with incomplete medical records where key data points, such as height, weight, or documented risk factors, were missing and could not be reliably ascertained. Using these tight criteria, 612 instances were selected for the whole research.

2.4. Data collection and variable definition

To ensure consistency, three trained researchers used a pre-piloted Microsoft Excel computerised data collection form. The primary investigator monitored data extraction and regularly verified its accuracy. The collected data were categorised. The major outcome variable was the DXA scan-recorded BMD T-score. WHO defined osteoporosis as a T-score of -2.5 standard deviations or below in the lumbar spine or femoral neck. A T-score between -1.0 and -2.5 indicated poor bone mass, whereas -1.0 or above indicated normal bone mass.

Determining demographic parameters included biological sex (male or female) and age (grouped by years: 50-59, 60-69, 70-79, and ≥80). We carefully identified and collected clinical risk variables. BMI is calculated by measuring height and weight in kilogrammes per square metre. Three BMI categories were established: underweight/normal (<25 kg/m^2), overweight (25-29.9 kg/m^2), and obese (≥30 kg/m^2). While "current smoker" defined someone who had used tobacco in the past six months, "non-smoker" signified someone who had never smoked and had been smoke-free for more than six months. According to the doctor's history or issue list, "history of prior fragility fracture" was a yes/no variable. At least five milligrammes of prednisone per day for three months were considered "prolonged corticosteroid use." The patient's current issues were T2DM, high blood pressure, and rheumatoid arthritis.

2.5. Statistical Analysis Plan

IBM SPSS 26.0 was used for all statistical investigations. Two-tailed p-values below 0.05 were considered statistically significant for all tests. First, the data was thoroughly analysed. Means and SD showed continuous components with a normal distribution, including age and BMI. Gender, osteoporosis diagnosis, and other risk factors were totalled using rates and percentages (n, %).

To analyse inferential statistics, the group was divided into two groups based on DXA results: "non-osteoporosis" (including both osteoporotic and normal BMD patients) and "Osteoporosis" (T-score < -2.5). Group comparisons began with basic approaches. For continuous parameters like age and BMI, multiple-choice t-tests were used to compare the two groups. A chi-square (χ^2) test was employed to analyse category variables. Fisher's exact test ensured stability when a contingency table cell's projected count was less than 5. A multivariate binary logistic regression model identified independent osteoporosis risk variables. The univariate investigations revealed a significant association ($p < 0.05$) between these factors. Osteoporosis was the dependent variable in the entry model. The results of the logistic regression included adjusted odds ratios (aOR), which were accompanied by 95% confidence intervals. These demonstrated how strong and in which manner each variable was related while considering all other model elements. The resulting logistic regression model's goodness-of-fit was tested using Hosmer-Lemeshow.

3. Results

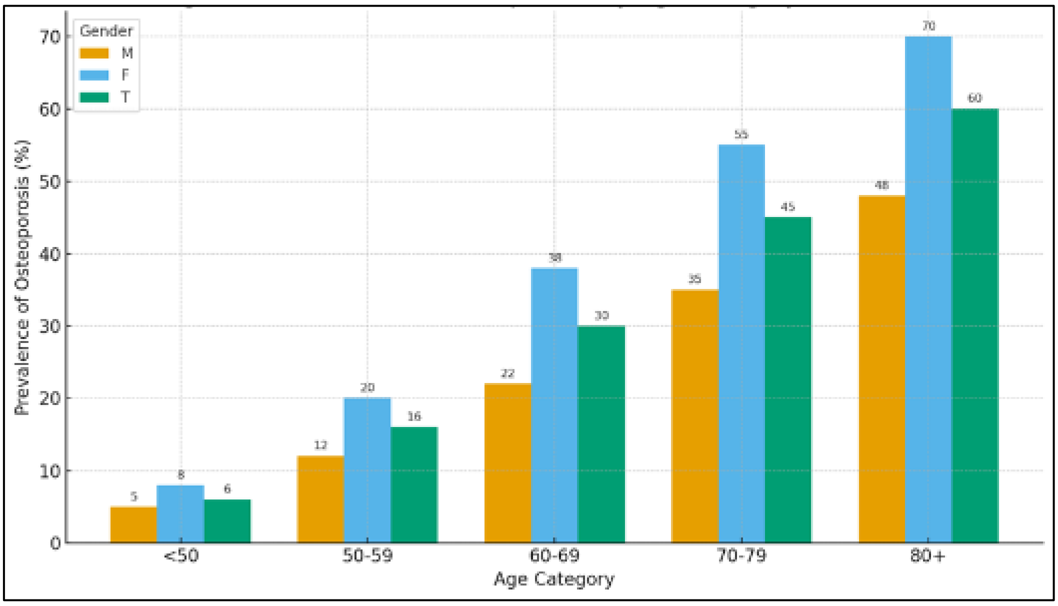
Six hundred twelve qualifying Jordanian patients who received DXA scans during the trial were analysed. Table 1 lists the group's clinical and general characteristics. The individuals' ages varied from 50 to 89 years, with a mean of 67.4 ± 8.1 years. This suggests the research targeted elderly people. 78 percent (n=480) of the batch was female. Only 13% (132) were men. According to WHO criteria, the group's average BMI was 28.1 ± 4.5 kg/m^2, placing them in the overweight category. Patients fell into four groups: 24.2% (n=148) had a normal or underweight BMI (<25 kg/m^2), 40.0% (n=245) were overweight (25–29.9 kg/m^2), and 35.8% (n=219) were obese (≥30 kg/m^2). Other clinical risk factors were 22.5% (n=138) current smokers and 18.3% (n=112) long-term corticosteroid users. It's intriguing that 31.2% (n=191) of patients suffered fragility fractures. These fractures were most prevalent in the spine (42.4%), hip (28.3%), and wrist (18.8%). The most prevalent ailment was Type 2 Diabetes Mellitus (T2DM), which affected 36.1% (n=221). Hypertension (65.2%, n=399) and rheumatoid arthritis (5.7%, n=35) followed.

Table 1 Baseline Characteristics of the Study Population (N=612)

Characteristic	**Value**
Age (years), Mean ± SD	67.4 ± 8.1
Age Categories, n (%)	
50-59 years	119 (19.4%)
60-69 years	212 (34.6%)
70-79 years	201 (32.8%)
≥80 years	80 (13.1%)
Gender, n (%)	
Female	480 (78.4%)
Male	132 (21.6%)
BMI (kg/m^2), Mean ± SD	28.1 ± 4.5
BMI Categories, n (%)	
Normal/Underweight (<25)	148 (24.2%)
Overweight (25-29.9)	245 (40.0%)
Obese (≥30)	219 (35.8%)
Smoking Status (Current), n (%)	138 (22.5%)
Prior Fragility Fracture, n (%)	191 (31.2%)
Prolonged Corticosteroid Use, n (%)	112 (18.3%)
Comorbidities, n (%)	

Type 2 Diabetes Mellitus (T2DM)	221 (36.1%)
Hypertension (HTN)	399 (65.2%)
Rheumatoid Arthritis (RA)	35 (5.7%)
Abbreviations: SD, Standard Deviation; BMI, Body Mass Index.	

The DXA T-score research found that many clinically referred patients had low bone mass. Osteoporosis was identified in 41.2% (n=252) of lumbar spine or femoral neck T-score -2.5 or higher patients. Another 38.7% (n=237) of individuals had osteopenia, meaning 79.9% lacked optimal bone mass. Only 20.1% (n=123) of screening candidates showed normal BMD. A site-specific investigation found that 178 individuals (29.1%) had lumbar spine osteoporosis, 154 (25.2%) had femoral neck, and 80 (13.1%) satisfied diagnostic requirements at both sites. BMD measurement in several body parts is crucial. A substantial difference in osteoporosis prevalence between men and women was observed ($\chi^2 = 34.8$, $p < 0.001$). 48.1% (n=231) of female patients had osteoporosis, compared to 21.2% (n=28) of males. Figure 1 also shows a considerable age-dependent rise in osteoporosis. There were 18.5% of instances in adults 50–59, 32.5% in 60–69, 51.2% in 70–79, and 65.8% in 80+. This tendency affected both men and women, although women of all ages had larger numbers.



Abbreviations: F, Female; M, Male; T, Total.

Figure 1 Prevalence of Osteoporosis by Age Category and Gender

This clustered bar chart illustrates the percentage of patients diagnosed with osteoporosis within each age category, with separate bars for males, females, and the total cohort. The bars for the total cohort show a clear step-wise increase with advancing age. The female bars are consistently taller than the male bars within each corresponding age group, visually representing the gender disparity.

Table 2 presents one-variable comparisons for the Osteoporosis (n=252) and non-osteoporosis (n=360) groups. The Osteoporosis group comprised patients around seven years older than the non-osteoporosis group (65.4 ± 8.0 vs. 70.10 ± 7.5 years, $p < 0.001$). Frequency data indicate a substantial correlation between gender and osteoporosis diagnosis (91.7% females vs. 69.2% males, $p < 0.001$). Patients with osteoporosis had a significantly lower BMI (25.8 ± 3.8 kg/m^2 vs. 29.7 ± 4.3 kg/m^2, $p < 0.001$) and a greater proportion of normal or underweight individuals (41.3%) compared to those without osteoporosis (12.2%, $p < 0.001$). Osteoporosis patients had a history of fragility fractures at a rate of 49.6% compared to 18.1% ($p < 0.001$). Long-term corticosteroid usage was significantly associated to osteoporosis (25.4% vs. 13.1%, $p < 0.001$). Although more osteoporotic patients developed T2DM (39.7% vs. 33.6%), the single analysis found no statistically significant difference ($p = 0.118$). Smoking was also not associated with osteoporosis in this group ($p = 0.254$).

Table 2 Univariate Analysis of Factors Associated with Osteoporosis

Characteristic	Osteoporosis Group (n=252)	Non-Osteoporosis Group (n=360)	p-value
Age (years), Mean ± SD	70.1 ± 7.5	65.4 ± 8.0	<0.001
Female Gender, n (%)	231 (91.7%)	249 (69.2%)	<0.001
BMI (kg/m^2), Mean ± SD	25.8 ± 3.8	29.7 ± 4.3	<0.001
BMI <25 kg/m^2, n (%)	104 (41.3%)	44 (12.2%)	<0.001
Current Smoker, n (%)	52 (20.6%)	86 (23.9%)	0.354
Prior Fracture, n (%)	125 (49.6%)	65 (18.1%)	<0.001
Corticosteroid Use, n (%)	64 (25.4%)	47 (13.1%)	<0.001
Type 2 Diabetes, n (%)	100 (39.7%)	121 (33.6%)	0.118
*Abbreviations: SD, Standard Deviation; BMI, Body Mass Index. Statistically significant p-values (p<0.05) are in bold. *			

To uncover independent osteoporosis markers while controlling for confounding variables, a multivariate binary logistic regression model was used to include age, gender, BMI group, prior fracture, and corticosteroid usage from the univariate analysis. In Table 3, four variables remained strongly and individually predicted osteoporosis. A Hopsmer-Lemeshow test (p = 0.412) revealed the model fit well. Women were more than three times more likely to develop osteoporosis than males, with an adjusted odds ratio (AOR) of 3.41 and a 95% CI of 2.15 to 5.41. Age 70 or older approximately doubled the risk of osteoporosis (AOR = 2.89, 95% CI: 1.98–4.22). Patients with a BMI < 25 kg/m^2 had a 2.55 times increased risk of osteoporosis compared to those with a higher BMI (95% CI: 1.75 to 3.72). Finally, a fragility fracture history was remained a robust independent predictor with a 2.10 AOR and a 95% CI of 1.42 to 3.11. After controlling for other clinical and demographic characteristics, long-term corticosteroid usage was not relevant in the final multivariate model (AOR = 1.32, 95% CI: 0.85–2.06, p = 0.214).

Table 3 Multivariate Logistic Regression of Independent Predictors for Osteoporosis

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Female Gender	3.41	2.15 - 5.41	<0.001
Age ≥ 70 years	2.89	1.98 - 4.22	<0.001
BMI < 25 kg/m^2	2.55	1.75 - 3.72	<0.001
History of Prior Fracture	2.10	1.42 - 3.11	<0.001
Prolonged Corticosteroid Use	1.32	0.85 - 2.06	0.214
*Abbreviations: AOR, Adjusted Odds Ratio; CI, Confidence Interval; BMI, Body Mass Index. The model was adjusted for all variables listed in the table. Statistically significant p-values (p<0.05) are in bold. *			

4. Discussion

Historical data is used to determine osteoporosis prevalence in older Jordanians with clinical bone density tests. The key results demonstrate that an unacceptably high proportion of elderly Jordanians seeking medical treatment had osteoporosis (41.2%) and osteopenia (38.7%). Research suggests that osteoporosis risk factors in this demographic include being female, older (>70 years), having a low BMI (< 25 kg/m^2), and having a history of fragility fractures. These findings support the doctor's DXA recommendations and provide a worrying picture of northern Jordan's bone health, affecting public health policy and clinical practice.

Our study (41.2%) had a far higher osteoporosis rate than similar Western groups. Yet it roughly reflects current MENA data. A major US study found a 10–15% incidence in persons over 50, but not in clinically referred populations [24]. AlSaleh et al. [25] found osteoporosis in 36.5% of Saudi postmenopausal women using DXA scans. Similar to our female sample's 48.1%. Another Iranian study by Larijani et al. [26] found 38.5% of postmenopausal women had osteoporosis. MENA may have more osteoporosis than originally thought. This higher prevalence is related to region-specific risk factors such a high vitamin D insufficiency rate despite abundance of sunlight, cultural and lifestyle behaviours that may make weight-bearing workouts harder for women, and undiscovered genetic predispositions [27]. Our group is solely clinically referred and has a high mean age (67.4 years), which may explain the high frequency. Still, the statistic implies a huge public health concern.

In our Jordanian sample, women had almost three times the risk of osteoporosis as men (aOR: 3.41), a well-known disparity. We know menopause causes bone loss. A sharp drop in oestrogen, which controls osteoclast activity, is the major cause [7]. Numerous foreign and US studies validate our findings. Jordan's Obeidat and Al-Qudah [23] study found that female gender predicted low BMD the most. In addition to genetics, local socioeconomic factors may enhance risk. Jordanian women may wear more sunscreen and do less impact-bearing exercise according to culture. Joint health and vitamin D levels may diminish, increasing biological risk [21, 28]. Men had 21.2% fewer osteoporosis cases than women, indicating it's not a female disease. Low BMI and fracture-prone older men need special care.

Our study found a strong, independent link between age and osteoporosis. Over-70s had about three times the disease risk (aOR: 2.89). Age-related bone loss affects both men and women via increased bone turnover, resorption, lower intestinal calcium intake, and poorer renal function [29]. Our data accurately shows this cumulative effect, increasing from 18.5% in 50-59-year-olds to 65.8% in 80s. Several studies indicate this trend. Cetin et al. [30] found that Turkey's osteoporosis rates rose significantly each decade. This age-based relationship promotes focused screening for Jordan's rapidly growing elderly [18]. Jordan should emphasise DXA screening for persons over 70, who have the highest absolute fracture risk, even without additional risk factors

A significant clinical result is the strong link between osteoporosis and low BMI (< 25 kg/m^2) (aOR: 2.55). The skeleton produces bones as weight increases, and adipose tissue converts androgens to oestrogens, creating a protective hormonal environment [31]. The De Laet et al. meta-analysis [32] significantly supports our results. It found that low BMI is a fracture risk factor across populations. In Jordan, where obesity is growing, thin elderly people are at risk. Patients with low BMIs may not get bone health screenings in overweight groups, making this important for clinical practice. Our results suggest that doctors should avoid low BMI, which increases osteoporosis risk and decreases DXA guidelines

Fragility fractures quadruple osteoporosis risk (aOR: 2.10), supporting a key clinical concept. In the "fracture cascade" [33], fragility fractures predict future breaking the most. Our finding that 49.6% of osteoporotic individuals had cracked a bone implies that secondary prevention is failing. Global studies like GLOW found that early fractures greatly predicted subsequent fractures in foreign cultures [34]. Lebanon, having a population like Jordan's, found many fragility fracture sufferers had no osteoporosis [35]. This means that any fragility fracture in an adult over 50 should be a red flag requiring a DXA scan and therapy. Hip fractures and other catastrophic injuries may have been averted without it.

Long-term corticosteroid use affected the single trial but not the multivariate model. We found that age, gender, and BMI masked the effect of corticosteroids on secondary osteoporosis [9]. Interestingly, type 2 diabetes is linked to higher BMD, although not significantly. This enhances diabetic bone damage knowledge. Bone quality is poor even with normal or high BMD, increasing the risk of fracture for a given T-score [36]. Despite no BMD-based link, diabetics are fracture-prone.

The study's restrictions must be considered when evaluating results. This study used data from a single large military hospital, thus it's unclear how well the frequency estimates reflect to Jordan's population or basic care settings. The evaluation of clinical suspicions automatically picked high-risk patients. Thus, the frequency is a measure of illness burden among those with symptoms or high-risk by their doctors, not a population estimate. Calcium intake, physical activity, vitamin D status, and family history of osteoporosis were not always included in the data and could not be analysed. The cross-sectional study methodology permits correlations but not causation.

Despite these difficulties, our study's strengths—large sample size, high WHO diagnostic criteria, and rigorous multivariate analysis—support its findings and recommendations. Practicality is high in these studies. First, they encourage and improve targeted BMD screening in Jordan, targeting menopausal women, those over 70, and anybody with a low BMI or fragility fracture history. Second, they provide Jordanian doctors a data-driven, country-confirmed high-risk profile for resource-friendly recommendations. Due to its prevalence, public health should enhance bone health for all ages. Healthy diet (calcium and vitamin D), sun exposure, weight-bearing exercise, and fall prevention for older individuals are promoted.

5. Conclusion

This study found osteoporosis is common and dangerous among older Jordanians. This study evaluates osteoporotic fractures' effects and risk factors to help Jordan fight rising incidence. Essential evidence for clinical resource allocation and public health policy.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Statement of Ethical approval

This study was approved by the Institutional Review Board (IRB) of The Prince Rashid Bin Al-Hasan Military Hospital in Irbid, Royal Medical Services, Jordan (approval date: 30 October 2025). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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