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## RISK FACTORS OF OSTEOPOROSIS AMONG ATTENDANCE OF RHEUMATOLOGY CONSULTATION UNITS AT IBN-SINA AND AL-SALAM TEACHING HOSPITALS IN MOSUL CITY

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#### ABSTRACT

Osteoporosis is a common, chronic, systemic skeletal disease characterized by low bone mass and micro architecture deterioration of bone tissue; its incidence is increasing due to the aging population, and its prevalence is approximately 20% worldwide. The case-control study included 280 participants, 140 diagnosed with osteoporosis and 140 healthy controls. Data were collected using questionnaires and analyzed to assess the association of various risk factors with osteoporosis.

KEYWORDS: Osteoporosis, risk factors, lifestyle.

#### INTRODUCTION

Osteoporosis is characterized by the depletion of bone mass and the destruction of bone structure, resulting in weak bones that are susceptible to fractures. Patients who are impacted by these 'fragility fractures' experience significant pain, suffering, disability, and even death. Additionally, these fractures impose considerable expenses on society.<sup>[1]</sup> The issues arising from fragility fractures and osteoporosis have multiple causes and are thus a multidisciplinary challenge. A first fragility fracture is frequently the initial indication of osteoporosis, and 'secondary' prevention of fragility fractures is centered on preventing additional fractures following the occurrence of an initial fracture.<sup>[2]</sup> Osteoporosis is the prevailing skeletal disorder. Research suggests that there are over 8.9 million fractures that happen every year around the globe, with a majority of them occurring in those who have osteopenia or osteoporosis.<sup>[3]</sup> The prevalence of osteoporosis tends to rise with advancing age.<sup>[4]</sup> The management of hip fractures constitutes the primary portion of the healthcare expenses linked to osteoporosis.[5]

### Epidemiology

Osteoporosis is a global problem, but the size of the problem is unclear because of the variability in assessment and awareness, which probably leads to erroneously low reporting.

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Worldwide, it is estimated that 200 million women have osteoporosis, and 1 in 3 women and 1 in 5 men will experience a fragility fracture, resulting in a hospital visit every 3 seconds.<sup>[6]</sup> After a fracture, the overall risk of a subsequent fracture is doubled, but this fluctuates over time, and the risk is highest immediately after an initial fracture.<sup>[7]</sup>

In Iraq, the prevalence of osteoporosis was estimated to be37.50% in patientsaged above 50 years.<sup>[8]</sup>

#### Un modifiable Risk Factors for Osteoporosis<sup>[9]</sup>

**Age:** Above 50 years of age contributes to the risk of fracture independently of BMD (bone mineral density), with doubling of risk for every decade after that.

**Female gender:** Women are more at risk of developing osteoporosis due to a menopausal decrease in estrogen. Women have a lower peak bone mass than men.

**Parents with a hip fracture:** Having a parent with a hip fracture at any time in their lives is associated with an increased risk of fracture (independent of BMD).

**Previous fracture:** At least one earlier fracture that occurred in adult life, a fracture arising from trauma which, in a healthy individual, would not have resulted in a fracture-doubles the risk of a second fracture in both men and women.

**Ethnicity:** Caucasian and Asian people have a higher incidence of osteoporosis and fractures of the hip and spine.

Menopause: Osteoclasts are more active, and bone loss

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increases due to a decrease in estrogen levels following menopause or oophorectomy.

# Modifiable Risk Factors for Osteoporosis<sup>[9,10,11,12]</sup>

**Alcohol:** Excessive alcohol consumption (>3 U daily) increases the risk of a fracture by 40% due to direct adverse effects on osteoblasts and parathyroid hormone levels (regulates calcium metabolism).

**Smoking:** Current and/or past smoking; the exact mechanism is unknown, but increased fracture risk is reported when there is a history of cigarette smoking.

**Low body mass index (BMI):** Regardless of age, gender, and weight loss, BMI <20 kg/m2 is associated with a twofold increased fracture risk.

**Poor nutrition with low dietary calcium intake:** Inadequate intake of calcium, vitamin D, or both influences calcium-regulating hormones; deficiency of either calcium or vitamin D will result in impaired calcium absorption and lower concentration of circulating calcium.

**Vitamin D deficiency:** Vitamin D plays an essential role in calcium absorption; it is made in the skin when exposed to the sun's ultraviolet rays (10–15 min a day is usually sufficient).

**Eating disorders:** Due to poor nutrition and vitamin D deficiency, there is a risk of obtaining a lower peak bone mass in early adulthood.

Estrogen deficiency accelerates bone loss and reduces the build-up of bone mass, which is related to hormone imbalance (e.g., early menopause) and nutritional factors.

**Sedentary lifestyle:** Physical activity and fitness reduce the risk of osteoporosis and fracture and other fall-related injuries."

**Long-term glucocorticoid therapy** (>5 mg/day of prednisone or equivalent for >3 months) increases bone loss and impairs bone formation.

**Rheumatoid arthritis (RA):** Inflammatory cytokines and impaired mobility increase bone loss.

**Secondary risk factors:** Disorders and medications that make the bone more fragile and/or affect balance and risk of falling.

## AIM OF THE STUDY

The present study aims to assess osteoporosis risk factors among the attendants of the Rheumatology units of Ibn-Sina and Al Salam teaching hospitals in Mosul city.

## **Specific Objective**

- 1. To describe the sociodemographic characteristics among the study sample.
- 2. To identify the association between medical history and drug history and osteoporosis.
- 3. To find the relationship between BMI and osteoporosis.
- 4. To evaluate the association between the nature of the lifestyle and osteoporosis.
- 5. To study if there is any association between the age of menopause, number of breastfed babies, number of pregnancies, and osteoporosis.

#### Patients and methods Study setting

The present study was conducted in Mosul City, northwest of Iraq. Mosul is the 2"d biggest city in Iraq after the capital, Baghdad, and it is the center of the Nineveh governorate.

#### The sample was taken from the patients themselves who attended the Rheumatology consultation unit of the following hospitals

- 1. Ibn-Sina teaching hospital.
- 2. Al Salam teaching hospital.

#### Study design

An observational, analytic, hospital-based, case-control study was conducted. Data was collected retrospectively from the participants using a non-randomized convenient technique. A modified questionnaire was used to assess the important risk factors associated with osteoporosis.

#### Study Period

Data was collected over six months, from the 2nd of January 2024 to the 30th of June 2024.

## Study sample

280 participants were enrolled in this study: 140 were cases, and 140 were controls.

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#### RESULTS

Table 3.1: Age distribution of the study population &its association with osteoporosis.

No. % No. % Odd Table $95\%$ C.1. val   Age $\geq$ 50 y 126 90.0 86 61.4 5.7 2.9:10.8 0.0			Cases [	n = 140]	Control	s [n=140]	Odd matia	05% C I	Р-
$Age \ge 50 \text{ y}$ 126 90.0 86 61.4 57 29.108 00			No.	%	No.	%	Ouu ralio	95% C.I.	value*
	1 00	≥ 50 y	126	90.0	86	61.4	57	2 0.10 8	0.001
$  \mathbf{x_{gc}}   < 50 \text{ y}    14    10.0    54    38.6    5.7    2.9,10.0    0.0    14    10.0    54    38.6    5.7    2.9,10.0    0.0    14    14    10.0    14    14    10.0    14    14    10.0    14    14    10.0    14    14    14    10.0    14  $	Age	< 50 y	14	10.0	54	38.6	5.7	2.9;10.8	0.001

\* Chi-square test was used.

Table 3.1 showed a highly significant association between age groups and osteoporosis; patients at age  $\geq 50$ 

years had 5.7 more risk of osteoporosis.

[n=140]	Controls	s [n=140]	Odd Ratio	95% C.I.	P- voluo*	
No. %	No.	%	Katio		value	
<b>Female</b> 110 78.6	100	71.4	1.4	0 8.2 5	0.169	
<b>Sex</b> Male 30 21.4	40	28.6	1.4	0.8;2.5	0.168	

Table 3.2.	Sex	distribution	of	the	study	nonulation&	its	association	with	osteoporosis
1 able 5.2.	<b>BCA</b>	uistiinution	01	une	Sluuy	population	115	association	with	05100001 0515.

\* Chi-square test was used.

Table 3.2 showed no significant association between sex and osteoporosis (p= 0.168).



Figure (3.1): Distribution of sex among case groups.



Figure (3.1): Distribution of sex among case groups.

Table 3.3: I	Body mass	index d	istribution	of the stu	lv po	pulation	& its as	sociation	with osteo	porosis.
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		C [n=	Cases 140]	Control	s [n=140]	Odd Batia	95% C.I.	P-
		No.	%	No.	%	Katio		value
Body mass	< 30	76	54.3	64	45.7	1.4	08.23	0 151
index	≥30	64	45.7	76	54.3	1.4	0.8; 2.3	0.131

\* Chi-square test was used.

Table 3.3 revealed that there was no significant association between body mass index and osteoporosis (p=0.151)

Table 3.4: Distribution of residence between case and control groups.

[			Cases [	n = 140]	Control	s [n=140]	Odd metho	050/ C I	P-
			No.	%	No.	%	Odd ratio	95% C.I.	value*
	Desidence	Urban	126	90.0	112	80.0		1 1.4 5	0.010
	Residence	Rural	14	10.0	28	20.0	2.3	1.1;4.5	0.019

\* Chi-square test was used.

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Table	3.4	showed	that	there	was	а	significant
associa	tion	between	urban	resider	nce an	d	osteoporosis

(Odd ratio = 2.3, p=0.019)

Table 3	3.5:	Comparison	$\boldsymbol{o}\boldsymbol{f}$	femalepatientsin	number	of	previous	pregnancies,	breastfed	babies	and	age (	of
menopa	ause	between case	&	control groups.									

Female related Variables	5	Cases [n = 108]		Control	s [n = 98]	Odd	95% C.I.	P- voluo*	
		No.	%	No.	%	rauo		value*	
No. of Brognomotion	>2	12	11.1	22	22.5	22	1 1.4 0	0.020	
No. of Freghancies	≤2	96	88.9	76	77.5	2.3	1.1;4.9	0.029	
No. of Propertied babies	>5	58	53.7	70	71.4	2.1	1 2.2 8	0.000	
No. of Breastied Dables	≤5	50	46.3	28	28.6	2.1	1.2;5.0	0.009	
Ago of	≤ 51 y	78	75.0	48	48				
Age 01 fomalos' mononausa	> 51 y	26	25.0	20	29.4	1.3	0.6; 2.5	0.523	
iemaies menopause	Total	104	100	68	100				

\* Chi-square test was used

Table 3.5 shows a statistically significant difference between the two groups in both variables. For the number of pregnancies, women with more than two pregnancies with an odds ratio of 2.3, indicating these women are more than twice as likely to be in the case group (p=0.029). Similarly, a higher number of breastfed babies (more than five) with an odds ratio of 2.1, suggesting a significant association (p=0.009). In this study, the age of menopause did not show a significant association with osteoporosis.

Variables		( [n	Cases = 140]	Cor [n =	ntrols : 140]	Odd ratio	95% C.I.	P-
		No.	%	No.	%			value
Lifectule	Sedentary	104	74.3	70	50.0	2.0	17.48	0.001
Lifestyle	Active	36	25.7	70	50.0	2.9	1.7; 4.0	0.001
Smolting	Yes (current smoker)	18	12.9	14	10.0	1.2	06.28	0.452
Smoking ]	No (former, never smoker)	122	87.1	126	90.0	1.5	0.0, 2.8	0.432

\* Chi-square test was used

Table 3.6 examines lifestyle habits and menopausal age, comparing these factors between the osteoporosis cases and controls. The findings show that a sedentary lifestyle is significantly associated with osteoporosis (OR = 2.9, p = 0.001). However, smoking did not show a significant association with osteoporosis in this study.

#### DISCUSSION

Osteoporosis represents a significant public health issue due to its correlation with age-related fractures, especially of the hip, vertebrae, distal forearm, and humerus. In recent decades, it has transitioned from being perceived as an unavoidable result of aging to being acknowledged as a significant and highly treatable illness.

#### Age

Demonstrated that individuals aged 50 or older have significantly higher odds of developing osteoporosis (OR = 5.7, p = 0.001). This finding aligns with a study by Naz, Ozgoli et al.<sup>[13]</sup>

Another study conducted by D'Amelio et al. consistently shows age as a primary cause of bone loss in men and women; it induces bone loss through hormonal changes and age-related osteoblast dysfunction.<sup>[14]</sup>

#### Sex

This study revealed a non-significant association

between sex and osteoporosis (OR= 1.4); this contrasts with a study by Zeng, Li et al., which had reported a higher prevalence of osteoporosis in females.<sup>[15]</sup> One possible explanation for the divergent findings is the demographic and clinical characteristics of this study population. Genetic factors and regional variations could play a role in the observed discrepancy. The genetic predisposition to osteoporosis can vary significantly across different populations, and environmental factors such as climate, socioeconomic status, and healthcare access can influence bone health outcomes.

#### BMI

Additionally, BMI did not show statistically significant associations with osteoporosis(OR= 1.4). This agrees with a study conducted by Soomro, Ahmed et al <sup>[16]</sup> and another study by Naz, Ozgoli et al., suggesting that the BMI > 30 (OR= 0.94) was identified as a protector against osteoporosis.<sup>[17]</sup>

#### Residence

Interestingly, living in urban areas was also identified as

a significant risk factor (OR = 2.3, p = 0.019). This finding is consistent with the study by Tanaka, Ando et al., which suggests higher osteoporosis prevalence in urban populations, potentially due to differences in lifestyle and diet between urban and rural areas.<sup>[18]</sup>

## Pregnancy and breastfeeding

Female patients reproductive history appeared to influence osteoporosis risk for the number of pregnancies, women with more than two pregnancies with an odds ratio of 2.3, indicating these women are more than twice as likely to be in the case group (p=0.029). Similarly, a higher number of breastfed babies (more than five) is more common in the case group (46.3%) than in the control group (28.6%), with an odds ratio of 2.1, suggesting a significant association (p=0.009). This suggests that extensive breastfeeding might be associated with an increased risk of osteoporosis, potentially due to prolonged calcium demands on the mother's body. An association between parity and bone loss was also reported by Allali et al.<sup>[19]</sup>, while another study indicated that during pregnancy, changes in levels of insulin-like growth factor 1 (IGF-I) play a crucial role in bone turnover, leading to trabecular bone loss in pregnant women Naylor et al.<sup>[20]</sup> The duration of lactation has shown no association with osteoporosis in some studies.<sup>[21,22]</sup> However, other studies by Hosseinpanah, Sorouri et al. on postmenopausal women found a negative correlation between the duration of lactation and (BMDs) of the femoral neck and lumbar spine.<sup>[23]</sup> It is estimated that a woman's bone density temporarily decreases by approximately 3-7% during lactation, but this loss is typically regained after weaning.<sup>[24]</sup> The age of menopause did not show a significant association with osteoporosis in this study. Yoldemir et al. concluded that time since menopause was not associated with osteoporosis.[25]

#### Lifestyle Habits

A sedentary lifestyle was significantly associated with osteoporosis (OR= 2.9, p = 0.001). The study by Sayed et al. agrees with this result. This underscores the importance of physical activity in maintaining muscle strength and bone health.<sup>[26]</sup>

The absence of a significant association with smoking in this study contrasts with other research by Kanis et al., which suggested smoking is a risk factor for osteoporosis.<sup>[27]</sup> This discrepancy may be due to variations in study populations or differences in smoking habits and their impact on bone health.

### CONCLUSIONS

From this study, we conclude that:

- 1. Individuals over 50 years old have a higher risk of osteoporosis.
- 2. Living in an urban area increases the risk of osteoporosis.
- 3. Women with more than two pregnancies and five

breastfed babies have a higher risk of osteoporosis.

4. A sedentary lifestyle increases the risk of osteoporosis.

#### Recommendations

- 1. Regular bone density screening is advised for individuals over 50 and those living in urban areas, given their higher risk for osteoporosis.
- 2. Encourage adequate calcium and vitamin D3 intake through diet and supplements, and limit consumption of cola and other soft drinks. Regular physical activity should also be promoted to strengthen bones and muscles.
- 3. Provide support for the nutritional needs of pregnant and breastfeeding women and educate them on how multiple pregnancies and extended breastfeeding can impact bone health.
- 4. Physicians advise prescribing the minimal effective dose of high-risk medications like corticosteroids and diuretics that can negatively affect bone health and consider safer alternatives.

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