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Research Paper

Osteoporosis risk factors in a sample of patients attending Baghdad teaching hospital

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ABSTRACT

Background: Osteoporosis is a skeletal condition causing reduced bone density and predisposing to fragility fractures, with a negative impact on quality of life and a significant financial burden on healthcare systems; understanding risk factors supports early detection.
Objective: To identify risk factors for osteoporosis among patients attending the DXA unit at Baghdad Teaching Hospital, Iraq, and examine the relationship between demographic, lifestyle, and reproductive factors and bone mineral density (spine T-score).
Methods: A cross-sectional study was conducted from December 2022 to April 2023 among 240 patients (18 males, 222 females; mean age 56.49 ± 12.63 years) recruited via simple sampling from the DXA unit and referring clinics at Baghdad Teaching Hospital. Structured interviews collected demographic, educational, and lifestyle data; bone density was assessed via DXA scan. Statistical analysis (SPSS-28) included frequencies, percentages, means, Student's t-test, ANOVA, and Pearson correlation (significance at $P \leq 0.05$).
Results: The highest proportion of osteoporosis cases occurred in the 50–59-year age group (35.4%). Most participants were female (92.5%), married (87.5%), unemployed (72.5%), and urban residents (83.8%); 36.7% were illiterate. Family history of osteoporosis was reported by 36%, and 7.9% were smokers. Mean age at menopause was 47.36 ± 5.78 years. Highly significant associations were found between spine T-score and BMI, and between spine T-score and menopausal status ($P = 0.05$).
Conclusion: Higher BMI appeared protective against osteoporosis, while early menopause — linked to estrogen deficiency — was a primary risk factor. Findings support targeted screening and preventive counseling for women approaching or experiencing early menopause.

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1. INTRODUCTION

Osteoporosis is a quiet illness until it is worsened by fractures in the hip, spine, and wrist that occur with minimum or no stress and can be permanently disabled [1]. It affects both sexes and is a huge public health issue since many individuals are unaware of it until issues arise. Furthermore, OP reduces the quality of life by causing severe back pain, loss of independence, expensive rehabilitation, and unnecessary healthcare [2]. It might manifest as a mild to severe backache or as a sudden fracture or collapse of a vertebra. Height loss is prevalent. Local discomfort, soreness, and deformity are common in peripheral osteoporotic fractures [3], [4].

According to the WHO, osteoporosis is the second most common medical illness after cardiovascular disease. Although North America and Europe today have the greatest rates of osteoporosis, these rates will climb in developing countries as population longevity increases [5]. The disorder affects one in every three postmenopausal women and one in every five elderly men. According to the WHO, osteoporosis causes more than 8.9 million fractures worldwide each year. Osteoporosis affects 10% of the population, but more than 30% of postmenopausal women, with a deficiency of estrogen associated with bone mass loss [6]. The prevalence of OP in Iraqi postmenopausal ladies increased to 22.8% (Nevin Hammam et al, 2018). Another research in Iraq found a prevalence of 25.6%, with a significant percentage of osteoporosis (26.7%) being female, whereas (16.1%) were male and (58.3%) were female [7].

- **Aims:** To identify the risk factors for osteoporosis in a sample of patients attending Baghdad teaching hospital.

2. RELATED WORK

Osteoporosis is a prevalent skeletal disorder characterized by low bone mass and structural deterioration of bone tissue, leading to an increased susceptibility to fractures. Understanding the risk factors associated with osteoporosis is crucial for early detection, prevention, and management of this debilitating condition. In a study conducted at Baghdad Teaching Hospital, researchers aimed to identify prevalent risk factors contributing to osteoporosis among patients attending the facility.

Several real-world studies have highlighted various risk factors associated with osteoporosis. A comprehensive review by emphasized age as one of the primary risk factors, with bone mineral density declining progressively with advancing age. Additionally, gender plays a significant role, as postmenopausal women are particularly susceptible due to hormonal changes affecting bone density.

Nutritional factors have also been implicated in osteoporosis development. Inadequate intake of calcium and vitamin D, essential for bone health, has been linked to increased fracture risk. Furthermore, lifestyle factors such as physical inactivity and smoking have been consistently associated with decreased bone density and increased fracture risk.

Certain medical conditions and medications can exacerbate osteoporosis risk. Chronic diseases like rheumatoid arthritis and endocrine disorders disrupt bone metabolism, predisposing individuals to

osteoporosis. Moreover, long-term use of corticosteroids, commonly prescribed for various inflammatory conditions, can lead to bone loss and increased fracture risk.

The aforementioned studies provide a framework for understanding the multifactorial nature of osteoporosis risk. However, further investigation is warranted to assess the prevalence and impact of these risk factors among patients attending Baghdad Teaching Hospital. By identifying high-risk individuals and implementing targeted interventions, healthcare professionals can mitigate the burden of osteoporosis and improve patient outcomes."

3. METHODOLOGY

Cross-sectional research was carried out from December 2022 to April 2023. It was carried out in the DXA section of Baghdad Teaching Hospital to assess bone density. Patients were sent to the DXA unit from the rheumatology, orthopaedic, endocrine, and gynaecology units of Baghdad Teaching Hospital clinics, as well as other governmental hospital clinics and outpatient clinics. A simple sampling approach was applied. During the four-month trial period, (240) patients were recruited (18 males and (222 females). Direct (personal) interviews were done in a private small room at the DXA facility to collect data. To collect data from participants, a standardized questionnaire was employed. The DXA machine (DXAIDMS, a model Stratos, number G14015D365) was used to diagnosing the patients. The study obtained permission from the Iraqi Ministry of Health and the Baghdad hospital management. All study participants consented to the study's purpose and procedures and received guidance on specific precautions to prevent osteoporosis.

- **Statistical Analysis:** The available statistical tool SPSS-28 (Statistical Packages for Social Sciences-version 28) was used to analyze the data. The data was given in basic frequency, percentage, mean, standard deviation, and range (minimum-maximum values) metrics. The significance of differences between means (quantitative data) was assessed using the students-t test for differences between two independent means or the ANOVA test for differences between more than two independent means. When the P value was equal to or less than 0.05, statistical significance was evaluated. Pearson correlation was generated to determine the significance of the correlation between two quantitative variables using its t-test.

4. RESULTS AND DISCUSSION

- **Socio Demographic Variable:** This cross-sectional research included 240 osteoporosis patients. The mean age was (56.49 years 12.63 SD), with the age groupings 50-59 years having the highest proportion of OP (35.4%) and the age group 40 years having the lowest percentage (10.0%). 18 (7.5%) were men and 222 (92.5%) were females; (87.5%) were married; (41.7%) had five or more children; (27.5%) were employed; and (22.5%) had a primary education. The majority of the research group (36.7%) was illiterate, while just 2.1% had higher education. The largest percentage of the research group (39.2%) was fat, while the lowest number (3.8%) was underweight. In terms of domicile, the largest percentage of the study was urban (83.8%), while the lowest number was rural (16.3%), with 7.9% of them being smokers and 36% having a family history of OP as shown in Table 1.

Table 1. Frequency Distribution of the Study Sample by Socio-Demographic Variable

Demographic Characteristics		No	%
Age (years)	<40years	24	10.0
	40---49	25	10.4
	50---59	85	35.4
	60---69	73	30.4
	70---79	33	13.8
	Mean±SD (Range)	56.49±12.63	(18-79)

Gender	Male	18	7.5
	Female	222	92.5
Educational level	Illiterate	88	36.7
	Primary	54	22.5
	Secondary	42	17.5
	College	51	21.3
	Higher education	5	2.1
Occupation	Employed	66	27.5
	Unemployed	174	72.5
Marital status	Married	210	87.5
	Single	25	10.4
	Divorced	5	2.1
Number of children	No children	39	16.3
	One	9	3.8
	Two	16	6.7
	Three	40	16.7
	Four	36	15.0
	Five & more	100	41.7
	Mean±SD (Range)	4.38±3.13	(0-12)
Residence	Urban	201	83.8
	Rural	39	16.3
BMI classification	Underweight (<18.5)	9	3.8
	Normal (18.5-24.9)	62	25.8
	Overweight (25-29.9)	75	31.3
	Obese (=>30)	94	39.2
	Mean±SD (Range)	28.04±5.57	(14.0-42.0)
Smoking	Smoker	19	7.9
	Ex-smoker	7	2.9
	No	214	89.2
Duration of smoking	<5	1	
	5-9	8	
	10-14	4	
	15-19	3	
	20+	3	
Amount of smoking (cig/day)	<10	4	
	10-19	10	
	20+	5	
Family history	Yes	85	36.0
	No	155	64.0

Table 2 demonstrated (66.7%) had Regular Menstrual history ;(32.9%) had contraceptives; the Mean age at menopause of female patients was (47.36 years ±5.78 SD), the Duration of menopause mean was (13.51 years ±8.78 SD), this table shows that the rate of hysterectomy was (14.9 %); (10.8%) were had Oophorectomy. (5.4%) of them had Bariatric surgery. (32.9 %) were 13 years Age at menarche; (28.8%) of them use oral contraceptives.

Table 2. Distribution of Female Participation According to Menstrual History and Reproductive Variable

Menstrual History (Pre-Menopausal Female N=30)	**Regular**	**20**	**66.7**
	Irregular	10	33.3

Age at menarche	11	22	9.9
	12	61	27.5
	13	73	32.9
	14	40	18.0
	15+	26	11.8
	Mean±SD (Range)	13.0±1.2	(11-16)
Oral contraceptive use	Yes	64	28.8
	No	158	71.2
Age at menopause (n=192)		47.36±5.78	(27-58)
Duration of menopause		13.51±8.78	(1-40)
Hysterectomy (female n=222)	Yes	33	14.9
	No	189	85.1
Date of hysterectomy	<5	7	
	5-9	8	
	10-14	5	
	15-19	5	
	20+	8	
Oophorectomy	Yes	24	10.8
	No	198	89.2
Date of Oophorectomy	<5	4	
	5-9	5	
	10-14	4	
	15-19	4	
	20+	7	
Bariatric surgery	Yes	13	5.4
	No	227	94.6
*(female n=222)			

The finding in Figure 1 showed that 86.5% of women in the study sample were postmenopausal, and only 13.5%were premenopausal.

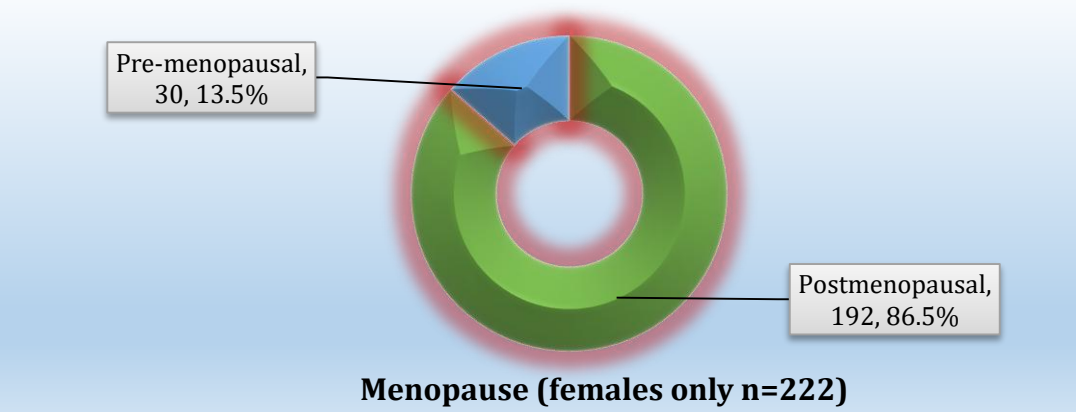


Figure 1. Menopausal Status for Female Patients

- **Medical History:** Table 3 represented health problems (diseases) among the study sample, it showed that the highest rates were diabetes mellitus in 53 (22.1%) of OP patients, rheumatoid arthritis 29 (12.1%) in second place; asthma17(7.1%) in the third place; malnutrition or digestive problems 15(6.3%); hyperthyroidism 13(5.4%); Hypothyroidism (5.8%); renal diseases (5.8%); arthritis (5.8%); Inflammatory Bowel disease (4.2%); liver & biliary diseases;(4.2%); breast cancer (2.9%).

Table 3. Frequency Distribution of the Study Sample According to the History of Some Health Problems

Medical History	No	%
Diabetes mellitus	53	22.1
Rheumatoid arthritis	29	12.1
Asthma	17	7.1
Malnutrition or Digestive problems	15	6.3
Hypothyroidism	14	5.8
Renal diseases	14	5.8
Arthritis	14	5.8
Hyperthyroidism	13	5.4
Inflammatory Bowel Disease	10	4.2
Liver & biliary diseases	10	4.2
Breast cancer (Females only n=222)	7	3.2
Hematological diseases	5	2.1
Lupus erythematosus	4	1.7
Pemphigus	4	1.7
Celiac disease	4	1.7
Appetite disorder	3	1.3
Others (Systemic sclerosis, Osteoarthritis, Psoriasis Multiple sclerosis, Multiple sclerosis, Uterus fibrosis, Lung fibrosis,) Gout, Peripheral neuropathy, Epilepsy, Chron's disease)	1	0.4

- **DXA Reading:** Table 4 showed the biggest proportion of participation, (47%) had a reading range from (-2.0 to -2.9); the range of (-3.0 to -3.9) with a rate of (39.2%) was in second place, (10.4%) was between (-4.0 to-4.9); and (2.5%) had a reading range from (-1.0 to -1.9). The lowest rate was between (-5.0 and -5.9). The DXA readings ranged from -5.4 to 1.6.

Table 4. Distribution of the Study Group according to DXA Reading

DXA Reading		No	%
Spine T Score	-1.0 --- -1.99	6	2.5
	-2.0 --- -2.99	113	47.1
	-3.0 --- -3.99	94	39.2
	-4.0 --- -4.99	25	10.4
	-5.0 --- -5.99	2	0.8
	Mean±SD (Range)	-3.10±0.67	(-5.4 - -1.6)

Table 5 presented that there were highly significant differences between the spine T score and the Patient's BMI, while there were no significant differences between the age, gender, educational level, occupation, marital status, number of children, residency, and smoking and Spine T Score at P value 0.05 level.

Table 5. Association between the Spine T-Score and Patient's Sociodemographic Characteristics

		Spine T Score			P Value
		No.	%	Mean±SD	
Age (years)	<40years	24	10.0	-2.98±0.79	0.268
	40---49	25	10.4	-2.87±0.64	NS
	50---59	85	35.4	-3.14±0.59	
	60---69	73	30.4	-3.14±0.71	
	70---79	33	13.8	-3.22±0.71	

Gender	Male	18	7.5	-3.06±0.73	0.773
	Female	222	92.5	-3.11±0.67	NS
Educational level	Illiterate	88	36.7	-3.21±0.73	0.127
	Primary	54	22.5	-3.16±0.66	NS
	Secondary	42	17.5	-2.89±0.54	
	College	51	21.3	-3.06±0.66	
	Higher education	5	2.1	-3.06±0.46	
Occupation	Employed	66	27.5	-3.15±0.71	0.522
	Unemployed	174	72.5	-3.09±0.65	NS
Marital status	Married	210	87.5	-3.09±0.64	0.689
	Single	25	10.4	-3.17±0.79	NS
	Divorced	5	2.1	-3.30±1.13	
Number of children	No children	39	16.3	-3.19±0.74	0.624
	One	9	3.8	-2.94±0.85	NS
	Two	16	6.7	-3.05±0.56	
	Three	40	16.7	-3.02±0.53	
	Four	36	15.0	-3.00±0.61	
	Five & more	100	41.7	-3.16±0.71	
Residence	Urban	201	83.8	-3.12±0.65	0.405
	Rural	39	16.3	-3.02±0.76	
BMI classification	Underweight (<18.5)	9	3.8	-3.61±1.20	0.004^
	Normal (18.5-24.9)	62	25.8	-3.28±0.65	HS
	Overweight (25-29.9)	75	31.3	-3.06±0.69	
	Obese (=>30)	94	39.2	-2.98±0.56	
Smoking	Smoker	19	7.9	-3.03±0.71	0.691
	Ex-smoker	7	2.9	-2.94±0.63	NS
	No	214	89.2	-3.12±0.67	
#Significant difference between two independent means using Students-t-test at 0.05 level.					
^Significant difference among more than two independent means using ANOVA-test at 0.05 level.					

The results of Table 6 revealed that there were highly significant between the spin T score and menopausal females.

Table 6. Association between the Spine T-Score and Menstrual History of Women Patients in the Study Sample

Female N=222		**Spine T Score**			**P Value**
		No.	**%**	**Mean±SD**	
Menstrual history	Regular	20	66.7	-2.78±0.60	0.663
	Irregular	10	33.3	-2.92±1.09	NS
Oral contraceptive use	Yes	64	28.8	-3.09±0.71	0.799
	No	158	71.2	-3.12±0.65	NS
Menopause	Pre-menopause	30	13.5	-2.83±0.78	**0.013#**
	Menopausal	192	86.5	-3.15±0.64	HS
Hysterectomy	Yes	33	14.9	-3.08±0.52	0.782
	No	189	85.1	-3.11±0.69	NS
Oophorectomy	Yes	24	10.8	-3.01±0.45	0.436
	No	198	89.2	-3.12±0.69	NS
Bariatric surgery	Yes	13	5.4	-3.07±0.85	0.843
	No	227	94.6	-3.11±0.66	NS

#Significant difference between two independent means using Students-t-test at 0.05 level.

4.1 Discussion

4.1.1 Sociodemographic Characteristics

The current study showed females account for the vast majority of osteoporosis cases (92.5%). Although these findings are consistent with the findings of numerous research that demonstrate osteoporosis is more prevalent in males than in women, a two-year cross-sectional study in Spain found that the prevalence of osteoporosis was greater in women 43.8% than in men 11.1% [8]. Another research in the United States discovered an age-adjusted prevalence of osteoporosis among persons aged 50 and older of 12.6%, with women (19.6%) having a greater incidence than males (4.4%) [9]. In addition, a study done in China found that the frequency of osteoporosis was 18.1% in the male population and 40.3% in the female population [10]. The inability to determine prevalence was a methodological limitation of this study due to the enormous problem of acquiring the complete number of patients attending the medical city and the presence of another fragility testing instrument at the radiology department. This is because women have smaller bones and hence lower overall bone mass, putting them at a higher risk of osteoporosis and women's bones lose density faster after menopause and live longer lives [11].

4.1.2 Smoking

According to the present study, 89.2% of the study sample were non smokers, whereas 7.9% were smokers. This finding is comparable with the findings of research done in Bangladesh, which found that 99% of women in both rural and urban regions did not smoke [12]. Another study in Bosnia and Herzegovina found that smoking is an independent risk factor for osteoporosis in postmenopausal women in a case-control study with 100 cases and 100 control participants [13]. This might be linked to the fact that the majority of research participants were female and that female smokers in Iraq are uncommon due to cultural and societal conventions.

4.1.3 Family History

The finding in this study represents, 36% of patients had a positive family history of OP. This conclusion is analogous to research conducted in Jordan, which discovered that 31.5% of patients had a family history of osteoporosis [14]. Another research in Kirkuk, Iraq, found that 48.1 percent of OP patients had a family history of osteoporosis [15]. Also study in Bosnia and Herzegovina demonstrated that the presence of osteoporosis in close relatives (usually the mother) represents a significant and independent risk factor for the development of osteoporosis by analyzing the data of a positive family history of osteoporosis as a risk factor using the model of the multivariate logistic regression. In several research, a positive family history of osteoporosis is cited as one of the most important risk factors [16], [17].

4.1.4 Age and Duration of Menopause

According to the results of this study, the average age of menopause was 47.365.78 SD, and the average length of menopause was 13.518,78 SD. These findings are congruent with those of research conducted in Romania, which discovered that the average age of menopause was 47.264.84 years [18].

The menopausal length of osteoporotic women was (25.4%), =5 years and (38.1%), 6-10 years and (43.8%), > =11 years, according to research conducted in Kirkuk, Iraq. Another study done in Iran discovered that menopause at a young age was connected with an increased risk of osteoporosis. Another study in Jordan found that menopausal length was substantially linked with osteoporosis. Furthermore, the study in Brazil highlighted the characteristics that are independently related to osteoporosis and constituted a risk factor for osteoporosis. When the risk was separated into groups, it increased after 20 years after menopause and then steadily increased every 5 years [19]. Inferring that shorter estrogen exposure relates to the risk of osteoporosis.

4.1.5 Hysterectomy and Oophorectomy

The data in the current study showed, 14.9% of women underwent hysterectomy and 10.8% got Oophorectomy. That is consistent with the findings of many studies that showed women with a hysterectomy and oophorectomy had the highest risk of OP. A case-control study conducted in Korea discovered the adjusted hazard ratios for osteoporosis were 1.43 depending on the status of a hysterectomy or oophorectomy. Additionally research in Taiwan found that women who had both a hysterectomy and an oophorectomy had a greater risk than those who had neither operation. Premenopausal hysterectomy is associated with decreased ovarian reserve, follicular atresia, and subsequently reduced long-term estrogen secretion, and women who undergo hysterectomy experience greater gradual bone mineral loss than women with an intact uterus and are at a higher risk of osteoporosis.

4.1.6 Medical History

- **Diabetes Mellitus:** Several studies indicated a larger percentage of DM than the current study; for example research conducted in Iraq found that 33.4% of patients had DM. In addition, Iranian research found that 34.9% of patients had Diabetes mellitus. Furthermore, a cross-sectional study in Jordan discovered that 33.4% of osteoporotic patients had diabetes, 40% of patients with diabetes had it for ten years or longer, while 35% had it for less than five years, diabetes status, and diabetes duration were significantly positively associated with osteoporosis. While another study in Korea found a smaller percentage of DM, the prevalence of diabetes was 13.5%, and diabetes was one of the leading causes of death. The discrepancies in results might be attributed to differences in sample size and diagnostic criteria. Insulin directly stimulates osteogenic action in human cells by boosting cell proliferation, differentiation, alkaline phosphatase activity, and the production of type I collagen and osteocalcin. Diabetes significantly impacts microstructural changes in bone mass and contributes to bone homeostasis impairment, which increases the risk of bone fractures.
- **Rheumatoid Arthritis:** The present study discovered that 12.1% of the individuals in this study had RA. This conclusion is consistent with the findings of another Iraqi study, which found that 12.9% of osteoporotic patients had rheumatoid arthritis. Another cross-sectional research conducted in Germany discovered that 20.6% of patients with osteoporosis had RA.

Chronic inflammatory responses affect the peripheral joints in RA. This inflammatory response within the joint synovium causes the synthesis of numerous cytokines (tumor necrosis factor, interleukin-1 (IL-1), and interleukin-6 (IL-6)), which results in the activation of osteoclasts, which can mediate bone degradation. Inflammation in the joints also promotes bone absorption, making the patient vulnerable to bone loss and the development of osteoporosis. Furthermore, corticosteroids and glucocorticoids are the principal medications indicated for the treatment of RA; these treatments have been shown to be risk factors for secondary osteoporosis and osteoporotic fracture. The danger increases with prolonged usage and the use of a high dosage.

- **Asthma:** According to the current research's findings, 7.1% of the study sample had asthma. Many studies have shown that asthma is linked to osteoporosis. Research done in the United Kingdom discovered that individuals with asthma had a greater risk of osteoporosis and were 12% more likely to sustain fragility fractures than the general population. Additionally, research done in the United States found that individuals with asthma and long-term glucocorticoid usage had a greater risk of osteoporosis and fractures than patients with asthma and no long-term glucocorticoid use. Several cases of corticosteroid-induced osteoporosis have been reported. Because of their anti-inflammatory impact, corticosteroids (oral and inhaled) constitute the cornerstone of asthma therapy regimens. They have been demonstrated to decrease osteoblast function and proliferation, increase osteoblast and osteocyte death, and enhance osteoclast longevity.
- **Associations between the Spine T Score and Patient's Sociodemographic Characteristics:** The present investigation found that there were significant variations between the spine T score and the patient's BMI. Underweight (18.5) have a T score of -3.611.20 SD, Normal BMI (18.5-24.9) have a T score of -3.280.65, Overweight (25-29.9) has a T score of -3.060.69 SD, and Obese (30) have a T score of -2.980.56 SD. At the P value 0.05 level, there were no significant differences between age, gender,

educational level, employment, marital status, number of children, residence, smoking, and Spin T Score. This is consistent with a study done in Brazil, which discovered that the factors independently related to osteoporosis were body mass index, with a higher BMI being a protective factor. Another study found that being overweight or obese has a protective effect on osteoporosis. This relationship can be explained by the conversion of androgens to estrogens in adipose tissue, which is the main source of estrogens in postmenopausal women, hence contributing to bone mass maintenance.

- **Association between the Spine T Score and Menstrual History of the Women Patients:** The findings demonstrated a significantly substantial relationship between the spine T score and menopausal females. Menopausal mean T score -3.150.64 SD, premenopausal mean T score -2.830.78 SD. The major cause of osteoporosis in postmenopausal bone loss caused by estrogen insufficiency. Advanced age, genetics, thinness, and numerous disorders and medicines that affect bone health are all key risk factors for postmenopausal osteoporosis. Jordan discovered a significant prevalence of osteoporosis and osteopenia among Jordanian postmenopausal women in cross-sectional research. These findings were consistent with those of an Iraqi investigation, which found a substantial difference in bone mineral density between postmenopausal and premenopausal participants in the lumbar spine and both femurs.

5. CONCLUSION

These results indicate that osteoporosis is a common health issue among Iraqi adults, particularly postmenopausal women, and several modifiable and non-modifiable risk factors should be considered in prevention and management strategies.

5.1 Recommendation

Regular assessment and follow-up for postmenopausal women to prevent fractures, detect low bone mineral density and provide appropriate treatment for OP according to the latest clinical guidelines.

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Author Contributions Statement

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Ali Hussein Al-Hafidh	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

Not Applicable.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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