

Prevalence of Osteoporosis and Osteopenia in Iraqi Premenopausal and Postmenopausal Subjects among a Sample of Patients Attending Baghdad Teaching Hospital

Ali Hussein Al-Hafidh*, Gassan Thabet Saeed, Faiq I. Goral

1. College of health and Medical technology – Baghdad /Iraq.

2. College of Medicine Baghdad University /Iraq.

3. College of Medicine Baghdad University /Iraq.

*Corresponding Author: Email: dr.ali69@yahoo.com

Abstract

Back ground: Osteoporosis is a major public health problem and more common in women and older people Objective: to determine the prevalence of osteoporosis and osteopenia in premenopausal and postmenopausal subjects attending Baghdad teaching hospital Methods: A cross sectional study was carried out for a period of one year in Baghdad teaching hospital Results: A total of 240 subjects were included in this study, they were divided into 2 groups: the first group included 120 postmenopausal women with a mean age (59.93 ± 6.88) and the second group included 120 premenopausal women with a mean age (46.36 ± 4.07). Significant differences of bone mineral density of lumbar spine and both femurs between postmenopausal and premenopausal subjects. The percentage of osteoporosis and osteopenia in premenopausal was (26.7%) and (3.3%) respectively and in postmenopausal subjects was (34.17%) and (52.5%). T-score was used for postmenopausal subjects and Z-score for premenopausal subjects. The percentage of osteoporosis and osteopenia was higher in lumbar spine in both postmenopausal and premenopausal subjects than femurs. Normal BMD of right femur was higher than left femur in both postmenopausal and premenopausal subjects. Conclusion: The prevalence of osteoporosis and osteopenia in premenopausal was (26.7%) and (3.3%) and in postmenopausal subjects was (34.17%) and (52.5%) respectively. The percentage of osteoporosis and osteopenia was higher in lumbar spine in both postmenopausal and premenopausal subjects than femurs. Recommendations: Essential measures are needed for public education particularly dietary habit, lifestyle modification and widespread distribution of information about osteoporosis and its prevention.

Keywords: *Osteoporosis, Osteopenia, Postmenopausal, Premenopausal.*

Introduction

Osteoporosis is a major public health problem and more common in women and older people. It causes more than 8.9 million fractures worldwide annually. Women are a considerably at a higher risk for osteoporosis, which is expected to affect around 200 million women allover world [1, 2].

Osteoporosis is the most common bone disease in the human and characterized by low bone mass with deterioration of bone tissue, and disruption of bone micro architecture with a subsequent increase in bone fragility and predisposition to fracture [3, 4]. One half of all postmenopausal women will experience an osteoporosis-related fracture during their lifetime [5].

Risk factors related to osteoporosis include age, female sex, ethnicity, early menopause, increased age at menarche, family history of osteoporosis; also endocrine, rheumatic, gastrointestinal and chronic obstructive pulmonary diseases.

Other factors include anorexia nervosa, depressed mood, smoking, alcohol intake, vitamin D deficiency, low calcium and high caffeine intake, prolonged immobilization and underweight [6,7].

Dual X-ray absorptiometry (DXA) is the preferred choice and golden clinical tool for the diagnosis of osteoporosis and assessment of its severity.

This equipment is noninvasive, widely available and currently the scanning of hip and spine used as the gold standard by a major number of clinicians. Low bone mineral density (BMD) is an important risk factor for osteoporosis and its related fractures [8, 11]. Other advantages of DXA include fast and simple procedure with high accuracy and reproducibility, and can be applied in all age groups [12].

In Iraq, there has been an increasing interest in assessment of osteoporosis recently as it became an important health issue. In 2013, Gorial and his colleagues found that (22.8%) of Iraqi postmenopausal women with osteoporosis [13], but no data about percentage of osteopenia and osteoporosis among premenopausal subjects. To best of our knowledge this is first study in Iraq among premenopausal and comparison with postmenopausal subjects.

Patients and Methods

This cross-sectional study was conducted at DXA Unit in Baghdad Teaching Hospital from November 2016 to December 2017. Data were collected from (120) postmenopausal female subjects and (120) premenopausal female subjects with total of 240 females from age of 40-69 years were randomly selected from the patients attending DXA unit in Baghdad Teaching Hospital.

The postmenopausal female subjects were defined as individuals with menopause at least one year since the last natural menstruation^(14,15). Osteoporosis was diagnosed according to WHO criteria T-score was used for postmenopausal subjects and Z-scores for premenopausal subjects [1,16].

Women were excluded from the study if they had malignancy, chronic inflammatory, endocrine diseases, renal impairment, gastrointestinal diseases, previous gastrointestinal surgery environmental factors, and diseases with altered activity or patients on one or more of the following medications: warfarin, heparin, vitamin K, thiazolidinedione, thiazide diuretics, cancer chemotherapy, anticonvulsants, barbiturates, estrogen, GnRH (gonadotropin releasing hormone agonists), methotrexate, glucocorticoids, vitamin D or osteoporosis medications.

Pregnant and lactating premenopausal individuals at time of BMD measurement also excluded from this study. The study protocol was approved by the ethics committee of Baghdad University, informed consents were taken from the participants, and they were assured of privacy of data and to be used only for scientific research. Demographic data were collected and family history of osteoporosis or fragility fracture and history of previous personal fragility fracture were recorded.

Weight and height were measured with standard apparatus in DXA unit by measuring the weight with tape measure from the side of the patient without shoes in standing position, weight was taken by electronic scale and the patient in standing position with light clothes and without shoes. Blood samples were aspirated for complete blood picture, fasting blood sugar, serum creatinine, serum calcium, serum phosphorus, liver function test. DXA scanning of lumbar spine (L1-4) and both femurs by Strous densitometer with pencil-beam technology.

Statistical Analysis

Analysis of data was carried out using the available statistical package of SPSS-24 (Statistical Package for Social Science-version 24). Data were presented in simple measures of mean, standard deviation, and range minimum and maximum values" for continuous variables. Using independent student-t-test for difference between two means, Pearson Correlation was used to compare the difference between means, Anova test (the one-way analysis of variance was used to compare the difference between means of several groups). Statistical significance was considered whenever the P value was less than 0.05.

Results

A total of 240 subjects were included in this study, they were divided into 2 groups: the first group included 120 postmenopausal subjects and the second group included 120 premenopausal subjects. Descriptive data of the subjects (mean $\pm$ SD) regarding the age, weight, height, body mass index, waist circumflex and years of menopause of postmenopausal subjects as shown in Table (1).

Table 1: Descriptive data of the studied patients

	Postmenopausal (120)	Premenopausal(120)
	Mean± SD	Mean± SD
Age(yr)	59.93±6.88	46.36±4.07
Weight(kg)	79.93±14.69	86.88±13.10
Height(cm)	157.14±5.48	159.19±5.28
Body mass index	32.31±5.27	34.36±5.40
Waist circumflex(cm)	86.26±10.39	88.10±8.81
Years of menopause	5.64±6.47	-

Significant differences of bone mineral density of lumbar spine and both femurs between postmenopausal and premenopausal subjects as shown in Table (2). Areas of

femoral neck and total hip for both femurs were measured. T-score was used for postmenopausal subjects and Z-score for premenopausal subjects.

Table 2: Comparison of bone mineral density of Lumbar spine and femurs in pre and postmenopausal subjects

DXA scanned area	WHO classification of BMD	Postmenopausal		Premenopausal		Total		P.V
		N0	%	N0	%	N0	%	
Total Lumbar spine BMD (g/cm ²)	normal	19	15.83	86	71.67	105	43.75	0.0001*
	osteopenia	64	53.33	30	25.00	94	39.17	
	osteoporosis	37	30.83	4	3.33	41	17.08	
	Total	120	100.00	120	100.00	240	100.00	
Right femoral neck BMD (g/cm ²)	Normal	51	42.50	116	96.67	167	69.58	0.0001*
	Osteopenia	65	54.17	4	3.33	69	28.75	
	Osteoporosis	4	3.33	0	0	4	1.67	
	Total	120	100.00	120	100.00	240	100.00	
Total right hip BMD (g/cm ²)	Normal	55	45.83	110	91.67	165	68.75	0.0001*
	Osteopenia	61	50.83	10	8.33	71	29.58	
	Osteoporosis	4	3.33	0	0	4	1.67	
	Total	120	100.00	120	100.00	240	100.00	
Left femoral neck BMD (g/cm ²)	Normal	49	40.84	114	95.00	163	67.91	0.0001*
	Osteopenia	67	55.83	6	5.00	73	30.42	
	Osteoporosis	4	3.33	0	0	4	1.67	
	Total	120	100.00	120	100.00	240	100.00	
Total left hip BMD (g/cm ²)	Normal	54	45.00	114	95.00	168	70.00	0.0001*
	Osteopenia	62	51.67	6	5.00	68	28.33	
	Osteoporosis	4	3.33	0	0	4	1.67	
	Total	120	100.00	120	100.00	240	100.00	

The percentage of osteopenia and osteoporosis in premenopausal was (26.7%) and (3.3%) respectively and in postmenopausal subjects was (52.5%) and (34.17%) as shown in table (3). T-score was used for postmenopausal subjects and Z-score for premenopausal subjects.

The percentage of osteoporosis and osteopenia was higher in lumbar spine in both postmenopausal and premenopausal subjects than femurs. Normal BMD of right femur was higher than left femur in both postmenopausal and premenopausal subjects.

Table 3: Percentage of osteoporosis and osteopenia in premenopausal and postmenopausal subjects

Postmenopausal	Total	Normal (%)	Osteopenia (%)	Osteoporosis (%)
		13.33	52.5	34.17
	Lumbar spine	15.84	53.33	30.83
	Left femoral neck Right femoral neck	40.83 43.34	55.84 53.33	3.33 3.33
Premenopausal	Total	70	26.7	3.3
	Lumbar spine	71.7	25	3.3
	Left femoral neck	95	5	0
	Right femoral neck	98.3	1.7	0

Discussion

Osteoporosis is a silent disease until a fracture occurs leading to a major public health problem especially fractures of hip that imposing a significant burden of morbidity, disability, decreased quality of life, costs and mortality in women and men [7]. In last 10 years, there has been an increasing interest in studying osteoporosis in Iraq but the magnitude of the problem is still not clear.

Oestrogen has a most important role in the regulation of skeletal homeostasis, and therefore physiological declines in concentration of oestrogen increase risk of osteoporosis in postmenopausal women and responsible for the fast bone loss.

The pathophysiology of postmenopausal osteoporosis involves the overproduction of osteoclast relative to coupled increase in osteoblastogenesis [17, 18]. This study showed that total percentage of osteopenia and osteoporosis by examination of three areas lumbar, right and left femurs among Iraqi women as osteopenia was in (26.7%) of premenopausal and (52.5%) of postmenopausal subjects while the percentage of osteoporosis was (3.3%) of premenopausal and (34.17%) of postmenopausal subjects attending our center.

The normal BMD was recorded in (70%) of premenopausal and (13.33%) of postmenopausal subjects in this study. The higher percentage of osteopenia and osteoporosis among the postmenopausal subjects. There have been several studies reporting that BMD of mean total body, lumbar spine, and femoral neck were higher in premenopausal subjects than postmenopausal [19].

A recent Indian study assessed the BMD of premenopausal and postmenopausal women and showed that (46.7%) of pre-menopausal individuals had normal BMD, (45.1%) with osteopenia and (8.2%) with osteoporosis while (8.8%) of postmenopausal individuals had normal BMD, (50%) with osteopenia and (41.2%) with osteoporosis [20]. These results are higher than findings of the present study in both groups. This discrepancy may be related to life style, dietary pattern, economic status and study design.

There is limited information about percentage of osteopenia and osteoporosis among premenopausal subjects but the issue was studied by many researchers from Middle East among the postmenopausal women to reveal the changes of BMD with the menopause. A study from Kuwait showed that prevalence of low bone mass among (454) postmenopausal subjects as (20.2%) of them with osteoporotic lumbar spine and (12.5%) of femur while osteopenia of the spine and femur neck was found in (35.4%) and (42.8 %) respectively [21].

Another study in Jordan reported that prevalence of alteration of lumbar spine BMD in postmenopausal subjects with (32.4%) as osteoporosis and (41.3%) as osteopenia [22] in comparison to current results of this study (30.83%) and (53.33%) respectively. The data of this study was lower than the prevalence rate reported in Saudi Arabia (44.1%) [23] and slightly less than Jordanian (37.5%) [20] And Indian prevalence (37.8%) [24] And higher than Turkish study (16.2%) [25].

This discrepancy in the findings may be related to study design, lifestyle practice, nutritional factor and diagnostic technique used. In this study we examined three areas not two as in other studies for better estimation of BMD but the limitations of this study were the nutritional factors and lifestyle with restricted information and the selected patients from one center. Small number of the patients may be another limitation of this study.

Conclusion

There is a high prevalence of osteopenia and osteoporosis among Iraqi postmenopausal women. Osteoporosis of lumbar spine is more than femurs in both premenopausal and postmenopausal subjects. The highest percentage of normal BMD was recorded in right femur in both groups. Essential measures are needed for public education particularly dietary habit, lifestyle modification and widespread distribution of information about osteoporosis and its prevention.

Recommendations

Essential measures are needed for public education particularly dietary habit, lifestyle

modification and widespread distribution of information about osteoporosis and its

prevention

References

1. Sözen T, Özışık L, Başaran N Ç et al (2017) An overview and management of osteoporosis. *Eur. J. Rheumatol.*, 4: 46-56.
2. Johnell O, Kanis JA (2006) An estimate of the world wide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int.*, 17:1726-1733.
3. Cosman F, de Beur SJ, LeBoff MS, Lewiecki EM, Tanner B, Randall S, et al (2014) Clinician's guide to prevention and treatment of osteoporosis. *Osteoporos Int.*, 25: 2359-81. [Cross Ref.]
4. Binkley N (2006) Osteoporosis in men. *Arq Bras Endocrinol Metabol.*, 50 (4):764-74.
5. Chon KS, Sartoris DJ, Brown SA, et al (1992) Alcoholism-associated spinal and femoral bone loss in abstinent male alcoholics, as measured by dual X-ray absorptiometry. *Skeletal Radiol.*, 21: 431-436.
6. Abushaikh L, Omran S (2013) A survey of osteoporosis risk factors and practices among Jordanian women. *J. Int. Womens Stud.*, 11:153-161.
7. Pisani P, Renna MD, Conversano F, Casciaro E, Paola MD, Quarta E et al (2016) Major osteoporotic fragility fractures: Risk factor updates and societal impact. *World J. Orthop.*, 18 7(3): 171-181.
8. Lee S, Gallaghere D (2008) Assessment methods in human body composition. *Curr Opin Clin Nutr. Metab. Care*, 11(5): 566–572.
9. Cummings SR, Black D (1995) Bone mass measurements and risk of fracture in Caucasian women: A review of findings from prospective studies. *The American journal of medicine*. 98 (2): 24S-8S.
10. Melton LJ, Atkinson EJ, O'Connor MK, O'Fallon WM, Riggs BL (1998) Bone density and fracture risk in men. *Journal of Bone and Mineral Research*, 13 (12): 1915-23.
11. Salamat M, Rostampour N, Shanehsazzadeh S, Tavakoli M, Siavash M, Almasi T (2008) Assessment of bone mineral density with dual energy X-ray absorptiometry in pre-and post-menopausal women. *Iranian Journal of Radiation Research*, 6 (2): 103-7.
12. Pezzuti IL, Kakehasi AM, Filgueiras MT, Guimarães JAD, Lacerda IAC, Silva IN et al (2017) Imaging methods for bone mass evaluation during childhood and adolescence: an update. *J. Pediatr. Endocrinol. Metab.*, 30(5): 485-497.
13. Gorial FI, Aubaese ND, Husaeen NH (2013) Prevalence and associated factors of osteoporosis in post-menopausal Iraqi women: A cross-sectional two centers study. *International Journal of Modern Biology and Medicine*, 3(1): 41-49.
14. Chen Y, Xiang J, Wang Z, XiaoY, Zhang D, Xia Chen X et al (2015) Associations of Bone Mineral Density with Lean Mass, Fat Mass, and Dietary Patterns in Postmenopausal Chinese Women: A 2-Year Prospective Study. *PLOS ONE* | DOI:10.1371/journal.pone.0137097 3.
15. Salamat MR, Salamat AH, Janghorbani M et al (2016) Association between Obesity and Bone Mineral Density by Gender and Menopausal Status. *Endocrinol. Metab.*, 31:547-558.
16. Kanis JA, McCloskey EV, Johansson H, Oden A, Melton LJ 3rd, Khaltayev N (2008). A reference standard for the description of osteoporosis. *Bone*. 42(3): 467-75.
17. Nicks KM, Fowler TW, Akel NS, Perrien DS, Suva LJ and Gaddy D (2010) Bone turnover across the menopause transition The role of gonadal inhibins. *Ann. N. Y. Acad. Sci.*, 1192: 153-160.
18. Sestak I, Singh S, Cuzick J, Blake GM, Patel R, Gossiel F et al (2014) Changes in bone mineral density at 3 years in postmenopausal women receiving anastrozole and risedronate in the IBIS-II bone sub study: an international, double-blind, randomised, placebo-controlled trial. *Lancet Oncol.*, 15: 1460-68.
19. Chain A, Crivelli M, Faerstein E, Bezerra FF (2017) Association between fat mass and bone mineral density among Brazilian women differs by menopausal status: The Pro-Saude Study. *Nutrition*, 33: 14-19.

20. Garg N, Viji Mol G, Sethi D (2018) An epidemiological study to assess bone mineral density and its association with contributing factors among premenopausal and postmenopausal women in selected villages of District Shimla, Himachal Pradesh, India. Garg N et al. Int J Reprod. Contracept. Obstet. Gynecol., 7(2):487-494.
21. Al-Shoumer KA, Nair V (2012) Prevalence of low bone mass in postmenopausal Kuwaiti women residents in the largest province of Kuwait. Arch. Osteoporos. 7:147-53. doi: 10.1007/s11657-012-0092-1. Epub. 1.
22. Hyassat D, Alyan T, Jaddou H, Ajlouni KM (2017) Prevalence and risk factors of osteoporosis among Jordanian postmenopausal women attending the national center for diabetes, endocrinology and genetics in Jordan. Bio Research Open Access, 6.1.
23. Sadat-Ali M, Al-Habdan IM, Al-Mulhim AA, et al (2004) Bone mineral density among postmenopausal Saudi women. Saudi Med. J., 25:1623-1625.
24. Waliullah S, Sharma V, Srivastava R, et al (2014) Prevalence of primary postmenopausal osteoporosis at various sites in Indian females. Int. J. Health Sci. Res., 4:113-117.
25. Demir B, Haberal A, Geyik P, et al (2008) Identification of the risk factors for osteoporosis among postmenopausal women. Maturitas., 60: 253-256.