A STUDY OF OSTEOPOROSIS IN EGYPTIAN PREMENOPAUSAL WOMEN IN URBAN AND RURAL AREAS

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ABSTRACT

Background: Osteoporosis is a systemic skeletal disease characterized by low bone mass with a consequent increase in bone fragility and susceptibility to fracture. With current trends of increase in life expectancy and increasing numbers of elderly women, it is a global public health issue. Moreover, this problem is expected to reach epidemic proportions by 2050.

Aim: The current study investigates the effect of environmental factors on the development of osteoporosis among urban and rural women and its relation with the dietary habits.

Subjects and methods: This was a cross sectional study that included 400 premenopausal women with regular menses and mean age 38.85 ± 3.11 years where half of them were from urban areas and other half were from rural areas. The studied women were recruited from National Nutrition Institute with the exclusion of those with high risk factors for secondary osteoporosis. All participants underwent meticulous medical history. They were all subjected to full examination with anthropometric measures, dietary

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assessment using 24 hours recall and bone density assessment using dual-energy x-ray absorptiometry (DEXA) scan.
Results: There were significant higher values in the urban sample than that of the rural sample in nutrient analysis of 24-hour recall for the following parameters: Kcal, protein, CHO, total lipid, K, P, Zn, Cu, Ca, Mg, Fe, vitamin C, A, B1and B2. However, there was a highly statistically significant difference between rural and urban areas as regard the cause of a previous fracture, the duration of sun exposure and vitamin D intake. Osteoporosis was diagnosed in 4.5% of the studied women and 27.75% had osteopenia.
Conclusion: No difference in the prevalence of osteoporosis between rural (55.6%) and urban (44.4%), nutrient profile was nearly similar in osteoporotic and non-osteoporotic women, obesity protect from osteoporosis.
Recommendation: Future research about osteoporosis among lean women is recommended.
Keywords: Osteoporosis, premenopausal women, T-score, urban and rural areas.

INTRODUCTION

Osteoporosis is a systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture (Reid, 2020). Osteoporosis is a metabolic bone disease that, on a cellular level, results from osteoclastic bone resorption not compensated by osteoblastic bone formation. This causes bones to become weak and fragile, thus increasing the risk of fractures (Föger-Samwald *et al.*, 2020). Osteoporosis is an important, global public health issue, which is especially relevant with an increasing life expectancy and increasing number of elderly women worldwide, and which is expected to reach epidemic proportions by 2050 (Sözen *et al*., 2017).

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Osteoporosis is an asymptomatic disease, for this reason, it has been called the "silent epidemic". It is a mistake to consider that bone loss is accompanied by musculoskeletal pain, and it is relatively common that patients are referred for this reason with the suspicion of osteoporosis, especially women in the peri- or first years of the menopause (Watts, 2018). The risk of fracture increases progressively in women from the time of menopause (generally occurring in women aged 45–55 years) through to the end of life. (Tatangelo *et al.,* 2019). The most common among them being fracture of the vertebrae (spine), proximal femur (hip) and distal forearm (wrist). Hip fractures are associated with an 8.4–36% excess mortality within 1 year (Pai *et al*., 2017).

Distribution of osteoporosis varies across different populations. In developed communities, ranges of 9–38% and 1–8% were reported for females and males, respectively (Wade *et al.,* 2014).

Risk of osteoporosis and its associated complications is one of the important health problems in The Eastern Mediterranean Region (EMR). The EMR countries are experiencing a nutritional transition from traditional diets to an industrialized diet, and a change in lifestyle (e.g., less physical activity), contributing to an increase in the prevalence rate of chronic metabolic diseases, such as obesity, metabolic syndrome, and osteoporosis, in the future years (Hwalla *et al*., 2017).

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In rural areas of Upper Egypt, the prevalence of osteoporosis in postmenopausal women was even higher reaching up to 47.8%. Such high prevalence highlights the magnitude of the problem in terms of public health and the importance of having up-to-date guidelines for the management of osteoporosis in Egypt (Gheita T. and Hammam N. 2018).

Aim of the study: is to study occurrence of osteoporosis among urban and rural women and to study the relation with some environmental factors.

SUBJECTS AND METHODS

Subjects: This was a cross-sectional comparative study. It was carried out at the outpatient clinics of National Nutrition Institute in Egypt during the period from October 2017 to October 2018. The study was carried out on 400 volunteer available premenopausal women divided into two groups: 1) Urban group which was comprised of 200 women having an age ranging from (35 - 42) years with regular menses and 2) Rural group which was comprised of 200 women having an age ranging between (35 - 42) years with regular menses. The inclusion criteria were: 1) an age period of 5 years below the average age of menopause in Egypt (46.7 years) (Sallam *et al*., 2006), 2) regular menses which asked by history and 3) apparently healthy women. The subjects were excluded if having the high-risk factors of secondary osteoporosis which asked by history such as chemotherapy, exposure to radiation, intake of steroids, certain diseases like hyperthyroidism, Cushing' diseases, inflammatory intestinal disease, Celiac disease.

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Methods: All the studied women were subjected to the following:

- History taking according to pre designed questionnaire with special focus on physical activity, age, history of fracture bones, residence, sun exposure, certain drugs e.g., glucocorticoids and certain disease conditions e.g., hyperparathyroidism.
- Dietary assessment using 24 – hour recall method & food frequency analysis. Every surveyed woman was asked to recall the exact foods and beverages intake during the previous 24hours period. Quantities of foods and beverages consumed were estimated in household measures and grams (Cashman, 2002).
- Clinical examination including general examination and anthropometric measures. The anthropometric assessment including weight, height and body mass index (BMI) was made using standardized equipment following the recommendations of World Health Organization (WHO, 2010).
- Bone density assessment using DEXA (dual – energy absorptiometry) (Shen *et al.*, 2004). Bone mineral density (BMD) was measured for all the surveyed candidates by special quantitative densitometer, acting peripherally on calcaneus bone (Norland Medical Systems, Inc-1998) BMD measurements were expressed as T-scores using the World Health Organization criteria (WHO, 1994) and then categorized as normal, low bone mass, or osteoporosis. These criteria define normal bone mass as any T-score above −1.0, low bone mass as T-scores between −1.0 and −2.4 and

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osteoporosis as a T-score of −2.5 or less. Cut-off points of mean peak bone mass for females were 0.635-0.640 g/cm^2. (Nieves *et al.,* 2008).

Statistical Analysis: data were collected, coded, revised and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The data were presented as number and percentages for the qualitative data or as mean, standard deviations and ranges for the quantitative data with parametric distribution and median with interquartile ranges (IQR) for the non-parametric data. Chi-square test, independent t-test and Spearman correlation coefficients were used for the analysis of data. P-value was considered significant when $P < 0.05$.

Ethical Considerations: An informed consent was obtained from all participants before the study according to the rules of Ethical committee in National Nutrition Institute (NNI). The aim of the study, its steps, the potential benefits and hazards were discussed with women. Confidentiality of all data was ensured. Women had the right to withdraw from the study at any time without giving any reason.

RESULTS

Table (1) shows that 99.2% of the studied women were married and 63.2% were literate and house-wife. The majority of them drink coffee (75.5%) where 58.75% drink coffee more than one time /day. The mean age of studied women was 38.85 ± 3.11 years.

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Table (1): Socio-demographic data of the studied women (n=400)

Socio-demographic data	Characteristics		Studied group (N = 400)	
			No.	**%**
Social status	Single		3	0.8
	Married		397	99.2
Education	Illiterate		253	63.2
	Read and write only		87	21.8
	High school		39	9.8
	College degree		21	5.2
Occupation	Worker		145	36.3
	House wife		255	63.7
Residence	Rural		200	50
	Urban		200	50
Special habits	Smoking	Yes	2	0.5
		No	397	99.25
		Stopped	1	0.25
	Caffeine Intake (Tea, Coffee, Cola)	No	98	24.5
		Yes	302	75.5
		▪ Once/day	67	16.75
		▪ >Once/day	235	58.75
Age / years ▪ Mean ± SD Range (Min. - Max.)			38.85 ± 3.11 35 - 42	

Table (2) shows that there was statistically significant difference between rural and urban women regarding time of sun exposure.

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Table (2): Comparison of sun exposure between studied women

Variables	Characteristics	Rural (N=200)	Urban (n=200)	P-value
		No. (%)	No. (%)	
Frequency of sun exposure	Infrequent	18 (9)	32 (16)	0.091
	Daily	156 (78)	152 (76)	
	Weekly	5 (2.5)	1 (0.5)	
	Twice weekly	16 (8)	10 (5)	
Time of sun exposure	Early morning	99 (49.5)	131 (65.5)	0.001*
	sundown	14 (7)	51 (25.5)	
	Both	87 (43.5)	18 (9)	
Duration of sun exposure	< one hour	56 (28)	92 (46)	<0.001**
	>one hour	133 (66.5)	90 (45)	
	Not interested	11 (5.5)	18 (9)	

P > 0.05 non-significant; P≤ 0.05 (*) significant ≤ 0.01 (**) highly significant

Table (3) shows that there was statistically significant difference between rural and urban women regarding: physical activity, shopping, transportation to work, work type and household activities practice.

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Table (3): Comparison of physical activities between studied women

Variables	Characteristics	Rural (N=200)	Urban (n=200)	P-value
		No. (%)	No. (%)	
Physical activity	Yes	190 (95)	179 (89.5)	0.04*
	No	10 (5)	21 (10.5)	
Shopping	Transportation	16 (8)	28 (14)	0.134
	On foot	171 (85.5)	157 (78.5)	
	Both	13 (6.5)	15 (7.5)	
Transportation to work	Not interested	154 (77)	135 (67.5)	0.002*
	On foot	23 (11.5)	15 (7.5)	
	Transportation	23 (11.5)	50 (25)	
Work type	Not interested	163 (81.5)	136 (68)	0.001*
	Movement	26 (13)	32 (16)	
	Office	11 (5.5)	32 (16)	
Household activities	By my self	125 (62.5)	146 (73)	0.025*
	others help	75 (37.5)	54 (27)	

P > 0.05 non-significant; P ≤ 0.05 (*) significant ≤ 0.01 (**) highly significant

Table (4) shows that there was highly statistically significant difference between rural and urban women as regard vitamin D supplements intake. There was statistically significant difference between rural and urban women regarding Bisphosphonate intake. There was no statistical significance between rural and urban women regarding calcium intake.

Table (4): Comparison of nutritional supplements intake between studied women

Nutritional supplements intake	Rural (N=200)	Urban (N=200)	P-value
	No. (%)	No. (%)	
Calcium	0 (0)	2 (1)	0.156
Vitamin D	0 (0)	22 (11.5)	<0.001**
Bisphosphonate	0 (0)	5 (2.5)	0.024*

P> 0.05 non-significant P≤ 0.05 (*) significant≤ 0.01 (**) highly significant

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Table (5) shows that there was highly statistically significant difference between rural and urban women as regard cause of fracture.

Table (5): Comparison of history of previous fractures between studied women

Variables	Characteristics	Rural (N=200)	Urban (N=200)	P-value
		No. (%)	No. (%)	
History of previous fracture	No	162 (81)	164 (82)	0.797
	Yes	38 (19)	36 (18)	
Site of fracture	Femur bone	4 (2)	2 (1)	0.112
	Wrist bone	2 (1)	9 (4.5)	
	Other bones	32 (16)	25 (12.5)	
Cause of fracture	Accident	28 (14)	9 (4.5)	<0.001**
	Sudden fall	10 (5)	27 (13.5)	
Age at fracture	Mean ± SD	23.2 ± 11.5	22.5 ± 11.6	0.795

P> 0.05 non-significant P≤ 0.05 (*) significant≤ 0.01 (**) highly significant

Table (6) shows that there were significant higher values in the urban sample than that of the rural sample as regard of Kcal, protein, CHO, total lipid, K, P, Zn, Cu, Ca, Mg, Fe, vitamins C, A, B1and B2 while for fibers and Na there was no significance difference between the two groups.

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Table (6): Comparison between urban and rural regarding nutrient analysis of 24-hour recall

Nutrients	Urban	Rural	P-value
	Mean ±S. D	Mean ±S. D	
K Cal	3548.1 ± 1039.6	2853.4 ± 812.6	<0.001**(b)
Protein gm	108.95 ± 35.9	79.84 ± 38.3	<0.001** (b)
Total lipid gm	139.14 ± 58.1	115.88 ± 76.3	0.030* (c)
Fiber gm	9.727 ± 3.9	8.776 ± 7.0	0.249 (b)
CHO gm	465.16 ± 140.2	372.89 ± 152.2	<0.001**(c)
Na mg	4852.2 ± 2138.2	2352.95 ± 1841.8	0.311(c)
K mg	3317.26 ± 1096.7	2301.10 ± 1394.0	<0.001** (c)
Ca mg	901.17 ± 403.6	698.46 ± 513.0	0.006* (c)
P mg	1639.93 ± 509.3	1298.27 ± 720.8	<0.001** (c)
Mg mg	264.59 ± 104.8	220.34 ± 176.5	0.039* (c)
Fe mg	20.80 ± 7.1	17.49 ± 14.2	0.043*(c)
Zn mg	15.80 ± 5.0	11.80 ± 6.4	<0.001**(c)
Cu mg	1.68 ± 0.5	1.26 ± 0.7	<0.001**(c)
Vitamin A ug	345.8 ± 383.5	213.2 ± 182.2	0.003*(c)
vitamin C mg	25.9 ± 22.5	17.6 ± 16.1	0.012*(c)
vitamin B1 ug	1.94 ± 0.7	1.50 ± 0.9	<0.001**(c)
vitamin B2 ug	1.7155 ± 1.0	1.2099 ± 0.5	<0.001**(c)

(b) Student t- test (c) Mann-whitney test

P > 0.05 non-significant; P ≤ 0.05 (*) significant; P ≤ 0.01 (**) highly significant

Table (7) shows that median of BMD and T score were -0.45 and -0.6 respectively. Osteoporosis was diagnosed in 4.5% of the studied women and 27.75% had osteopenia.

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Table (7): DEXA results and prevalence of osteoporosis within the studied women

DEXA results	Studied women (N=400)	
	Mean ± S.D	**Median (IQR)**
Bone mineral density BMD g/cm^2	0.46 ± 0.086	0.45 (0.4-0.49)
T- score	-0.49 ± 1.6	-0.6 (-1.3-0.2)
T-score classification: ▪ T≥-1 (normal) ▪ -1>T > -2.5 (osteopenia) ▪ T≤-2.5 (osteoporosis)	**Studied women**	
	NO.	**%**
	271 111 18	67.75 27.75 4.5

Table (8) shows that there was no statistically significant relation between osteoporosis and age, location, social status, education, occupation, smoking and caffeine intake.

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Table (8): Relation between osteoporosis and socio-demographic data in the studied women (n=400)

Variables	Characteristics	Osteoporotic women (n=18) No. (%)	Non-osteoporotic women (n=382) No. (%)	P-value
Residence	Rural	10 (55.6)	190 (49.7)	0.630[a]
	Urban	8 (44.4)	192 (50.3)	
Social status	Married	18 (100)	379 (99.2)	0.706[a]
	Single	0 (0)	3 (0.8)	
Education	Literate	9 (50)	244 (63.9)	0.622[a]
	Read and write only	5 (27.8)	82 (21.5)	
	High school	3 (16.7)	36 (9.4)	
	College degree	1 (5.5)	20 (5.2)	
Occupation	Work	6 (33.3)	139 (36.4)	0.792[a]
	House wife	12 (66.7)	243 (63.6)	
Smoking	Yes	0 (0)	2 (0.5)	0.931[a]
	No	18 (100)	379 (99.2)	
	Stopped	0 (0)	1 (0.3)	
Caffeine intake (Tea, Coffee, Cola)	Yes	12 (66.7)	290 (75.9)	0.373[a]
	No	6 (33.3)	92 (24.1)	
Age (years)		39.14 ± 3.67	38.8 ± 3.09	0.684[b]

(a) Chi-square test; (b) Student's t- test; P > 0.05 non-significant relation

Table (9) shows that there was highly statistically significant relation between osteoporosis and sun exposure, where the majority of non-osteoporotic women had daily exposure to sun.

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Table (9): Osteoporosis and some lifestyle factors in the studied women (n=400)

Variables	Items	Osteoporotic women (n=18) No. (%)	Non-osteoporotic women (n=382) No. (%)	P-value
Sun exposure	Infrequent	8 (44.4)	52 (13.6)	<0.001**[a]
	Daily	10 (55.6)	298 (78)	
	Twice weekly	0 (0)	26 (6.8)	
	weekly	0 (0)	6 (1.6)	
Time of sun exposure	Per nine	6 (33.3)	224 (58.6)	0.052[a]
	Per sundown	1 (5.6)	31 (8.1)	
	Both	11 (61.1)	127 (33.2)	
Work type	Not interested	16 (88.8)	283 (74.1)	0.365 [a]
	Movement	1 (5.6)	57 (14.9)	
	Office	1 (5.6)	42 (11)	
Physical activity	Yes	17 (94.4)	352 (92.1)	0.722[a]
	No	1 (5.6)	30 (7.9)	

(a) Chi-square test ; P > 0.05 non-significant relation

(**) highly significant relation; (*) significant relation

Table (10) shows that there was highly statistically significant relation between osteoporosis and T score where the majority of non-osteoporotic women had higher T-score. There was statistically significant relation between osteoporosis and fracture history and bone mineral density (BMD).

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Table (10): Osteoporosis and bone health status in the studied women (n=400)

Variables	Items	Osteoporotic women (n=18) No. (%)	Non-osteoporotic women (n=382) No. (%)	P-value
Fracture history	Yes	1(5.6)	73 (19.1)	0.148 [a]
	No	17 (94.4)	309 (80.9)	
Variables		**Osteoporotic women (n=18) Mean ± SD**	**Non-osteoporotic women (n=382) Mean ± SD**	**P-value**
Bone mineral density BMD g/cm		0.39 ± 0.094	0.47 ± 0.08	0.012*[c]
T- score		-4.2 ± 1.28	-0.3 ± 1.39	<0.001**[c]

(a) Chi-square test; (c) Mann-Whitney test; P > 0.05 non-significant relation (**) highly significant relation; (*) significant relation

Table (11): shows that there was statistically significant relation between osteoporosis and and BMI where osteoporosis was related to reduced BMI.

Table (11): Relation between osteoporosis and BMI in the studied women (n=400)

Variables	Responses	Osteoporotic women (n=18) No. (%)	Non-osteoporotic women (n=382) No. (%)	P-value
BMI kg/m^2	Normal	6 (33.3)	41 (10.7)	0.01*[a]
	Overweight	2 (11.1)	97 (25.4)	
	Obese	10 (55.6)	244 (63.9)	
Variables		**Osteoporotic women (n=18) Mean ± SD**	**Non-osteoporotic women (n=382) Mean ± SD**	**P-value**
BMI kg/m^2		29.7±7.6	34.1±10.2	0.03*[b]

(a) Chi-square test; P > 0.05 non-significant relation; (*) significant relation

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Table (12) shows that there was no statistically significant relation between osteoporosis and different analyzed nutrients.

Table (12): Relation between osteoporosis and nutrient analysis of 24-hour recall in the studied women (n=400)

Nutrients	Osteoporotic women (n=18)	Non-osteoporotic women (n=382)	P-value
	Mean ±S. D	Mean ±S. D	
K cal	2424.9 ± 1125.96	3119.9 ± 985.3	0.328 (c)
Protein gm	97.71 ± 32.41	84.24 ± 44.39	0.864 (c)
Total lipid gm	100.97 ± 20.1	131.01 ± 83.85	0.499 (c)
Fiber gm	6.17 ± 3.73	8.85 ± 6.91	0.632 (c)
CHO gm	281.14 ± 210.2	401.1 ± 169.7	0.309 (c)
Na mg	4009.3 ± 1589.7	3589.98 ± 2373.46	0.660 (c)
K mg	2432.1 ± 872.3	2467.8 ± 1505.6	0.985 (c)
Ca mg	793.5 ± 589.1	733.7 ± 425.8	0.955 (c)
P mg	1461.37 ± 416.3	1324.01 ± 700.1	0.909 (c)
Mg mg	211.7 ± 37.58	229.3 ± 151.5	0.955 (c)
Fe mg	18.3 ± 8.6	16.5 ± 9.5	0.674 (c)
Zn mg	14.3 ± 7.5	12.01 ± 6.6	0.879 (c)
Cu mg	14.34 ± 7.5	1.27 ± 0.7	0.618 (c)
Vitamin A ug	409.1 ± 149.04	259.6 ± 360.3	0.115(c)
vitamin C mg	8 ± 6.9	15.7± 18.7	0.674 (c)
vitamin B_1 ug	1.53 ± 0.9	1.56 ± 0.9	0.97 (c)
vitamin B_2 ug	1.8 ± 0.49	1.35 ± 0.6	0.166 (c)

(c) Mann-Whitney test; P > 0.05 non-significant relation

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DISCUSSION

Osteoporosis is a highly prevalent health concern worldwide that has a major impact on individual and community in terms of pain and disability, quality of life, and economic costs (Compston *et al.*, 2019). It is a hidden disease since the symptoms typically do not appear until the occurrence of a broken bone and even minor stress may induce fractures when BMD is decreased (Chen *et al*., 2016). Osteoporosis has traditionally been considered a disorder of postmenopausal women, but low bone mass and accelerated bone loss can also occur early in life causing premenopausal osteoporosis. There are a few risk factors that increase a woman's risk of premenopausal osteoporosis, including inadequate nutrition, physical inactivity, hormonal, drugs, and medical diseases (Cheng and Gupta, 2013). Urban and rural differences in lifestyles, especially dietary patterns and physical activity could lead to BMD differences (Matsuzaki *et al*., 2015). Most of the previous studies were done to assess osteoporosis in postmenopausal women; some of them included both premenopausal and postmenopausal women, and few studies were available for premenopausal women only (Pepe *et al.,* 2020). Therefore, this study was conducted to estimate the prevalence of osteoporosis in premenopausal women and investigates the effect of environmental factors and dietary habits on the development of osteoporosis among urban and rural premenopausal women.

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Regarding prevalence of osteoporosis, it was found that 4.5% of the studied premenopausal women had osteoporosis (T score ≤-2.5) and 27.75% of them had osteopenia (-1>T score>-2.5) while the majority of participants (67.75%) were normal (T score ≥-1). Median (IQR) of BMD and T score were 0.45 (0.4-0.49) and -0.6 (-1.3-0.2) respectively. There was highly statistically significant positive correlation between T-score and BMD in premenopausal women in rural and urban areas. In agreement with our study, a retrospective cross-sectional study conducted in Egypt included premenopausal women revealed that a highly statistically significant association was detected between T-score and BMD, however, a higher prevalence was reported where osteoporosis was 10.5% and osteopenia was 42.5% (Hassan *et al*., 2020). This higher prevalence can be attributed to inclusion of those had risk of secondary osteoporosis and may be due to different referral centers, whereas a recent cross sectional in China found that the prevalence of osteoporosis among adults' women 40 years or older was 20.6% (Wang *et al.,* 2021). This higher prevalence can be due to inclusion of both premenopausal and postmenopausal women in addition to different population. On the other hand, a Saudi cross-sectional study of premenopausal women aged 20–50 years revealed that osteopenia was in 46.1% of them, with no osteoporosis had been diagnosed by using DEXA scan (Zareef *et al*., 2021). This difference may be referred to variation in the studied population.

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Regarding rural and urban areas, it was found that there was no statistically significant difference between rural and urban areas regarding occurrence of osteoporosis (P=0.630) where 55.5% (10/18) of osteoporotic women were from rural areas and 44.4% (8/18) of them were from urban areas. This indicates that residence does not affect occurrence of osteoporosis among the studied premenopausal women. Similarly, a cross-sectional study included participants from urban and rural areas in Thai aged > 20 years, demonstrated that no difference between women from urban rural in lumber spine BMD (Pongchaivaikul *et al,* 2005). Conversely, a systematic review and meta-analysis to determine the prevalence of osteoporosis in China and to characterize its epidemiology concluded that osteoporosis prevalence was higher in rural than in urban areas (20.87 % vs. 23.92 %) (Chen *et al.,* 2016). This difference may be due to ethnicity variations and inclusion of both premenopausal and postmenopausal women. According to a cross-sectional survey to determine the prevalence of osteoporosis and related factors in Vietnamese adult women free of illnesses affecting bone metabolism by using quantitative ultrasound revealed that among premenopausal women, the crude prevalence of osteoporosis was higher in the urban areas compared with the rural areas (Vu *et al.,* 2005). This difference can be explained by different tools used in determining bone density.

Regarding socio-demographic data, it was demonstrated that there was no statistically significant relation between osteoporosis and age, social status,

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education, occupation and smoking. Similarly, Saudi cross-sectional study included premenopausal women reported that no significant association was found between BMD and age, physical activity, parity, and smoking (Zareef *et al.,* 2021). In contrast with an Indian study done by Shatrugna and colleagues (2007) included women matched in anthropometric measures, gravidity and calcium intake concluded that occupational activities affect bone mass. Whereas, a cross-sectional study in Poland included women aged 30–79 years found that age has strong negative independent associations with lumbar spine BMD (Filip *et al.,* 2005). The difference can be explained by different ethnicity and these studies included both premenopausal and postmenopausal women.

Regarding physical activity, which include transportation to work, work type and household activities practice among the studied premenopausal women, it was observed that 92.25% practiced physical activity, 82% did shopping on foot and 67.7% did household activities by themselves. There was statistically significant difference between rural and urban areas regarding physical activity, but no significant relation between osteoporosis and any of these variables. This indicates that physical activity couldn't affect bone density of this population and this may be attributed to small sample size, type of exercise performed and infrequent sport practicing. Similarly, a cross-sectional study in Poland of risk factors of osteoporosis that included

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rural and urban women aged 30–79 years found that level of physical activity had insignificant association with BMD (Filip *et al.,* 2005).

Regarding dietary intake, with 24-hour recall analysis among the studied premenopausal women it was showed that median (IQR) daily dietary protein and calcium were 91.1 (46.7-109.66) gm and 676.03 (413.9-960.4) mg respectively where osteoporosis was not significantly associated with any daily nutrient intake. In rural areas, protein intake was significantly associated with osteoporosis (P=0.005). Similarly, a cross-sectional study in Poland of risk factors of osteoporosis that included 900 rural and urban women aged 30–79 years found that dietary calcium intake and coffee consumption not significantly associated with BMD (Filip *et al.,* 2005). On the other hand, a cross sectional study among premenopausal Saudi women showed that median (IQR) of calcium intake included both dietary and supplement was 702.7 (469.6–981.2) mg/day estimated using the semi-quantitative Food Frequency Questionnaire where it was found that there was a statistically significant relationship between BMD at the lumbar spine and calcium intake (Zareef *et al.,* 2021).

CONCLUSIONS AND RECOMMENDATIONS

Prevalence of osteoporosis was 4.5% in the studied women while that of osteopenia was 27.75% with no difference between rural and urban areas. There were significant higher values in the urban sample than that of the rural sample as regard most of dietary intake, which in turn need more effort to

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organize campaigns for nutritional education among rural areas. Sun exposure has a significant effect in protecting against osteoporosis in premenopausal women.

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دراسة هشاشة العظام في المرأة المصرية قبل انقطاع الطمث في المناطق الحضرية والريفية

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المستخلص

الخلفية: هشاشة العظام هو مرض يتميز بانخفاض كتلة العظام مما يؤدي إلى قابليتها للكسر. في الوضع الحالي يوجد زيادة في متوسط العمر المتوقع وزيادة عدد المسنات ولذلك أصبحت هشاشة العظام مشكلة صحية عامة عالمية. علاوة على ذلك من المتوقع أن تصل هذه المشكلة إلى أبعاد وبائية بحلول عام ٢٠٥٠.
الهدف: تبحث الدراسة الحالية في تأثير العوامل البيئية على تطور مرض هشاشة العظام بين نساء مصريات في الحضر والريف وعلاقته بالعادات الغذائية وعوامل أخرى.
طريقه البحث: كانت هذه دراسة مقطعية شملت ٤٠٠ امرأة في فترة ما قبل انقطاع الطمث لديهن حيض منتظم ومتوسط العمر ٣٨,٨٥ ± ٣,١١ سنة حيث كان نصفهن من المناطق الحضرية والنصف الآخر من المناطق الريفية. تم اختيار النساء الخاضعات للدراسة من المعهد القومي للتغذية مع استبعاد اللاتي لديهن عوامل خطر عالية لهشاشة العظام الثانوية. تم أخذ التاريخ الطبي للمشاركات في البحث مع التركيز على التاريخ الإنجابي وتاريخ الأدوية والتاريخ العائلي لهشاشة العظام والتعرض لأشعة الشمس والنشاط البدني واستهلاك القهوة وتدخين السجائر وتناول فيتامين د وتاريخ الكسور. بالإضافة إلى ذلك فقد خضعن لفحص كامل مع مقاييس الجسم البشري، وتقييم غذائي باستخدام استدعاء لمدة ٢٤ ساعة وتقييم كثافة العظام باستخدام مسح امتصاص الأشعة السينية ثنائي الطاقة. .(DEXA)

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النتائج: كانت هناك دلالة إحصائية في العينة الحضرية أعلى من تلك الخاصة بالعينة الريفية في تحليل المغذيات لاسترجاع ٢٤ ساعة للمحددات التالية: السعرات الحرارية، البروتين، الكربوهيدرات، إجمالي الدهون، البوتاسيوم، الفوسفور، الزنك، النحاس، الكالسيوم، الماغنسيوم، الحديد، فيتامين ج، أ، ب١ وب٢. ومع ذلك كان هناك فرق ذو دلالة إحصائية عالية بين المناطق الريفية والحضرية فيما يتعلق سبب كسر سابق، ومدة التعرض للشمس وتناول فيتامين د. تم تشخيص هشاشة العظام في ٤,٥٪ من النساء الخاضعات للدراسة و ٢٧,٧٥٪ مصابات بقلة كثافة العظام.
الخلاصة: بلغ معدل انتشار هشاشة العظام ٤,٥٪ عند النساء اللاتي أجريت عليهن الدراسة بينما كان انتشار هشاشة العظام ٢٧,٧٥٪ مع عدم وجود فرق بين المناطق الريفية والحضرية. كانت هناك قيم أعلى بكثير في العينة الحضرية من تلك الخاصة بالعينة الريفية فيما يتعلق بالعادات الغذائية، والذي يحتاج بدوره إلى مزيد من الجهد لتنظيم حملات التثقيف الغذائي في المناطق الريفية. يرتبط ترقق العظام عند النساء في فترة ما قبل انقطاع الطمث بنقص تناول فيتامين د وعدم التعرض لأشعة الشمس حيث انخفض تطوره مع تناول فيتامين د والتعرض اليومي للشمس. وعليه فإن تناول فيتامين د والتعرض لأشعة الشمس له تأثير كبير في الحماية من هشاشة العظام عند النساء في فترة ما قبل انقطاع الطمث.

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