Risk factors and Prevalence of Osteoporosis amidst Postmenopausal females turning up the Diabetes and Endocrinology clinic at Azadi Teaching Hospital at Kirkuk /Iraq

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Abstract: for estimation the prevalence of osteoporosis and osteopenia amidst Iraqi postmenopausal females turning up the Azadi Teaching Hospital's Diabetes and Endocrinology clinic, as well as the relevant venture agents. A descriptive cross-sectional treatise was carried out in a diabetic and endocrinology clinic in Kirkuk, Iraq. An aggregate of 1085 Iraqi postmenopausal females at age 45 to 84 years old were enrolled in this study, which took place between April 2019 and April 2021. The bone mineral density of all patients was measured using a dual-energy X-ray absorptiometry (DEXA) scan. According to World Health Organization recommendations, the DEXA scan was explicated in idioms of T score. Osteoporosis and osteopenia were found to be prevalent in 37.5 percent and 44.6 percent of the population, respectively. The lumbar spine had the highest incidence of osteoporosis (32.40 %), chased via the left femoral neck (14.40 %), and the left femoral neck had the highest frequency of osteopenia (56.10 %), the lumbar spine (41.30 %). Extended menopausal scope, ordinary or overweight BMI, elevated parity, corporal inactivity, affirmative family history of osteoporosis, inconvenient sun exposition, elevated diurnal cafe utilization, low diurnal utilization of calcium, with delayed menarche age were whole linked to osteoporosis. Females with type 2 diabetes, on the other hand, had a decreased incidence of osteoporosis. Iraqi postmenopausal females have a significant frequency of osteoporosis and osteopenia. More generic instruction plus a better publicizing of knowledge about osteoporosis and its prohibition are required.

Key word: Kirkuk; prevalence; osteoporosis and osteopenia ; venture agents; type 2 diabetes mellitus

Introduction

Each year, osteoporosis gives rise to more than 8.9 million fractures internationally, with an osteoporotic fracture occurring each three seconds. [1] females are at an increased venture of developing osteoporosis, which affects an estimated 200 million females globally.[2] Shilbayeh [3] discovered that the universal percentage of osteoporosis amidst females in Jordan was 30% regardless of menopausal state, and 43.30 percent amidst postmenopausal females. Furthermore, found that the prevalence of osteoporosis was 13.50% with running age amidst a pattern of Jordanian females divert to investigations about osteoporosis; hypertension, diabetes mellitus, and renal problems plus age at menarche, were each historically correlated with an accelerarion of venture of osteoporosis. [4] During their lifetime, half of each postmenopausal females will suffer an osteoporotic-associated fractures, 25% of these females will develop a vertebral disfigurement, and 15% will suffer from a fracture of hip . [5] females account for about 75% of all hip fractures, which are stationary accompanied with disability, persistent pain, decreased motility, increased reliance, and the risk of subsequent fractures. Furthermore, hip fractures caused by osteoporosis are linked to an increased risk of death. The mortality rate after fracture

of hip is as high as 20-25% in the first year. Female genus, age, ethnicity, fumigation, family history of osteoporosis, deficiency of vitamin D, slash calcium ingestion and high caffeine intake, immobility and sedentary life style , raised age at menarche, premature menopause, and underweight (BMI is low) are all venture agents for osteoporosis. [7,8] the relation between osteoporosis and Diabetes mellitus is complicated . Type one diabetes mellitus (T1DM) is a type of diabetes that affects people of all ages.

Slash bone mineral density (BMD) is caused by poor amounts of IGF-1 and insulin in the blood, and it commonly take places in young children before they reach their maximal bone mass. While type 2 diabetes mellitus (T2DM) is common in adults who have already reached their peak bone mass, the impact of T2DM on BMD is debatable; it could be accelerated, decelerated, or remained unchanged. [9,10]. The treatise's Objectives: For estimation the prevalence of osteoporosis and osteopenia amidst postmenopausal females turning up a Diabetes and Endocrinology clinic, as well as the potential venture agents associated with them.

Materials and Procedures:

Data collecting and sampling: A cross-sectional treatise was conducted in the clinic for diabetes and endocrinology at Azadi Teaching Hospital in Kirkuk, Iraq, between April 2020 and April 2021. All women over the age of 45 years, who had been menopausal for more than a year and had their BMD measured by dual-energy X-ray absorptiometry (DEXA) at our facility throughout the treatise duration, were qualified to debate. Patients with T1DM, malignancy, uncontrolled hypothyroidism, hyperthyroidism, primary or secondary hyperparathyroidism, rheumatoid arthritis, systemic lupus erythromatosis(SLE), epilepsy, renal failure, Cushing syndrome, cirrhosis, and premature menopause (45 years old), or patients on one or more of the following drugs: warfarin, heparin and thiazolidinedione.

The patient's medical record and a constitutional oppositional questionnaire conducted over the direct interview. In addition, The medical file was utilized to compile datum on actual age at estimation of BMD , marital state, instructional level, menopause interval, age at menopause and menarche starting, parity, figure of abortions and pregnancies, breast feeding, years of menstruation, diabetes situation and interval, hypertension situation and utilizing of vitamin D3 addendum or Statin , height and weight.

Considerations of morality: The ethical committee of Azadi Teaching Hospital's Diabetic and Endocrinology Clinic accepted the study protocol. Through phone calls and verbal exchanges Patients gave their assent after being told that their data would be kept private and used only for scientific study.

The treatise variables' definitions: Analyses in the lab and measurements The quotient of weight (kg) and height squared was used to calculate the body mass index (BMI) (m2). Patients were categorized. According to BMI, the American Diabetes Association (ADA) approved the World Health Organization's (WHO) recommendation (ADA).(11)

Smoking was prohibited: According to WHO standards from 1998, there are three categories: a current smoker is someone who smokes cigarettes on a daily or irregular basis. Nonsmoker: a person who has never fumigated or has fumigated very slight at the former; past-smoker: a

person who used to smoke diurnally or sometime but no longer does; and past-smoker: a personage who used to smoke diurnal or occasionally but no longer does.(12)

Corporal activity was defined as "the leisure time spent doing any type of moderate-intensity aerobic physical exercise for at least thirteen minutes five days a week." "Immobilization" was described as "I've been in bed for more than two months." or "being restricted to a single position." (14)

According to the ADA 2014, pre-diabetes and diabetes were diagnosed. Furthermore, diabetes was considered controlled if the patient's HbA1c was less than 7.0 percent, moderately controlled if the HbA1c was between 7 and 7.9%, and uncontrolled if the HbA1c was greater than 8%. In adults, sun exposure was described as "daily exposure of the face, arms and hands to the sun for 10–15 minutes (denudation and wanting sun screen)". 15 Caffeine utilization was calculated as the mean diurnal consumption of tea, coffee, caffeinated soft drinks, ice coffee and chocolate at a lifetime. There are various sorts of coffee, including instant, brewed, and Turkish coffee. Each cup (8 oz. of brewed coffee has 85mg caffeine), (8 oz. of instant coffee contains 75mg caffeine), (8 oz. of brewed tea contains 40mg caffeine), and the caffeine content was approximated in milligrams per day depend on numbers from the International Food Information Council Foundation Review16 (12 oz. of cola contains 40mg caffeine). The average amount of caffeine in a cup of Turkish coffee (40 mL) is 165 mg. At the time of data analysis, 17 lifetime daily caffeine intake was categorized into two groups: 0, low caffeine intake (£300mg/day), and 1, high caffeine intake (>300mg/day). 18

Via deducting the age at menopause from the running age at BMD assessment, the duration of menopause was determined. The number of years of menstruation was determined as follows: the age variation between menopause and menarche in years. DEXA (Hologic Discovery A Scanner) was used to evaluate BMD at the lumbar spine L1–L4 (anterior– posterior projection) and left femoral neck, and the results were represented as g/cm2. Only the value of T-score was used for evaluation, as indicated by the WHO diagnostic classification19, which divided the patients into three groups: normal BMD was defined as (T-score at or above 1.0), osteopenia (poor bone mass) as (T-score between 1.0 and 2.5), and osteoporosis as (T-score at -2.5 or less). Vitamin D3 concentrations in the blood were measured using a radioimmunoassay (BIOSOURCE Europe S.A., Nivelles, Belgium) and were divided into three categories: vitamin D deficiency (>20 ng/mL), vitamin D insufficiency (20–29 ng/mL), and vitamin D adequate (30 ng/mL). 2

Analytical statistics: The Statistical Program for Social Sciences (SPSS) version 20.0 was used to analyze the data. Data was checked for data entry mistakes and outlier values, and any problems were fixed as needed. The prevalence of osteoporosis in the general population was determined. The Chi-square test and the t-test were used to analyze the statistical significance of the bivariate correlation between osteoporosis and a variety of factors. A statistically significant p value of 0.05 was used.

Results : Characteristics of Participants The participants in treatise were 1085 postmenopausal females between the ages of 45 and 85, with a mean age (standard deviation) of 61.1 (7.2). Family history of fragility fractures and osteoporosis, perior personal fragility fractures, lifestyle, and other sociodemographic, reproductive, and clinical characteristics, as well as

sociodemographic, reproductive, and clinical characteristics, sociodemographic, reproductive, and clinical characteristics, sociodemographic, reproductive, and clinical characteristics.

Table 1 shows the frequency distribution of the treatise pattern via sociodemograghic, clinical, lifestyle, reproductive, and laboratory characteristics, as well as health (Personal History of Previous Fracture, , Family History of Fragility Fracture, and Family History of Osteoporosis).

variable	Number (%)
running age at BMD (years)	
<60	**491 (45.20)**
>/= 60	**594 (54.80)**
Matrimonial state	
celibate	**88 (8.00)**
wedded	**976 (90.30)**
Divorced or widowed	**21 (1.80)**
Instructional level	
Basic instruction	**299 (27.50)**
Intermediate instruction	**223 (20.50)**
Advanced instruction	**563 (52.00)**
BMI(kg/m^2)	
Normal	**98 (8.70)**
Overweight	**325 (29.70**
obese	**662 (61.60)**
fumigation	
not fumigate	**925 (85.40)**
running fumigate	**160 (14.60)**
Corporal activity	
yes	**436 (40.10)**
no	**649 (59.90)**
Exposition to sun	
yes	**515 (47.50)**
no	**570 (52.50)**
Life time diurnal caffeine(mg/day)	
</=300	**518 (47.70)**
>300	**567 (52.30)**
Ingestion of calicium	
<600	**335 (30.90)**
600-1000	**478 (4.10)**
>1000	**272 (25.00)**
Presence of diabetes mellitus	
No DM	**147 (14.40)**
Pre-DM	**406 (37.70)**
DM	**532 (49.10)**
Duration of diabetes Mellitus	
<5 years	**176 (34.7)**
5-9 years	**131 (25.70)**
>/=10 years	**201 (39.60)**
Statin utilization	
yes	**736 (67.90)**
no	**349 (32.10)**
Presence of hypertension	
yes	**696 (64.10)**
no	**389 (35.80)**
Vitamin D3 usage	
Yes	**967 (89.30)**
no	**118 (10.70)**
solidification	
yes	**31 (2.60)**
no	**1054 (97.40)**
HbA1c	
Good Controlled(<7)	**262 (49.30)**
Fairly controlled(7-7.9)	**142 (26.60)**

Poor controlled(>/=8)	**129 (24.10)**
Parathyroid hormone(pg/ml)	
</=55	**515 (66.30)**
>55	**263 (33.70)**
Vitamin D3 level(ng/ml)	
Normal (>/=30)	**695 (61.80)**
Insufficiency (20-29)	**185 (18.1)**
Deficiency (<20)	**205 (20.10)**
Age at menopause (years)	
</=50	**670 (61.80)**
>50	**415 (38.20)**
Menopausal duration when DXA curried out	
</=5 years	**285 (26.20)**
6-10 years	**270 (24.80)**
>/=11 years	**530 (48.90)**
Age at menarche (year)	**Mean+/-SD=13.71+/-1.58**
Years of menstruation	**Mean+/-SD=36.12=+/-3.58**
Number of Parity	
</=2	**212 (19.50)**
3-5	**466 (43.00)**
>/=6	**407 (37.50)**
Number of Abortion	
None	**540 (49.90)**
1-2	**420 (38.70)**
3 &more	**125 (11.40)**
Breast feeding	
yes	**857 (79.10)**
no	**228 (20.90)**
Family history of osteoporosis	
negative	**742 (68.50)**
positive	**343 (31.50)**
Family history of fragility fracture	
negative	**820 (75.70)**
positive	**265 (24.30)**
Individual history previous fragility fracture	
Negative	**877 (81.00)**
positive	**208 (19.00)**

table 2 shows that 32.40% of the entrants had osteoporosis of lumber spine, put up with the left femoral neck (14.40%), while the prevalence of osteopenia was notified high at the left femoral neck (56.10%) put up with the lumbar spine (41.30%).

Table 2. Prevalence of Osteopenia and Osteoporosis Amidst Postmenopausal females (No. 1085)

	Normal (%)	**Osteopenia (%)**	**Osteoporosis (%)**
Total	**17.89**	**44.58**	**37.53**
Lumbar spine	**26.2**	**41.3**	**32.4**
Femoral neck	**29.6**	**56.1**	**14.4**

Chi-square distribution was utilized to evaluate the loose distribution of osteoporosis by particular treatise variables. As signalized in Table 3.

Table 3. Chi-Square Distribution and degree of prominence of Osteoporosis via special sociodemograghic and Health mutable (number = 1085)

variable	**Normal no. (%)**	**Osteoporosis no. (%)**	**P value**
running age at BMD (years)			**0.000**
<60	**343 (69.9)**	**149 (30.1)**	
>/= 60	**334 (56.3)**	**259 (43.7)**	
Marital status			**0.002**

Single	**42 (47.7)**	**46 (52.3)**	
Married	**626 (64.2)**	**350 (35.8)**	
Divorced or widowed	**9 (42.1)**	**12 (57.9)**	
instruction			**0.089**
<secondary school	**171 (57.2)**	**128 (42.8)**	
secondary school	**142 (63.8)**	**81 (36.2)**	
>secondary school	**364 (64.6)**	**199 (35.3)**	
BMI (kg/m^2)			**0.000**
Normal	**43 (44.7)**	**53 (55.3)**	
Over weight	**167 (51.7)**	**156 (48.3)**	
obese	**462 (70.1)**	**197 (29.9)**	
Smoking			**0.261**
Never smoke	**582 (62.9)**	**344 (37.1)**	
Current smoke	**95 (59.9)**	**64 (40.1)**	
Physical activity			**0.000**
No	**369 (56.8)**	**281 (43.2)**	
yes	**309 (70.9)**	**128 (29.1)**	
Sun exposure			**0.000**
No	**323 (56.6)**	**248 (43.4)**	
yes	**354 (68.9)**	**160 (31.1)**	
Life time diurnal caffeine(mg/day)			**0.015**
</=300	**433 (66.2)**	**175 (33.8)**	
>300	**334 (59)**	**232 (41)**	
Ingestion of calicium			**0.013**
<600	**188 (56.2)**	**147 (43.8)**	
600-1000	**307 (64.3)**	**171 (35.7)**	
>1000	**182 (67.0)**	**90 (33.0)**	
Diabetic status			**0.003**
No	**76 (51.7)**	**61 (48.3)**	
Pre-DM	**247 (60.9)**	**159 (39.1)**	
DM	**354 (66.6)**	**178 (33.4)**	
Duration of diabetes (years)			**0.045**
<5	**130 (74.1)**	**46 (25.9)**	

5-9	**85 (65.1)**	**46 (34.9)**	
>/=10	**125 (62.3)**	**76 (37.7)**	
use of statin			**0.337**
no	**211 (60.4)**	**139 (39.6)**	
yes	**466 (63.4)**	**269 (36.6)**	
Hypertension			**0.295**
No	**235 (60.4)**	**155 (39.6)**	
yes	**466 (63.4)**	**253 (36.6)**	
Use of vitamin D3			**0.325**
No	**69 (58.3)**	**50 (41.7)**	
yes	**608 (63.0)**	**358 (37.0)**	
Immobilization			**0.556**
No	**660 (62.6)**	**395 (37.4)**	
yes	**17 (57.1)**	**13 (42.9)**	
HbA1c			**0.403**
Good Controlled(<7)	**131 (66.5)**	**88 (33.5)**	
Fairly controlled(7-7.9)	**91 (70.0)**	**43 (30.0)**	
Poorly controlled(>/=8)	**80 (62.2)**	**49 (37.8)**	
Parathyroid hormone(pg/ml)			**0.038**
</=55	**327 (63.5)**	**189 (36.5)**	
>55	**146 (55.8)**	**116 (44.2)**	
Vitamin D3 level(ng/ml)			**0.279**
Normal (>/=30)	**378 (60.4)**	**248 (39.6)**	
Insufficiency (20-29)	**117 (63.4)**	**68 (36.6)**	
Deficiency (<20)	**136 (66.5)**	**69 (33.5)**	
Age at menopause (years)			**0.390**
</=50	**412 (61.5)**	**259 (38.5)**	
>50	**265 (64.1)**	**149 (35.9)**	
Menopausal duration at time of DXA performing			**0.000**
</=5	**212 (74.6)**	**73 (25.4)**	
6-10	**167 (61.9)**	**103 (38.1)**	
>/=11	**280 (56.2)**	**232 (43.8)**	
Parity			**0.052**

</=2	126 (59.5)	86 (40.5)	
3-5	310 (66.6)	156 (33.4)	
>/=6	241 (59.3)	166 (40.7)	
Abortion			0.752
None	343 (63.6)	197 (36.4)	
1-2	257 (61.2)	163 (38.8)	
3 &more	77 (61.8)	48 (38.2)	
Breast feeding			0.186
No	134 (58.7)	95 (41.3)	
yes	543 (63.5)	313 (36.5)	
Family history of osteoporosis			0.000
No	494 (66.6)	249 (33.4)	
yes	183 (53.5)	159 (46.5)	
Family history of fragility fracture			0.000
No	540 (65.9)	281 (34.1)	
yes	137 (51.9)	127 (48.1)	
Personal of perior fragility fracture			0.001
No	569 (64.9)	309 (35.1)	
yes	108 (52.2)	99 (47.8)	

Discussion

The prevalence of osteoporosis amidst postmenopausal females coming a diabetes and Endocrinology visiting clinic was 37.50% in this treatise. This result was greater than the 16.20% prevalence average recorded in Turkey[21], which was equivalent to the 37.80 % prevalence rate reported in India[22], but less than the 44.10% prevalence average informed at kingdom of Saudi Arabia. [23] This discrepancy in the results could be due to variation in treatise pattern, techniques of diagnosis, bone scan area selection, lifestyle pursuit, and patient election. Non diabetics and pre-diabetics had a more chance for achiving osteoporosis than type 2 diabetic patients, according to our findings. This conclusion was in line with the findings of numerous research[24–26], but not with the findings of other investigations. [27,28] Even after controlling for other variables, this study found that the number of years since menopause was an important predictor in predicting osteoporosis. This result was consistent with what has been published in the academic literature. [21,29,30] Our research discovered a link between the age at menarche and the likelihood of getting osteoporosis. Because premature menarche is associated with increased revolving estrogen pending and after menarche, it may protect against the development of osteoporosis. There was also a link between premature menarche and high BMD. [31,32] while, our results contradicted those of else treatise[33–35], which revealed no

link between menarche age and BMD or fracture venture. Our results showed that increased parity was a venture agent for osteoporosis, which was proportional with the results of else treatises[36,37]. Increased parity, on the other hand, protects postmenopausal women from osteoporosis, according to Sadat-Ali et al. [23] Obesity has a preventive effect against osteoporosis, according to our findings, and a greater BMI may do requite for the unfavorable impact of hypo estrogen on BMD following menopausal period. Some research backed up this conclusion, claiming that a larger body weight correlates with stronger bone density and a decreased risk of fracture. [38,39] plenty theories have been proposed to explicate this relationship, one of which is that a bigger corporal mass places a maximal mechanical pressure on bone, causing bone mass to increase to handle this burden. Also adipocytes are key providers of estrogen in postmenopausal females, and estrogen has been shown to suppress osteoclast bone resorption.so it is observed that raising mass of fat may not have a favorable sequel on bone mass, which contradicts our findings.(40) In our research, postmenopausal women who consumed more than 300 mg of caffeine per day had a higher chance of developing osteoporosis. Rapuri et al. discovered that caffeine intake of >300mg/day accelerated bone loss at the spine in elderly postmenopausal women, which is consistent with our findings. [18] , on the other hand, another study was discovered that coffee drinking has a clinically conservative effectiveness on periodontal bone loss. [41] many investigations have shown that cafe affects osteoblasts and osteocytes directly, disrupting their differentiation, multiplication, mineralization, and bone matrix synthesis, and causing them to perish. [42–45] Caffeine may also accelerate the discrimination of osteoclasts, leading to more calcium lack in the urine. (46) each of these mechanizations could have a role in the loss of bone density induced by excessive coffee use. It is generally understood that appropriate calcium consumption is critical for maintaining bone health during the growing period, plus the protection of BMD in the old females. [49,50] When calcium levels fall, parathyroid hormone rises quickly to compensate, stimulating osteoclast-mediated bone resorption. [51,52] The link between low calcium consumption (600 mg/day) and osteoporosis was headmost of the most significant results in our treatise. In line with our findings, Ensrud et al. found that low fractional calcium absorption combined with inadequate calcium intake increases the risk of hip fracture in elderly women. (53) In our study, postmenopausal patients who did not get enough sun were more likely to progress osteoporosis. However, because the wide number of our patients were taking vitamin D supplements, our study was unable to evaluate the effect of vitamin D insufficiency on osteoporosis. Contrary to our returns, some studies was discovered that a low vitamin D level in postmenopausal females is a prevalent risk factor for osteoporosis. (54, 55) Our research found that insufficient physical activity was linked to accelerate the hazard of osteoporosis, highlighting the prominence of corporal activity in reducing the venture of falls via particular muscle strengthening and balance training actions, which should protect muscle strength, postponed sarcopenia (muscle mass loss with aging), and safeguard neuromuscular activities, all of which are necessary for maintaining balance and a good fall reaction. Physical exercise, that its impact on bone mass, can induce bone production leading to mend BMD by displaying the skeleton to mechanical pressure. Furthermore, one survey discovered a favorable correlation between physical activity and BMD, as well as a protective effect for exercise in BMD. [56] There was no significant link between smoking and osteoporosis in this study. Young et al. similarly flop to discover a substantial link between osteoporosis and smoking, which is consistent with our findings. (57) while two other studies were discovered a link between cigarette use and osteoporosis venture. [58,59] In our study, there was a clear link between

having a family history of osteoporosis and the chance of getting osteoporosis. Other studies [60–62] found that having a family history of osteoporosis is an independent risk factor for osteoporosis, similar to our findings.

Conclusion: In Kirkuk, postmenopausal women have a significant prevalence of osteoporosis and osteopenia. More generic instruction and broad transmission of knowledge regarding osteoporosis and its forbidding are required.

Restrictions: are a serious issue. At headmost, that our treatise pattern was recruited from a congregation of postmenopausal females who had been transmitted to DEXA screening during the treatise interval, a method that could lead to selection bias and, as a result, sway the results. while, our insularity gauge, which excluded abundant people with deep-seated conditions and those using drugs that could affect bone density, greatly reduced this effect. Second, while the plurality of information was gathered from the center's medical radiological laboratory records.

Recommendations: More research is needed to increase women's awareness and trainings about osteoporosis and how to avoid it, via particular guidance on proper calcium, cafe, and vitamin D consumption, as well as inducement to engage in rising frequent corporal activity.

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