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Research Article

Prevalence of osteoporosis and factors associated with osteoporosis in women above 40 years in the Northern Part of Saudi Arabia

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ABSTRACT

Background: Women have lower bone density than men and they lose bone mass more quickly as they advance in age, which leads to osteoporosis. The Saudi Diabetes and Endocrine Association in the Eastern Province revealed that 30 to 50% of Saudi women above 40 years of age develop osteoporosis. Factors related to the development of osteoporosis include poor diet, low calcium intake, vitamin D deficiency, sedentary lifestyle and smoking. Previous studies have shown that there is a high prevalence of vitamin D deficiency in Saudi women.
Methods: The present study was done in 100 Saudi women above 40 years of age who were outpatients in Arar Central Hospital during a period of four months. After taking an informed consent, data was collected relating to the risk factors, vitamin D levels were assessed and the patients underwent a Dual Energy X-ray Absorptiometry (DEXA) scan.
Results: The results showed that 82% of Saudi women patients had vitamin D deficiency. Only 21% of women were exposed to sunlight. 58% of the women had low BMD (18% with osteoporosis and 40% with osteopenia). Only 5% of patients took Vitamin D and Calcium rich diet and 7% were in the habit of doing exercise. There was a significant association between bone mass density and exercise when Fisher's exact test was used (P value < 0.05)
Conclusion: Prevalence of osteopenia is higher than osteoporosis in the Saudi women above 40 years in the Northern part of Saudi Arabia. The major cause of low BMD is lack of exercise even though there is a high prevalence of Vitamin D deficiency.

Keywords: Osteoporosis, Vitamin D, Saudi women, Exercise

INTRODUCTION

Osteoporosis is a progressive systemic skeletal disease which is characterized by low bone mass and microarchitectural deterioration of the bone tissue with a consequent increase in bone fragility and susceptibility to fracture.[1] Fractures are commonly associated with vertebrae, hip and wrist. Risk factors for the prediction of osteoporosis and fractures have been less thoroughly studied in younger women.[2] Dual Energy X-ray Absorptiometry (DEXA) scans are widely recommended for the measurement of bone mineral density and to identify individuals who are at high risk of fracture.[3-5] According to Hussein et al, Vitamin D deficiency is common in Saudi Arabia and contributes adversely to bone health. Vitamin D deficiency should be suspected and treated in all subjects with osteopenia and osteoporosis.[6] The study done by Warensjo et al suggested that dietary calcium intake below approximately 700 mg per day in women were associated with an increased risk of hip fracture, any fracture and osteoporosis.[7] According to Stewart et al, exercise may preserve or increase bone mineral density (BMD) even while reducing fatness.[8] The present study was therefore undertaken to find out the prevalence of osteoporosis in Saudi women above 40 years of age and the factors associated with osteoporosis.

METHODS

The study was conducted in Arar central Hospital, Arar, Saudi Arabia over a period of four months. 100 Saudi female patients who came to the outpatients department of medicine and orthopedics departments were selected for the study. Patients were selected by simple random sampling. All patients were Saudi women residing in Arar and have completed 40 years of age. Patients who did not have hormonal disorders and renal diseases and who were not on immunosuppressive drugs were selected for the study. An informed consent was taken from all the patients and a questionnaire was given relating to age, marital status, smoking habits, diet, exercise, diseases and drugs taken by them. Blood samples were collected to assess the Vitamin D levels and the patients were sent to the Radiology department of Arar central hospital to undergo DEXA scans. BMD was measured at the femoral neck (right side and left side) and the lumbar spines L1 - L4. The DEXA scan report was given by the radiologist. The report was based on the WHO classification ranges of BMD T-score to classify the patients into three groups- normal, with osteopenia and with osteoporosis.[9] The data was analyzed using SPSS 16.0 statistical package for frequency distribution. To find out the correlation between bone mineral density and vitamin D, Pearson correlation was used. To find out the association between BMD and various independent factors, Fisher's exact test was used.

RESULTS

Among the 100 Saudi women who were in the age group 40-75 years, 58% had low BMD (18% had osteoporosis and 40% had osteopenia).

The reports of the blood Vitamin D levels showed that 82% of the Saudi women had Vitamin D deficiency (<50 nmols/l). Only 21% were exposed to sunlight. There was no statistically significant association between Vitamin D level and exposure to sunlight as shown in Table 1 (P value > 0.05). 40% of the women whose diet was adequate had normal Vitamin D level while only 16.4% of the women whose diet was not adequate had normal Vitamin D level. Although there was some association between vitamin D level and diet, it was not statistically significant as shown in Table 2 (P value > 0.05). There was also no significant correlation between Vitamin D level and bone mineral density when Pearson correlation was used (P value > 0.05).

Among the 100 Saudi women, only 7 women (7%) were doing regular exercise. Out of the 7 patients, 6 patients had normal BMD while 1 patient had low BMD. There was a significant association between BMD and exercise (P value < 0.05) as shown in Table 3.

Table 1: Association between Vitamin D level and exposure to sunlight.

Factor	Factor Levels	Vitamin D		Total	P value
		Normal	Deficiency		
Sunlight Exposure	Yes	2	19	21	> 0.05
		9.5%	90.5%	100.0%	
	No	16	63	79	
		20.3%	79.7%	100.0%	
	Total	18	82	100	
		18.0%	82.0%	100.0%	

Table 2: Association between Vitamin D level and diet.

Factor	Factor levels	Vitamin D		Total	P value
		Normal	Deficiency		
Diet	Adequate	2	3	5	> 0.05
		40%	60%	100.0 %	
	Moderate	7	33	40	
		17.5%	82.5%	100.0 %	
	Inadequate	9 16.4%	46 83.6%	55 100%	
	Total	18	82	100	
		18.0%	82.0%	100.0 %	

Table 3: Association between bone mineral density and exercise.

Factor	Factor levels	BMD		Total	P value
		Normal BMD	Low BMD		
Exercise	Yes	6	1	7	< 0.05
		85.7%	14.3%	100.0%	
	No	36	57	93	
		38.7%	61.3%	100.0%	
	Total	42	58	100	
		42.0%	58.0%	100.0%	

Only 7 patients (7%) were in the habit of smoking. There was no significant association between smoking and bone mineral density as shown in Table 4 (P value > 0.05).

Table 4: Association between bone mineral density and smoking.

Factor	Factor levels	BMD		Total	P value
		Normal BMD	Low BMD		
Smoking	Yes	2	5	7	> 0.05
		28.6%	71.4%	100.0%	
	No	40	53	93	
		43.0%	57.0%	100.0%	
	Total	42	58	100	
		42.0%	58.0%	100.0%	

60% of the Saudi women whose diet was adequate had normal BMD while 47.3% of the women whose diet was not adequate had normal BMD. Even though there was some association between BMD and diet, it was not statistically significant (P value > 0.05) as shown in Table 5.

DISCUSSION

Osteoporosis is reported to be a common problem among Saudi women especially after menopause. According to Mir Sadat Ali et al the reported incidence of osteoporosis varies between 50-60%.[10] They suggested that necessary steps should be taken to avoid osteoporosis and its complications which could end up in epidemic proportions. Many clinical guidelines recommend risk factor assessment and measurement of bone mineral density through DEXA scans.[11-12] In the present study, bone mineral density (BMD) was measured in 100 Saudi women in the age group 40-75 years using DEXA scans to find out the prevalence of osteoporosis. The results showed that 58% of the Saudi women had low BMD (18% had osteoporosis and 40% had osteopenia). It is very important to detect osteopenia early to prevent the development of osteoporosis and associated bone fractures.

Table 5: Association between bone mineral density and diet.

Factor	Factor levels	BMD			Total	P value
		Normal	Osteopenia	Osteoporosis		
Diet	Adequate	3	2	0	5	> 0.05
		60.0%	40.0%	0.0%	100.0%	
	Moderate	13	17	10	40	
		32.5%	42.5%	25.0%	100.0%	
	Inadequate	26	21	8	55	
		47.3%	38.2%	14.5%	100.0%	
	Total	42	40	18	100	
		42.0%	40.0%	18.0%	100.0%	

In the Northern part of Saudi Arabia, it is mandatory for all the Saudi women to cover the entire body including the face as part of the Saudi culture. According to Ardawi et al, Vitamin D deficiency is highly prevalent among healthy pre-menopausal and post- menopausal women and largely attributed to obesity, poor exposure to sunlight, poor dietary Vitamin D supplementation and age.[13] It is difficult to define adequate Vitamin D nutrition because circulating Vitamin D is derived from both dietary sources and sunlight. An optimal serum level of Vitamin D for bone health is above 50nmols/l.[14] Mishal has reported that the factors which have significant effects on serum vitamin D levels are sunlight, exposure, age, race and diet.[15]Study done by Turki et al on Vitamin D levels among healthy Saudi Arabian women showed that covering the face by veil is not a cause of hypovitaminosis D. However the overall non exposure to sun and a diet deficient in Vitamin D is the cause.[16] They suggested that further studies are needed to find out any other reason for the increased prevalence of Vitamin D deficiency among Saudi women above 50 years of age. Binkley et al have reported that high amounts of sun exposure do not ensure what is currently accepted as Vitamin D adequacy. Thus clinicians should not assume that individuals with abundant sun exposure have adequate Vitamin D status.[17] In the present study done in

Saudi women in the age group of 40 -70 years, 82% had vitamin D deficiency (< 50 nmols/l). Only 21% had exposure to sunlight. However there was no statistically significant association between Vitamin D levels and exposure to sunlight (P value > 0.05). Our study supports the view that sun exposure alone cannot maintain the vitamin D level.

According to Vieth R osteoporosis can be largely prevented by optimizing physical activity and vitamin D related factors of environment and nutrition.[18] In the present study, there was no significant correlation between Vitamin D level and BMD when Pearson correlation was used (P value > 0.05). According to Zehnacker et al, weighted exercises can help in maintaining BMD in postmenopausal women and increasing BMD of the spine and hip in women with osteopenia and osteoporosis.[19] In our study even though only 7% of the Saudi women were in the habit of doing regular exercise, there was a significant association between BMD and exercise (P value < 0.05).

A meta-analysis of 29 published cross sectional studies reporting the difference in bone density in smokers and nonsmokers according to age, showed that hip fracture is a major adverse effect of smoking and the cumulative excess bone loss due to smoking is substantial, increasing the life time risk of hip fracture by half.[20] In the present study, only 7% of the Saudi women were smokers and there was no significant association between BMD and smoking (P value < 0.05). Even though there was some association between BMD and diet, it was not statistically significant (P value < 0.05).

CONCLUSIONS

The study shows that there is a higher prevalence of osteopenia when compared to osteoporosis in Saudi women in the Northern part of Saudi Arabia. The results indicate that osteoporosis can be prevented with adequate therapeutic measures. Although there is a high prevalence of vitamin D deficiency and the diet taken is not adequate, the major cause of osteopenia and osteoporosis is lack of exercise.

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REFERENCES

1. Collier JD, Ninkovic M, Compston JE. Guidelines on the management of osteoporosis associated with chronic liver disease. Gut 2002;50(Suppl 1):1-19.
2. Morin S, Tsang JF, Leslie WD. Weight and body mass index predict bone mineral density and fractures in women aged 40-59 years. Osteoporosis Int 2009; 20: 363-370.
3. Glen MB, Ignac F. The role of DXA bone density scans in the diagnosis and treatment of osteoporosis. Postgrad Med J 2007; 83:509-517.
4. Sambrook P, Cooper C. Osteoporosis. The Lancet 2006; 367:2010-2018.
5. Johnell O, Kanis JA, Oden A, Johansson H, De Laet C, Delmas P, et al. Predictive value for BMD for hip and other fractures. J Bone Miner Res 2005; 20: 1185-1194.
6. Hussein R, Munira A, Sakra B, Mahmoud M, Mohammed E, Aneela H, et al. Updated Recommendations for the Dignosis and Management of Osteoporosis: A Local Perspective. Ann Saudi Med 2011;31(2):111-128.
7. Warensjo E, Byberg L, Melhus H, Gedeborg R, Mallmin H, Wolk A, et al. Dietary calcium intake and risk of fracture and osteoporosis: prospective longitudinal cohort study. BMJ 2011;342:d 1473.
8. Stewart KJ, Bacher AC, Hees PS, Tayback M, Ouyang P, Jan de Beur S. Exercise effects on bone mineral density relationships to changes in fitness and fatness. Am J Prev Med 2005;28(5):453-460.
9. Sedrine WB, Broers P, Devogelaer JP, Depresseux G, Kaufman JM, Goemaere S et al. Interest of a Prescreening Questionnaire to Reduce the Cost of Bone Densitometry. Osteoporosis Int 2002;13:434-442.
10. Mir Sadat A, Ibrahim MA, Fatma AA, Abdallah YE. Bone mineral density among postmenopausal Saudi women. Saudi Med J 2004;25(11):1623-1625.
11. Brown JP, Josse RG. 2002 Clinical practice guidelines for the diagnosis and management of osteoporosis in Canada. CMAJ 2002;167 (10) S1-S34.
12. Kanis J. Diagnosis of osteoporosis and assessment of fracture risk. Lancet 2002;359:1929-1936.
13. Ardawi MSM, Qari MH, Rouzi AA, Maimani AA, Raddadi RM. Vitamin D status in relation to obesity, bone mineral density, bone turnover markers and Vitamin D receptor genotypes in healthy Saudi pre- and postmenopausal women. Osteoporosis Int 2011;22:463- 475.

14. Gallagher JC, Sai AJ. Vitamin D Insufficiency, Deficiency, and Bone Health. J Clin Endocrinol Metab 2010; 95 (6): 2630- 2633.
15. Mishal AA. Effects of different Dress Styles on Vitamin D levels in Healthy Young Jordanian Women. Osteoporosis Int 2001;12:931-935.
16. Turki HA, Sadat AM, Al Elq AH, Al Malhim FA, Al Ali AK. 25 Hydroxy Vitamin D levels among healthy Saudi Arabian women. Saudi Med J 2008;29(12):1765-1768.
17. Binkley N, Novotny R, Krueger D, Kawahara T, Daida YG, Lensmeyer G. Low Vitamin D status despite Abundant Sun Exposure. The Journal of Clinical Endocrinology & Metabolism 2007;92(6):2130.
18. Vieth R. The role of vitamin D in the prevention of osteoporosis. Ann Med 2005;37(4):278-285.
19. Zehnacker CH, Bemis DA. Effect of weighted exercise on bone mineral density in postmenopausal women. A systematic review. J Geriatr Phys Ther 2007;30(2):79-88.
20. Law MR, Hackshaw AK. A meta- analysis of cigarette smoking, bone mineral density and risk of hip fracture: recognition of a major effect. BMJ 1997;315:841-846.

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