CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2653875

Available online at: http://www.iajps.com *Research Article*

A STUDY ON COMPARISON OF VITAMIN D LEVELS WITH BONE DENSITY AND ALKALINE PHOSPHATASE IN WOMEN

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Article Received: February 2019 **Accepted:** March 2019 **Published:** April 2019

Abstract:
Introduction: *Osteoporosis is a serious, worldwide, and growing health problem; WHO has estimated the 30% of all women, older than 50 years (post-menopausal) has osteoporosis. Osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture.* ***Aims and objectives:*** *The main objective of the study is to compare the level of vitamin D levels with bone density and alkaline phosphatase in women.* ***Material and methods:*** *This cross-sectional study was conducted in Holy family hospital, Rawalpindi during March 2018 to November 2018. This study was conducted for the comparison of level of Vitamin D with bone density. The data was collected from 100 patients. All clinically suspected cases of osteopenia and osteoporosis with age >40 years were included in this study. The data were collected through a questionnaire in which we add all the demographic values of selected patients. Biochemical tests performed included alkaline phosphatase (ALP), serum calcium, serum phosphorus, and 25 hydroxy vitamin D(25[OH]D). Serum phosphorous, calcium and ALP were determined by spectrophotometric method, while 25(OH)D was determined by using radioimmunoassay method.* ***Results:*** *The data was collected from 100 individuals. There was no significant correlation (P = 0.09) between values for 25-OHD and 25-$(OH)_2$D. Ten per cent of the women (n = 50) had serum 25-OHD levels below 12 ng mL. This subgroup also had significantly lower serum 25-$(OH)_2$D (24.9 vs. 27.9 pg mL, P , 0.05), but they did not differ from the rest with regard to PTH and P-calcium levels.* ***Conclusion:*** *It is concluded that there is no significant relationship of vitamin D deficiency with decreased BMD and levels of phosphorus, serum calcium, and ALP.*

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Please cite this article in press Asifa Saeed et al., ***A Study On Comparison Of Vitamin D Levels With Bone Density And Alkaline Phosphatase In Women.,*** *Indo Am. J. P. Sci, 2019; 06(04).*

INTRODUCTION:

Osteoporosis is a serious, worldwide, and growing health problem; WHO has estimated the 30% of all women, older than 50 years (post-menopausal) has osteoporosis. Osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture. Bone strength reflects the integration of two main features: bone density and bone quality. Vitamin D plays a key role in homeostasis as well as regulation of body functions and its deficiency has been associated with different disorders [1]. Vitamin D deficiency is reported in different age brackets and in different age groups, like newborns, toddlers, pregnant women, adolescents, and elderly males from different countries. The common risk factors of vitamin D deficiency are poverty, not taking proper diet, poor calcium intake, dark pigmented skin, avoiding sunlight and social norms such as indoor living. It has been reported that despite abundance of sunlight in South Asia, there is vitamin D insufficiency [2]. The deficiency of vitamin D is a public health issue in Pakistan and its prevalence in different areas of Pakistan ranges from 70% to 90% in healthy asymptomatic volunteers, while 92-97% deficiency was reported in ambulatory patients. Insufficient vitamin D results in increased bone loss and low bone mineral density (BMD) as well as osteoporosis. However, it was shown that vitamin D deficiency has no direct impact on BMD [3].

Vitamin D metabolites participate in the regulation of calcium homeostasis and bone metabolism. Their role in determining bone mass, however, is still not clear. It is well known that severe and prolonged vitamin D deficiency causes osteomalacia. Subclinical vitamin D deficiency is common in the elderly and may lead to development of secondary hyperparathyroidism and bone loss, for which reason it has been implicated in the pathogenesis of senile osteoporosis [4]. Whilst there is good evidence that extreme old age is associated with a decline in serum vitamin D metabolites, this seems not to be the case earlier in life. Kinyamu et al. found no differences in serum 1,25-dihydroxyvitamin D (1,25-(OH)2D) between freeliving elderly women with a mean age of 71 and a group of 30-year-old women, whereas a group of elderly women with a mean age of 84 living in nursing homes had a significantly lower serum 1,25-$(OH)_2$D [5,6].

Aims and objectives

The main objective of the study is to compare the level of vitamin D levels with bone density and alkaline phosphatase in women.

MATERIAL AND METHODS:

This cross-sectional study was conducted in Holy family hospital, Rawalpindi during March 2018 to November 2018. This study was conducted for the comparison of level of Vitamin D with bone density. The data was collected from 100 patients. All clinically suspected cases of osteopenia and osteoporosis with age >40 years were included in this study. The data were collected through a questionnaire in which we add all the demographic values of selected patients. Biochemical tests performed included alkaline phosphatase (ALP), serum calcium, serum phosphorus, and 25 hydroxy vitamin D(25[OH]D). Serum phosphorous, calcium and ALP were determined by spectrophotometric method, while 25(OH)D was determined by using radioimmunoassay method.

Statistical analysis

The data were collected and analyzed using SPSS version 21.0. All the values were expressed in mean and standard deviation.

RESULTS:

The data was collected from 100 individuals. There was no significant correlation (P = 0.09) between values for 25-OHD and 25-$(OH)_2$D. Ten per cent of the women (n = 50) had serum 25-OHD levels below 12 ng mL. This subgroup also had significantly lower serum 25-$(OH)_2$D (24.9 vs. 27.9 pg mL, P , 0.05), but they did not differ from the rest with regard to PTH and P-calcium levels.

Table-1: Association of Demographic characteristic with vitamin D levels and bone mineral density.

Demographic features	Sufficient Vit. D	Insufficient Vit. D	P-value	Normal BMD	Reduced BMD	P-value
Age Group (years)						
≤ 19	2	27	0.01	24	5	< 0.00001
20-44	17	129		90	56	
45 and Above	27	89		40	76	
Gender						
Male	19	96	0.78	71	44	0.01
Female	27	149		83	93	
BMI						
Normal	20	95	0.38	61	54	0.41
Overweight	10	68		36	42	
Obese	16	65		46	35	
Under weight	0	17		11	6	
Skin color						
Dark	25	63	0.001	32	56	0.001
Fair	11	95		63	43	
Wheatish	8	62		43	27	
Use of sun screen						
Yes	1	9	0.679	7	3	0.184
No	36	209		119	126	
Daily Milk Intake						
No milk	20	115	0.845	61	74	0.051
<1 glass	1	4		3	2	
1 - 2 glass	25	121		87	59	
Daily Sun Exposure						
None	16	39	0.079	25	30	0.490
< 5 minutes	0	12		7	5	
5-15 minutes	8	38		23	23	
15-30 minutes	7	54		27	34	
> 30 minutes	15	89		59	45	
Daily Exercise						
Little or No Exercise	27	138	0.11	86	79	0.53
Light Exercise	7	71		44	34	
Moderate Exercise	9	25		15	19	
Hard Exercise	3	11		9	5	

DISCUSSION:

Kuchuk et al conducted study, relationships of serum 25- Hydroxyvitamin D to BMD and serum PTH and markers of bone turnover in old persons on 1319 subjects. All BMD values were higher in the higher serum 25 OH D groups, although only significantly for total hip and total body mineral content. A threshold of about 40 nmol/lit existed for osteocalcin and deoxypyridinoline/creatinine, 50 nmol/lit for BMD, and 60 nmol/lit for physical performance [7].

Melhus et al conducted study, plasma 25-hydroxyvitamin-D level and fracture risk in a community-based cohort of elderly men in Sweden on 1194 person and found 309 of the participants (26%) sustained a fracture. 25 (OH) D levels below 40 nmol/liter, which corresponded to the fifth percentile of 25 (OH) D, were associated with a modestly increased risk for fracture. No risk difference was detected above this level [8]. Approximately 3% of the fractures were attributable to low 25 (OH) D levels in this population.

Dark skin colour was a significant risk factor associated with vitamin D insufficiency which is consistent with the studies conducted in South Asia. The BMD examination showed that almost half of the study population had a normal bone minerals level. But on the other hand, one quarter had osteopenia and other quarter had osteoporosis, indicating that almost half of the population is on the risk of bone fracture [9]. Osteopenia and osteoporosis were common among females, especially of old age. This was consistent with a previous study. Our study findings showed no correlation between vitamin D levels with the BMD, which is similar to the findings reported by others. Studies have also reported a positive association between vitamin D levels and BMD at the hip and spine in men and women [10]. Another study from India on healthy individuals also reported similar results. However, this is contradictory to the findings from the same population of South Asian women living in the United Kingdom where serum 25(OH)D deficiency was associated with a progressive reduction in bone mass [11].

CONCLUSION:

It is concluded that there is no significant relationship of vitamin D deficiency with decreased BMD and levels of phosphorus, serum calcium, and ALP.

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