Original Article

Vitamin-D Deficiency

Frequency of Vitamin-D Deficiency in Female Health Care Workers of Child Bearing Age

Muhammad Raheel Anjum[1], Javeid Iqbal[1], Sadia Anjum[2], Muhammad Ammad Haider[3] and Aziz-ur-Rehman[1]

ABSTRACT

Objective: To determine the prevalence of vitamin D deficiency in healthy female health care workers of child bearing age.

Study Design: Cross-sectional descriptive study

Place and Duration of Study: This study was conducted at the Services Hospital, Lahore from 1st July 2014 to 31st December 2014.

Materials and Methods: Two hundred seventy healthy female doctors and nurses were recruited by random consecutive sampling. 25(OH) vitamin D and intact parathyroid hormone (PTH) levels were measured, and effects of different variables were noted on vitamin D level.

Results: Three subjects out of 270 were excluded because of abnormal PTH levels. Median age was 28±4 years. Mean value of 25(OH) vitamin D was found to be 13.94±6.91. 254 (95.13%) were found to be deficient in vitamin D. Significant correlation was found between vitamin D deficiency and use of veil, obesity/malnutrition, married females, fish intake and lack of sun exposure.

Conclusion: Vitamin D deficiency has very high prevalence even in educated and relatively higher socioeconomic groups, even those having enough medical knowledge about its pathophysiology and effects.

Key Words: Vitamin D deficiency, Health care worker, Prevalence

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INTRODUCTION

Vitamin D is a fat soluble vitamin involved in bone mineralization. It is unique in that it cannot only be ingested in the diet as cholecalciferol (vitamin D3) or ergocalciferol (vitamin D2) but can also be synthesized in the skin when sunlight exposure is adequate. Despite dual mechanisms of attainment, vitamin D deficiency is not uncommon in many countries throughout the world and can lead to disease. Vitamin D has many functions in humans including calcium and phosphate homeostasis. Once absorbed from the gut or produced in the skin, it is then hydroxylated in the liver into 25-hydroxyvitamin D (25(OH) D and then in the kidney and in extrarenal tissues to 1,25-dihydroxyvitamin D (1,25(OH)2D) and 24,25-dihydroxyvitamin D (24,25(OH)2D). Thereafter, the active metabolite can enter cells and bind to either the vitamin D-receptor or to a responsive gene, such as that of calcium binding protein, and thus assist in calcium absorption.[1] Vitamin D also regulates parathyroid hormone (PTH) levels which in turn reduces bone loss.[2] Severe vitamin D deficiency causes new bone, the osteoid, not to be mineralized. This can lead to rickets in children and osteomalacia in adults. Vitamin D deficiency has been associated with lower BMD in individuals without frank osteomalaciA.[3,4] It is not surprising therefore that in cases of severe vitamin D deficiency causing rickets or osteomalacia, a myopathy can develop and when severe, it presents with marked proximal muscle weakness with a predilection for the lower limbs.[5] Recently vitamin D has also been linked with several other conditions. Associations have been shown with colorectal cancer[6], diabetes mellitus[7], infection[8], multiple sclerosis, cardiovascular disease, breast cancer, autoimmunity and allergy[9], depression[10], and postural instability.[11] Foods that provide vitamin D include: fatty fish like tuna, mackerel, and salmon, foods fortified with vitamin D, like some dairy products, orange juice, soy milk, and cereals, beef liver cheese and egg yolks.

There are many causes of vitamin D deficiency. Generally, they can be divided into two groups: UVB-related deficiency and medical/physical condition-related deficiency. UVB-related deficiency is found in the elderly[12,13] dark skin people[14], sun screen users[15]

1. Department of Medicine, Rashid Latif Medical College, Lahore.
2. Department of Pediatric Oncology, Shaukat Khanum Memorial Cancer Hospital & Research Centre Lahore.
3. Department of Ophthalmology, University Medical & Dental College, Faisalabad

Correspondence: Dr. Muhammad Raheed Anjum, Assistant Professor of Medicine, Rashid Latif Medical College, Lahore.
Contact No: 03349919561
Email: dr.raheelanjum@gmail.com

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and also depends upon season, latitude, and the time of day. Medical conditions causing vitamin deficiency include fat malabsorption[16], chronic kidney disease[17], obesity[18] and drugs like anticonvulsants[19].

The aim of our study was to highlight the prevalence of vitamin D deficiency in a cohort of women of child bearing age and correlate them to certain demographic variables. Most of the published literature on Vitamin D levels in Pakistanis performed in smaller outpatient settings, involving low socioeconomic groups of the population. There is a dearth of published data on prevalence of vitamin D deficiency in asymptomatic population of middle and high socioeconomic group like health care workers including female doctors and nurses and to highlight importance the lack of awareness even in medical field workers.

MATERIALS AND METHODS

The cross-sectional study was conducted at Services Hospital, Lahore over a period of six months from 1st January 2012 to 30th June 2012. The sample size was calculated to be 270 assuming an anticipated population proportion of 85%, a relative precision of 0.05 with 95% confidence. This study was funded by Services Institute of Medical Sciences, Lahore (SIMS) and was approved by Institutional Review Board of SIMS. Healthy adult female doctors and nurses, without any comorbidities, aged between 18 years to 45 years, were recruited by non-probability random consecutive sampling and informed consent was taken. Subjects who had vitamin D supplementation in last 6 months were excluded. Data was recorded on a predesigned proforma including demographic and socioeconomic details, BMI, marital status, lactation status, number of children, exposure to sun light, milk intake, use of veil, fish intake, source of water and any history of musculoskeletal problems.

Venous blood samples of 10 ml were collected by trained health care workers in plastic serum tubes for each respondent. The samples were placed in ice boxes at the site of the camp and were sent to the lab in batches. There was a time lag of approximately 60 minutes between venous puncture and serum separation after centrifugation at 3000 bpm. After centrifugation the serum was stored in the laboratory freezer at -20°C, until further analysis. Serum markers measured included 25(OH) vitamin D, intact parathyroid hormone (PTH) measurements. Vitamin D deficiency was taken as 25-hydroxyvitamin D blood level below 30 ng/ml and severe deficiency was defined as 25-hydroxyvitamin D blood level below 20 ng/ml. Levels above 75 ng/ml were taken as toxicity.

The data was entered and analyzed in SPSS v17. Descriptive statistics were calculated and effect of different factors on vitamin D level was analyzed.

RESULTS

The sample comprises of 270 females of child bearing age. 267 subjects' data was analyzed further. Median age was 28±4 years. 3 females were excluded from the results because of abnormality in intact PTH level. The minimum age in the sample was 23 years, with a maximum age of 45 years being reported. Mean value of 25(OH) vitamin D was 13.94±6.91. only 13 (4.87%)subjects had the level in sufficient range, i.e., ≥ 30 ng/ml. Rest of the sample population which is 254 (95.13%) were found to be deficient in vitamin D. Demographic, social and behavioral determinants of vitamin D status in healthy adult females are described in table 1.

Table No.1: Demographic, social and behavioral determinants of vitamin D status

Determinant Factor	Subgroups of Determinant Factor	Mean 25(O) vitamin D level ±SD	p-value
Age	18-30	16.94±6.91	<0.05
	31-45	12.94±3.81	
BMI	<18.5	10.24±2.71	<0.05
	18.5-24.9	18.33±6.13	
	>25	14.34±3.54	
Marital status	Single	19.94±5.61	<0.05
	Married	13.25±5.32	
Lactation status	Lactating	17.94±5.91	>0.05
	Non lactating	18.34±6.91	
Children	Yes	13.72±4.81	>0.05
	No	15.64±7.31	
Exposure to sun light	<30 min	11.54±4.22	<0.05
	≥ 30 min	22.64±7.32	
Use of veil	Yes	11.94±3.52	<0.05
	No	16.94±6.71	
Daily milk intake	Yes	18.74±2.64	>0.05
	No	17.98±3.42	
Fish intake	Yes	19.56±6.96	<0.05
	No	16.31±3.91	
Water source	Tap	14.94±5.11	>0.05
	Boiled	14.74±6.83	
	Mineral	17.94±6.91	
Open space in home	Yes	16.33±7.41	>0.05
	No	14.44±3.93S	
Monthly income	<10000	14.94±2.61	>0.05
	10000-30000	15.54±4.33	
	>30000	16.48±1.95	
H/O musculoskeletal problem	Yes	10.94±3.95	<0.05
	No	18.94±2.81	

DISCUSSION

Our study found very high prevalence of vitamin D deficiency and insufficiency in Pakistani female population which is consistent with reported values of vitamin D deficiency in a few earlier studies carried out in Pakistan.[20-22]

Significant correlation was found between vitamin D deficiency and use of veil, obesity/malnutrition, married females, fish intake and lack of sun exposure, keeping in view with other studies.[23] Milk intake was not significantly related to vitamin D deficiency in our study. It has also been reported previously that serum calcium does not predict serum 25(OH)D levels.[24] Also it has been noted that vitamin D deficiency becomes more severe with advancing age[25], and it was also the case in our study.

Unique point in our study is that it estimated the prevalence of vitamin D deficiency in an educated and relatively good socioeconomic status population. Apart from this, the study population was healthy adult health care worker females, doctor and nurses, who are supposed to have education about high prevalence of vitamin D deficiency. It was found that an alarming 95% of them are deficient in vitamin D.

CONCLUSION

Very high rates of vitamin D deficiency among healthy female doctors and nurses of a tertiary care hospital and showed that even health care workers need awareness about alarming levels of vitamin deficiency, probably due to changing life styles. It is recommended that women who are not in a position to increase their sun exposure can significantly reduce their risk of vitamin D deficiency by taking a multivitamin tablet containing vitamin D.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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