

Assessment of the Vitamin D Levels in the Patients Presenting with Different Medical Conditions and its Correlation with Symptomatology

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Background: Vitamin is the important micronutrient that acts like hormone and its deficiency is related to various diseases¹. Limited Data is present for the Pakistani population for vitamin D.

Objectives: Assess the vitamin D levels in the patients presenting with different medical conditions and its correlation with symptomatology.

Methods: We randomly took 400 patients visiting the outpatient department for the various diseases and complaints. They were asked about various complains, diet, drugs and food fortification. Blood samples for the vitamin D was collected and results were analyzed statistically. They were divided into four grades; Normal (30-100 ng/ml), Mild deficiency (20-29 ng/ml), Severe deficiency (less than 20 ng/ml) and Toxic levels (more than 100 ng/ml).the correlation between vitamin D levels and symptomatology was also calculated.

Results: Out of 400 patients, 304 (76%) were female and 96 (24%) were male. Mean value for the vitamin D was 20.70 (for male 20.50 and for female 20.20). Mean value for the age was 45.50. Among 400 subject, 53 (13.25%) had normal values, 80 (20%) had mild deficiency and 264 (66%) had severe deficiency, where as 3 (0.75%) were having toxic levels. The frequency of major symptoms was Generalized body weakness 360 (90%), Bone and joint pains 88 (22%), Diabetes 64 (16%), history of Pathological fracture/falls 45 (11.25%), Depression/anxiety 240 (60%), Blood pressure 132 (33%), Hair loss 8 (02%), Shortness of Breath 60 (15%), Ch. Diarrhea 40 (10%), Weight loss 40 (10%), Fever 20 (5%). Almost all patients having severe deficiency were symptomatic 262 (99.2%).

Conclusion: Pakistani Urban, Well feed population is grossly deficient of vitamin D and majority of patients with severe deficiency are symptomatic.

Introduction

Vitamin D deficiency or insufficiency has affected over one billion people in the world; especially worse deficiency is present in the countries of South Asia.² Vitamin D also work like a steroid with hormone, regulates the functions of many genes, essential for growth and body development.¹

The association of Rickets and bone disease in the past is only a tip of an iceberg of the morbidities caused by the deficiency of this vital micronutrient and hormone. The discovery that most of the cells of the body including brain, prostate, bone, immune, musculoskeletal and skin have the receptor for the vitamin D has made this vitamin as a centre of research for the prophylaxis and treatment of various diseases.⁶ Various disease of bone metabolism, diabetes mellitus, cardiomyopathies, hypertension, metabolic syndrome, lymphoma, cancers, obstructive airway diseases, multiple sclerosis, osteoarthritis, rheumatoid arthritis and psychiatric illnesses have been associated with Hypovitaminosis D (deficiency of vitamin D).¹

Pakistani population seems to be especially prone to develop vitamin deficiency because of less exposure of women to light, excessive cooking, unbalanced diet and consumption of unfortified foods (table 1). Limited data is available for the assessment of prevalence of Hypovitaminosis D in Pakistan. Few small scale studies show gross deficiency especially in pregnant ladies and infants. We

tried to assess the levels of vitamin D in different age groups and correlation with symptomatology.

Original Study

Objective

Assess the vitamin D levels in the patients presenting with different medical conditions and its correlation with symptomatology.

Material and Methods

Study type: Cross-sectional study design was used.

Location: Study was conducted in National Hospital DHA, Orthopedics and Medical Complex, Lahore Gut and Liver Centre situated in the Lahore Pakistan.

Duration: March 2008 to January 2009.

Sample size: 400 persons were included in the study.

Sampling technique: Probability sampling technique was used to collect the data.

Inclusion criteria

- all patients presenting to the outpatient department for the different medical conditions.
- age > 15 yrs and < 75 yrs.

Table 1: Causes of vitamin D deficiency in Pakistan.

<p>Skin pigmentation: Light brown to almost dark. It reduce vitamin D synthesis by as much as 99% depending on melanin pigmentation</p> <p>Unbalanced diet:</p> <ul style="list-style-type: none"> ▪ Illiterate. ▪ Unaware of the importance of balanced diet. ▪ Poor can't use balance diet. ▪ Overcooking that destroy most of the vitamins and micronutrients <p>Social customs: Women are deprive of sunshine in many areas: Not the sole reason for deficiency as large number of women work in the fields in the rural areas and working in offices in the cities where conventional Burqa is seldom seen. Though there least chances for them to tan themselves on the beach but they can be exposed well to sun. The middle class urban population living in over-populated apartment, which have with very little penetration of natural light.</p> <p>Addictive Habits: Chewing betel nut (Areca catechu), contributes to Vitamin D deficiency by modulating the regulatory enzymes for circulating levels of 1, 25 di (OH)D.</p> <p>Cosmetics and Sun screen: Increase usage of sunscreens, sun block lotions and other cosmetics has deprived us from the natural source of vitamin D.⁸</p> <p>Malabsorption: Intestinal tuberculosis: Enteritis leads to Malabsorption of fat soluble vitamins.</p> <p>Drugs: Unjudicial usage of steroids and polypharmacy including anticonvulsants has increased the catabolism and resulted into deficiency of vitamin D.⁸</p> <p>Other diseases: Many diseases are contributing to Hypovitaminosis D directly or indirectly including; Mild to moderate liver dysfunction. Nephritic syndrome. Chronic Kidney Disease. Ricket.⁸ Malignancy.¹</p>
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<p>Primary Hyperparathyroidism.^{4,1} Granulomatous Disease. Hyperthyroidism.</p> <p>Breast feeding: It is observed that mother's milk is deficient in vitamin D leading to Hypovitaminosis D in the kids.⁵ It doesn't mean that we should discourage breast feed but we should give I/M injection to mother and kids.</p>
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- Exclusion criteria**
- pregnant and lactating women
 - chronic kidney disease

Settings
After getting written informed consent the data of randomly selected patient with the defined symptoms was collected on a preset Performa. Blood samples for the Vitamin D were collected at the same time. These persons visited the physician for many different reasons. They were picked up randomly and asked for the question regarding bone pains, muscular weakness, blood pressure, depression, diabetes onset and control, drugs and diets fortification. Results were divided into four grades including normal (30-100 ng/ml) mild deficiency (20-29 ng/ml) severe deficiency (below 20 ng/ml) and toxicity above 100 ng/ml.

Results of the study were analyzed by SPSS 12.0 for the windows.

Results
Out of 400 patients, 304 (76%) were female and 96 (24%) were male (Figure 1). Average age of the patients was 50.0 +0.83 years. Mean value for the vitamin D was 20.014 (for male 20.90 and for female 20.20). Among 400 persons 53 (13.25%) had normal values, 80 (20%) had mild deficiency and 264 (66%) had severe deficiency it p=0.000, where as 3 (0.75%) were having toxic levels (Table 2). Vitamin D was significantly low p=0.000 in the study group. Standard deviation was 16.86 + 0.84 for vitamin D.

Table 2: Frequency of vitamin D levels in the study group.

Grade	No. of Patient	Percentage
Normal	53	13.25%
Mild deficiency	80	20%
Severe deficiency	264	66%
Toxicity	3	0.75%

Among the patients presented to us the total number of symptom was 1080 that is statistically significant for the deficient levels p=0.000. The frequency of major symptoms was Generalized body weakness 360 (90%), Bone and joint

pains 88 (22%), Diabetes 64 (16%), history of Pathological fracture/falls 45 (11.25%), Depression/anxiety 240 (60%), Blood pressure 132 (33%), Hair loss 8 (02%), Shortness of Breath 60 (15%), Ch. Diarrhea 40 (10%), Weight loss 40 (10%), Fever 20 (5%) (Table 3).

Discussion

We get vitamin D from exposure to light, diet and dietary supplements. It was difficult to have a rigid value for the whole world because of the regional, ethnic and genetic differences. But it was seen that most of protective benefits of vitamin D were at 40ng/ml or above and potential defects were below 30 ng/ml. The mean serum concentration of 25 (OH) D of 30 ng/ml is considered desirable for health. A level of 20-29 ng/ ml is considered as mild deficiency and is minimally acceptable.⁹ below 20 ng/ml is considered severe deficiency.⁵ Manifestations of Vitamin D intoxication were observed at higher serum levels that were greater than 150 ng/ml.

Recommendations for the daily intakes for vitamin D for infants, children and adults are 200 IU (5 µg) per day, for adults between 50-70 years, it is 400 IU^{12,14} (10 µg) and for 71 or above it should be 600 IU. Several investigators are of the view that these values are insufficient especially high risk group i.e pregnant females, sick adults and older adults.

According to many experts without adequate sun exposure children and adults will need 800-1000 IU per day.¹⁵ Those with the deficiency should be treated more aggressively especially children, nursing mothers and those with chronic kidney disease. Most of (40-100%) the European and American elderly men and women living in the com-munity are deficient in vitamin D.^{5,19} More than half of postmenopausal women taking medication for osteoporosis are deficient(less than 30 ng/ml) in 25-hydroxyvitamin D.¹⁹ In south East Asia despite of sunny area, Hypovitaminosis D is quite prevalent.

According to Sachan et al,¹⁰ investigated Hypovitaminosis and found that eighty-four percent of pregnant women of Lucknow, India had 25 (OH) D values below 22 ng/ml. Atiq et al al¹¹ investigated that vitamin D levels in healthy breast-fed children and their mothers at a major teaching hospital in Karachi were low, among them 55% of infants and 45% of mothers had very low serum 25 (OH) D levels.

In our study even urban population of Lahore coming from good socioeconomic set up got gross deficiency of

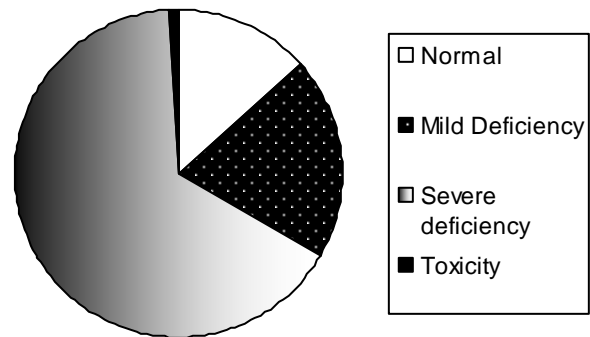


Figure 1: Percentage levels of Vit. D in study group.

Table 3: Frequency of symptoms.

Symptoms	Normal levels (%)	Mild Deficiency (%)	Severe Deficiency
Generalized body weakness	27 (6.75%)	73 (18.25%)	260 (65%)
Bone and Joint pains	5 (1.25%)	7 (1.75%)	76 (19%)
Diabetes	2 (1.25%)	10 (2.5%)	52 (13%)
h/o Pathological Fractures/ Fall	1 (0.25%)	15 (3.6%)	29 (7%)
Depression/Anxiety	30 (7.50%)	70 (17.5%)	140 (35%)
Hypertension	12 (3%)	30 (7.50%)	90 (22.5%)
Hair loss	2 (0.50%)	1 (.25%)	5 (1.25%)
Shortness of Breath	16 (04%)	15 (3.75%)	29 (7.25%)
Ch. Diarrhea	10 (2.5%)	16 (04%)	14 (3.5%)
Weight loss	10 (2.5%)	16 (04%)	14 (3.5%)
Fever	12 (3%)	3 (0.75%)	5 (1.25%)

P-value = 0.0000

vitamin D (86%) p value 0.000, and among the deficient severe deficiency (66% of cumulative) was also significant p value 0.000. It might be due to different metabolism and genetics of our region. Perhaps the normal value needs to be redefined because our study group with normal values or mild deficiency is asymptomatic.

Vitamin D deficiency causes muscle weakness.^{8,5} Vitamin D receptors are present on the skeletal muscles and they may require vitamin D for maximum function.⁸ We found majority of the patients having muscle pains and generalized weakness had severe deficiency of vitamin D (70%).

Its deficiency has been associated with congestive heart failure, increase in C-reactive proteins¹⁷ and development of early wheeze and obstructive air way disease.³ Many epidemiological studies (prospective and retrospective) indicate that vitamin D deficiency below 20 ng/ml is associated with

an increased risk of colonic, prostate carcinoma, Hodgkin's lymphoma and breast cancer about half than normal population, and also higher mortality from these cancers.^{4,5,16}

In Vitamin D deficient persons there was increased incidence of depression and anxiety (52.5%).

Conclusion

The conclusions of the study are:

Majority of Our Urban, Well feed population is grossly deficient of vitamin D.

Majority of patient with severe deficiency are also symptomatic.

Recommendations

- (1) Mass awareness campaign over the electronic media against Hypovitaminosis D and its prevention.
- (2) Vitamin D replacement need to be considered as annual intramuscular dose of vitamin D especially for the high risk population i.e. children, pregnant and lactating women and elderly.
- (3) Physician to consider vitamin D replacement as part for the patients visiting OPD for the mentioned complains especially high risk group.

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