VITAMIN D STATUS OF ADULTS IN THE OUTPATIENT DEPARTMENT IN BANGLADESH

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Abstract

Background: *Vitamin D deficiency (VDD) is widespread, yet it is the most underdiagnosed and undertreated nutritional deficiency in the world. The prevalence of VDD is estimated to affect over 1 billion people worldwide. The present study was conducted to estimate the prevalence of VDD among adults aged 18–89 years visiting the outpatient department in a clinic/chamber.*

Objective: *To assess the status of vitamin D deficiency (VDD) among the adult population in Bangladesh.*

Methods: *A cross sectional study was conducted among 189 adults in the year 2017 including both males and females aged 18–89 years in outpatient department of a clinic/chamber. Venous blood sample was collected for the measurement of Vitamin D (25 hydroxyvitamin D).*

Results: *This study included a total of 189 adults (29 males and 160 females) aged between 18 and 89 years. Majority of the patients were vitamin D deficient, 67.2% and 20.6% were suffering from vitamin D insufficiency. Maximum males and females are deficient, 69% and 66.9% respectively where as a very small percentage has sufficient level of vitamin D.*

Conclusions: *Vitamin D deficiency (VDD) is alarmingly high. Screening services should be implemented while researchers focus on strategies to lessen the incidence and morbidity associated with these conditions.*

Keywords: *Vitamin D; Deficiency; Adult; Micronutrient; Bangladesh; VDD.*

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Introduction

Vitamin D is known as "The Sunshine Vitamin". The major source of vitamin D for most human is exposure to sunlight. With exposure to ultraviolet (UV) radiation, vitamin D3 is synthesized in human skin via the photo isomerization of 7-dehydrocholesterol (7DHC) which ultimately produces pre-vitamin D3.[1] Exposure to the amount of sunlight that causes a slight pinkness of the skin after 24 hours (1MED) is equivalent to ingesting approximately 20,000 IU of vitamin D.[2] Very few foods naturally contain vitamin D such as Salmon, Sardine, Tuna, Mackerel, Shiitake mushroom, hardboiled egg and foods that are fortified with vitamin D like milk, cereal, orange juice, yogurt, and margarine. But those are inadequate to satisfy the requirement of vitamin D among children and adult.[3] Vitamin D deficiency causes rickets among children and osteomalacia in adults, although these represents only the tip of the vitamin D deficiency iceberg. The vitamin D receptor is distributed in the osteoblasts, small intestine, colon, activated T and B lymphocytes, B islet cells, mononuclear cells and most other organs in the human body including the brain, heart, skin, gonads, prostate, and breast.[4] In recent years, there has been lots of study regarding the influence of vitamin D on extra skeletal health, besides skeletal health. Hypovitaminosis D may be associated with diabetes mellitus[5,6], cancers[7], autoimmune diseases[8,] infectious diseases[10], multiple sclerosis[11] and other cardiovascular diseases.[12]

Nowadays, vitamin D deficiency is a silent and neglected global public health issue. Almost one billion people in the world suffer from vitamin D deficiency or insufficiency.[13] There is a

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misconception that vitamin D deficiency is prevalent only in western countries, but in practical field it is totally reverse. Previously, it was assumed that hypovitaminosis D is less frequent in tropical countries, as cutaneous vitamin D synthesis is stimulated by exposure to sun. But, surprisingly 80% of the apparently healthy population is deficient in vitamin D (<20 ng/mL) and up to 40% of the population is severely deficient (<10 ng/mL) in South Asia.[14] Rickets is still widespread in regions, in northern China where 42% of infants were found to suffer from rickets which occurs as a consequence of vitamin D deficiency during winter and spring season.[15] According to Siddiqui and Rai in Northern Pakistan, despite of abundant sunlight, rickets was a common problem in infants and children due to malnutrition, lack of awareness and antenatal factors.[16] High prevalence of vitamin D deficiency in South Asia can be explained by skin pigmentation and traditional clothing. Moreover, air pollution and limited outdoor activity is also responsible for this in the urban population.[17] In Japan, the status of vitamin D is relatively better than other regions of South Asia due to high sea fish consumption.[18]

Although there is no definite cut off point for the optimal levels of 25-hydroxyvitamin D as measured in serum. According to most expert opinion, vitamin D deficiency is defined as a 25-hydroxyvitamin D level of less than 50 nmol per liter[19], which is equivalent to 20 ng/ml. In children, due to fewer outcome data, the optimal level of serum 25(OH)D for general health is not known yet. Moreover, it is controversial than in adults.[20,21] It is evident that biochemical squeal of vitamin D deficiency may appear at cutoff levels of 75 nmol/L.[22,23] Expert opinion suggested that the minimal optimal circulating vitamin D level should be increased from 50 nmol/L to 75 nmol/L.[24,25] The level of 25-hydroxyvitamin D between 50 nmol/L and 75 nmol/L can be considered as a relative insufficiency of vitamin D.

As per above mentioned definitions, the prevalence of vitamin D insufficiency was higher among American children aged 6 - 11 years (73%) compared with children aged 1 - 5 years (63%); girls (71%) compared with boys (67%); and non-Hispanic black (92%) and Hispanic (80%) children compared with non-Hispanic white children (59%).[26] Several other studies suggest that the prevalence of vitamin D insufficiency among children is 30% - 50% in Australia, Turkey, India, and Lebanon.[27,28]

Considering the report from other Asian countries, it is assumed that Bangladesh is at risk of rickets and other vitamin D deficiency related health consequences. But there is no study regarding Vitamin D deficiency in infant, preschool, school age, adolescence stages and adult. Therefore, we aimed to determine the prevalence of vitamin D deficiency in adult of Bangladesh.

Methods

Sample

This was a cross sectional study was carried out among 189 adults (18 years and above) who were residents of Dhaka, Bangladesh and visited the clinic/chamber in the year 2017.

Sampling strategy

Participants were selected through a convenience sampling procedure. All adults aged between 18 to 89 years from every household were included in this study.

Covariates

We considered the following demographic and life-style variables: age (≤20, 21-40, 41-60, ≥61 years) and sex (Male, Female).

We categorized deficient as <20 ng/mL, insufficient as 20 – 29 ng/mL and sufficient as 30 – 100 ng/mL.

Statistical analysis

Data were presented as proportions in percentage for categorical variables and mean ± standard deviation (SD) for continuous variables.

Results

This study included a total of 189 adults (29 males and 160 females) aged between 18 and 89 years. Majority of the patients were females (84.7%). More than half, 67.2% of the patients were vitamin D deficient and 20.6% were suffering from vitamin D insufficiency. The socio-demographic characteristics of the patients are given below [see Table-I].

Table 1
Socio-demographic characteristics of the patients (n=189)

Variables	Category	Number (n)	Percentage (%)
Gender	Male	29	15.3
	Female	160	84.7
Age	≤20	6	3.2
	21 – 40	66	34.9
	41 – 60	76	40.2
	≥61	41	21.7

The percentage of deficient, insufficient and sufficient levels of vitamin D within different age group are given in the table below [see Table 2]. The maximum vitamin D deficiency is within the age group 21 – 40 years old.

Table-II
Comparison between age distribution and vitamin D deficiency

Age Group (years)	Deficient (%)	Insufficient (%)	Sufficient (%)
≤20	4 (66.6)	1 (16.7)	1 (16.7)
21 – 40	50 (75.8)	14 (21.2)	2 (3.0)
41 – 60	48 (63.1)	16 (21.1)	12 (15.8)
≥61	25 (61.0)	8 (19.5)	8 (19.5)

Maximum males and females are deficient, 69% and 66.9% respectively where as a very small percentage has sufficient level of vitamin D [see Table-III].

Table-III
Vitamin D status among male and female

Sex	Deficient (%)	Insufficient (%)	Sufficient (%)
Male	20 (69.0)	4 (13.8)	5 (17.2)
Female	107 (66.9)	35 (21.9)	18 (11.2)
Total	127 (67.2)	39 (20.6)	23 (12.2)

Discussion

In this, the first, study of status of vitamin D deficiency (VDD) among the adult population in Bangladesh, we saw the level of Vitamin D (25 hydroxyvitamin D).

The findings suggests that more than half, 67.2% of the patients were vitamin D deficient and 20.6% were suffering from vitamin D insufficiency. The maximum vitamin D deficiency is within the age group 21 – 40 years old which is 75.8% and insufficiency was also within the same group, 21.2%.

Maximum males and females are deficient, 69% and 66.9% respectively where as a very small percentage has sufficient level of vitamin D.

The study strengths include large number of sample size. In addition, we maintained the standard of estimating vitamin D level. However, the study has important limitations. We could have taken detailed history about diet, exposure to sun, outdoor activities and correlate it with the vitamin D level to get a better idea. Therefore, further studies in various settings are needed.

Conclusions

Our study found very high proportions of vitamin D deficiency (VDD) in Bangladesh and even higher proportion were among the younger group. Screening services should be implemented while researchers focus on strategies to lessen the incidence and morbidity associated with these conditions.

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