

A Study on Vitamin D Levels in Patients Attended at OPD of A Tertiary Care Hospital of Chattogram

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Abstract

Background: Vitamin D is a fat soluble vitamin, having important role in calcium and phosphorous metabolism. Many researches support the role of vitamin D against cancer, cardiovascular diseases, fractures and falls, cognitive disorders, Parkinsonism, auto-immune diseases, respiratory ailments and depression. Thus Vitamin D Deficiency (VDD) is an alarming public problem. Purpose of this study was to measure the frequency of hypovitaminosis D among different age and sex group of Chattogram, Bangladesh.

Materials and methods: A cross sectional hospital based observational study was conducted over a period of six months from February 2018 to July 2018 at a leading diagnostic complex and hospital of Chattogram. A total of 243 patients were included in the study. Number of male and female respondents were 86 and 157 respectively. Age range was 15-85 years. Blood samples were collected aseptically after an oral informed consent. Serum vitamin D levels were estimated using standard laboratory technique (Chemiluminescent microparticle immunoassay method).

Results: Among 243 respondents, male female ratio was 1:1.83, mean age was 47±16.3 years, prevalence of hypovitaminosis was 82%, among male hypovitaminosis was found in 78% cases, whereas among female it was a bit higher with 84%. Sex difference was strongly significant with p value of < 0.01.

Conclusion: The present study has limitation with estimation of only vitamin D, in absence of valuable indicators of bone health like serum calcium, bone mineral density and parathyroid hormone. Factors like, less outdoor activities, obesity or covering whole body (Abaiya or burkah) in case of Muslim women, which could be responsible for more hypovitaminosis in case of female was not noticed. But it was very much clear that 45-60 years age group was the most vulnerable with highest level of hypovitaminosis-D in both sexes.

Key words : Hypovitaminosis-D; Metabolism; Chattogram.

INTRODUCTION

Vitamin D is a fat soluble, steroid containing vitamin, important regulatory factor in calcium and phosphorous metabolism¹. The vitamin D level is regulated by different factors like Parathyroid Hormone (PTH) serum calcium level, intestinal absorption and renal function². Vitamin D is naturally synthesized in the skin during exposure to sunlight emitting ultraviolet radiation in the band of 290 to 315 nm. Vitamin D though very little portion also coming from food sources like fatty fish (Tuna, salmon and mackerel) beef liver, cheese, egg yolks and foods fortified with vitamin D, such as some dairy products, orange juice, soya milk. Vitamin D is converted in the liver to 25-hydroxyvitamin D³. The active form of vitamin D is 1,25-dihydroxyvitamin D, is produced in the kidney⁴.

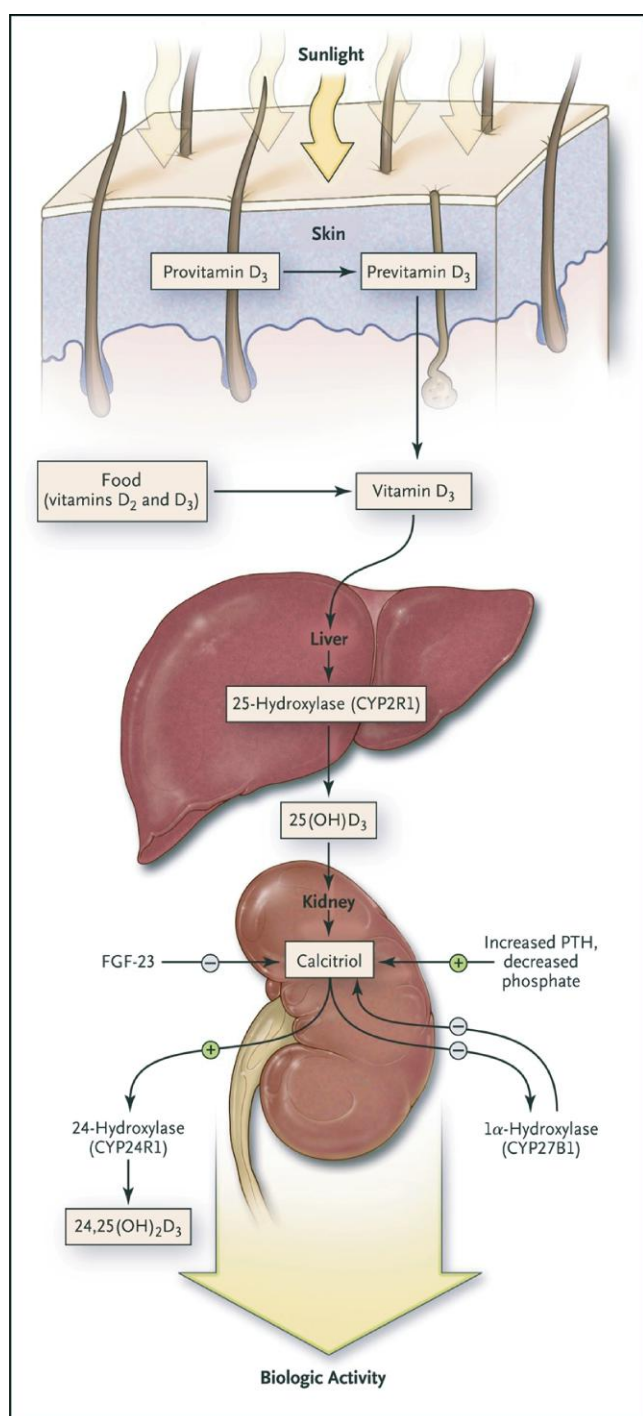


Figure 1 : Vitamin D metabolism

Multiple biological functions like inhibition of cellular proliferation and differentiation, inhibition of angiogenesis, stimulation of insulin production and inhibition of renin production are done by vitamin D⁵. Its effects on cardiovascular smooth muscles and myometrium are also documented⁶. Many researches support the role of vitamin D against cancer, cardiovascular disease, fractures and falls, cognitive disorders, parkinsonism, auto-immune diseases, respiratory ailments and depression⁷. Thus Vitamin D Deficiency (VDD) is an alarming public health problem.

Different factors affect serum vitamin D level such as, area far from the equator (amount of UVB available from sunlight, during the winter season is insufficient to produce cutaneous vitamin D synthesis), skin pigmentation (Dark skin reduces synthesis), ageing (The more the age the less the vitamin D synthetic capacity) use of sun screen or protective clothing, obesity (BMI>30 kg/m²), chronic renal, liver and gastrointestinal tract diseases and use of some drugs (e.g. anticonvulsants, glucocorticoids)^{8,9}.

The synthesis of vitamin D (Calcitriol) is stimulated by increased level of Parathyroid Hormone (PTH) and as well as low level of serum phosphate. Low level of serum vitamin D and calcium exerts a positive feedback on PTH, to increase serum calcium level, that stimulates the conversion of 25(OH)D to vitamin D in kidney and to increase the absorption of vitamin D from the gut¹⁰.

Daily recommended dose of Vitamin D is considered between 200-600 IU/day for both male and female from one year to fifty years. The requirement rises to 600 IU/day for people between 51- 70 years, and to 800 IU/day for the people older than 70 years¹¹. A recent recommendation from the American Academy of Pediatrics increased the suggested daily intake to 400 IU/day for infants, children and adolescents¹². Around one billion people have either vitamin D insufficiency or deficiency. Vitamin D deficiency level is, vitamin D level less than 20 nmol/L, however insufficiency is vitamin D level less than 30 nmol/L (1 nmol/L = 0.4 ng/ml). Hypervitaminosis of vitamin D may occur when level exceeds 100 nmol/L¹³.

This study aimed to observe vitamin-D levels in patients attending at OPD of a tertiary care hospital for reasons other than absolute vitamin D deficiency complaints. We also tried to value the impact of age and gender on it.

MATERIALS AND METHODS

A cross sectional hospital based observational study was conducted over a period of six months from February 2018 to July 2018 at a leading diagnostic complex and hospital of Chattogram to know the vitamin D status of the patients visiting OPD for various medical problems. Total 243 cases were studied. Female were more (157) than their counterpart male (86). Age range of the respondents was 15-85 years. After an informed blood was collected and serum analysed for vitamin D levels.

Inclusion criteria:

Patients attending at OPD of various specialties with symptoms unrelated to gross vitamin D deficiency were included in the study.

Exclusion criteria:

Patients with chronic liver and kidney disease, congenital anomalies and malabsorption syndrome were excluded. Unwilling patients were also excluded.

According to Lips classification and Hillock MF et al. the vitamin D status of an individual is defined as:¹⁴

< 20 ng/ml = Deficient
 20 – 29 ng/ml = Insufficient
 30 – 100 ng/ml = Sufficient
 >100ng/ml = Intoxication

RESULTS

Total 243 patients were studied for vitamin D levels. Females were more than males by being around 65%. The male female ratio was 1:1.83. The age range was between 15 to 85 years. The mean age was 47 ± 16.3 years. Majority of the hypovitaminosis-D respondents in the study were observed in the age group of 46 to 60 years in both sexes, 42% in case of male and 33% in case of female. Prevalence of hypovitaminosis D was 82% in both sex groups with male and female individual percentage were 78% and 84% respectively. Sex difference was strongly significant, p < 0.01.

Table I : Vitamin D Levels According to Sex (n=243)

Gender	Sufficient (30-100 ng/ml)	Insufficient (20-29 ng/ml)	Deficient (< 20 ng/ml)	Total
Male	19 (22%)	40 (46%)	27 (32%)	86 (35%)
Female	25 (16%)	60 (38%)	72 (46%)	157 (65%)
Total	44 (18%)	100 (41%)	99 (41%)	243 (100%)

Source: Study report 2018

In table I, it is shown that, vitamin D deficiency is more common in female than that of male with 46% in female and 32% in male respectively, whereas insufficiency level shows the opposite picture with dominancy in male group with 46% and females were a bit less than that group with 38%. Sufficiency level also projected same trend with male majority, 22% and 16% respectively. But as a whole female were more sufferer with 65% than males with 35%.

Table II : Hypovitaminosis-D According To Age Group (n=199)

Age Group	Male	Female	Total
15-30 years	07 (11%)	32 (24%)	39 (20%)
31-45 years	13 (19%)	28 (21%)	41 (21%)
46-60 years	28 (42%)	43 (33%)	71 (36%)
61-70 years	13 (19%)	17 (13%)	30 (14%)
71-85 years	06 (09%)	12 (09%)	18 (09%)
Total	67 (100%)	132 (100%)	199 (100%)

Source: Study report 2018

In table II, it is observed that, the most vulnerable age group in both sexes was 46-60 years group, with total hypovitaminosis-D level 36% and male, female percentage were 42% and 33% respectively with male dominancy. Whereas, extreme age group, 71-85 years shows least level of hypovitaminosis-D in both sexes, only 09%.

DISCUSSION

Vitamin D Deficiency (VDD) rate is increasing and these days it is a common problem among many people irrespective of age and sex. In present study, 82% respondents showed deficiency

in vitamin D, which was far more higher than a hospital based report by Rudrajit et al. as 47.5% and a community based study by Sheik et al. from Pakistan as 57% cases^{15,16}.

Regarding sex variation we found that females were more deficient in vitamin D than males, 84% and 78% respectively. Goswami et al found vitamin D deficiency in 80% female¹⁷. But opposite figure was observed by Fatima et al as 57.35% in male and 47.19% in female¹⁸. Our study found that only 18% respondents were sufficient in vitamin D, whereas, reports by Vishal et al. showed 26.83%, both these reports observed were much more better picture than the report of Rachna et al. as 10% and Rudrajit et al. as 12.5%^{19,20,15}. In present study, hypovitaminosis-D according to age group found that, elderly groups such as 61-70 years and 71-85 years had much less vitamin D deficiency (14% and 09% respectively) than the middle age group, 46-60 years (36%) It could be due to less number of respondents in the age group of 61-70 years (30 out of 199 hypovitaminosis-D cases) and age group 71-85 years (Only 18 out of 199 hypovitaminosis cases). It could be also due to the fact that elderly group might be having vitamin D and calcium supplements. But opposite figure observed by Fatima et al that with increasing age, the vitamin D levels were gradually declining with lowest levels (Cent percent) noted in the age group 81-90 and 91-100 year¹⁸. Marawah et al from India noted it as 91.2% in elderly²¹. In our study hypovitaminosis-D in the lowest age group of 15-30 years was seen as 20% and most commonly affected age group was 45-60 years showed 36%. But Harinaryan CV and Rudrajit et al. showed as 50% for the age group 21-30 years and 51% for the age group 51-60 years¹⁵. Our highest prevalence group for hypovitaminosis-D was 45-60 years age group, whereas Harinaryan CV and Rudrajit et al. reported in the age group of 31-40 years, but Rachana et al. reported highest prevalence of 95% in the age group of less than 31-40 years^{15,20}. Vitamin D deficiency in elderly most likely due to decreased dietary intake, diminished sunlight exposure, reduced skin thickness, impaired intestinal absorption, impaired hydroxylation of vitamin D in liver and kidney²².

Most of the studies reported hypovitaminosis D prevalence in females than in males as 92% in females by Rachana et al. and 28% in males, Rudrajit et al. as 53% in females and 33% in males^{20,15}. Insufficiency is predominant in female, which could be due to diet lack of calcium and vitamin D, covering whole body as dress code for Muslim female, use of sunscreen and indoor life style of female in the subcontinent.

This study was conducted as a hospital based study without other important parameters like PTH, serum calcium levels, and bone mineral density, which are related with vitamin D metabolism. Female respondents were out-numbered than male. Because more females sought medical attention than males. So sample size and sex ratio were not appropriate for concrete findings. Moreover covering the whole body as a religious symbol for Muslim females, percentage of outdoor activities were not noted in the current study. Larger sample size was needed to get a factual picture of vitamin D status.

CONCLUSION

Vitamin D deficiency was more in female than in male according to this study, peri and post-menopausal women were more vulnerable group. Regarding this, factors associated with were, limited sun exposure and time spent outdoors, inadequate dietary vitamin D intake (Including supplements), biological consequences of ageing which may lead to increased vitamin D deficiency in the elderly. So, relevant factors should be removed to reduce the hypovitaminosis-D burden.

DISCLOSURE

All the authors declared no competing interest.

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