ORIGINAL ARTICLE

25-HYDROXYVITAMIN D_3 DEFICIENCY IN HEALTHY ADULT MEN ATTENDING ISRA UNIVERSITY HOSPITAL

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Background: Serum 25-hydroxy cholecalciferol (25-OH-D_3) is a marker of both endogenous production and exogenous supply. The objective of the present study was to determine frequency of 25-hydroxyvitamin D_3 (25-OH-D_3) deficiency in normal healthy males presenting at the Outpatient Department of Isra University. It was a descriptive study conducted at the Departments of Medicine, Isra University Hospital, Hyderabad, Pakistan, from September 2014 to March 2015. **Methods:** A sample of 180 normal healthy adult male of age 18–50 years was selected. Cases were selected through non-probability consecutive sampling according to predefined inclusion and exclusion criteria. Informed written consent was obtained from the participants. Biochemical analysis of serum 25-OH-D_3 was performed on ARCHITECT I 1000^{TM} system. Data were analysed using Statistix 8.1. Continuous variables were presented as mean and standard deviation whereas categorical variables as frequency and percentages. Difference between categories was measured by using Chi-Square test for goodness of fit and a $p<0.05$ was considered significant. **Results:** Mean age of the subjects was 37.6±5.7 years. The mean 25-OH-D_3 was observed as 24.57±5.57 ηg/dl (CI 23.19–26.39). Normal, insufficiency, and deficiency of 25-OH-D_3 were noted in 4.4% (n=8), 6.6% (n=12) and 88.8% (n=160) of the subjects respectively. Vitamin D_3 as low as 7.13 ηg/dl were noted. **Conclusion:** There is high frequency of 25-hydroxyvitamin D_3 deficiency in normal healthy male adults.

Keywords: Vitamin D_3 deficiency, Male, Isra University

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INTRODUCTION

It was in 1921 that the sunshine vitamin called as vitamin D (calciferol) was first identified. Vitamin D has 2 main types viz cholecalciferol (vitamin D_3) and ergocalciferol (vitamin D_2), collectively termed as calciferol. Skin is the most important site of calciferol synthesis under sunlight exposure to UVB 290–315 ηm.[1] Serum 25-hydroxy cholecalciferol (25-OH-D_3) is a marker of both endogenous production and exogenous supply. Of total circulating vitamin D, 5% is of vitamin D_2 type and remaining 95% is of vitamin D_3.[2–4] Vitamin D is essential for bone health.[5] It is claimed to be reducing mortality in aged women.[6] Vitamin D deficiency produces rickets during childhood and osteomalacia in adulthood.[7] Vitamin D deficiency has been linked to bone fracture due to decreased bone mineral density.[8] Plasma 25-OH-D_3 is a marker of body's total vitamin D_3 stores. Vitamin D deficiency in 36% of general population and 57% of out-patients has been reported from the United States.[8] At present, vitamin D deficiency has taken shape of an epidemic in the United States.[9] In Australia 1 out of 3 of normal healthy adults showed vitamin D deficiency.[10]

Recent studies from Pakistan had reported sever vitamin D deficiency in normal adult population. Vitamin D deficiency is an endemic problem in Pakistan but the issue has never gained attention. The problem is further compounded by the lack of people who are not aware of the nature of problem.[11–14] Vitamin D deficiency is a public health problem not accepted by most of organizations.

The problem is not yet evaluated completely in our country. Vitamin D deficiency may be prevalent in all age groups, social strata, and communities of Pakistan but is overlooked. The present study was conducted to determine the frequency of 25-hydroxyvitamin D_3 deficiency in healthy male attendants presenting at the outpatient department of Isra University Hospital, Hyderabad, Pakistan.

SUBJECTS AND METHODS

This descriptive study was conducted at the Outpatient Department, Department Medicine, Isra University, Hyderabad, Pakistan from September 2014 to March 2015. A sample of 180 normal healthy adult male of age 18–50 years was selected. Study subjects were selected through non-probability consecutive sampling according to pre-defined inclusion and exclusion criteria. Normal healthy adult male were included in study protocol. Men with history of any systemic disease, intake of vitamin and mineral pills and drug users were excluded. Normal, insufficiency and deficiency of vitamin D_3 were defined as >30 ηg/dl, 20–30 ηg/dl and <20 ηg/dl respectively.

Five ml of blood was drawn into disposable syringe. Blood was centrifuged for 10 minutes at 4000 rpm. Sera were frozen at -20 ^{o}C. Biochemical analysis of serum 25-OH-D_3 was performed on ARCHITECT I 1000^{TM} system. Written consent was obtained from all participants. Ethical review committee approved the

study. Study data was collected on a performa. Data was entered into Statistix 8.1. Continuous variables were presented as mean and standard deviation whereas categorical variables as frequency and percentages. Difference between categories was measured by using Chi-Square test for goodness of fit and a *p*-value of less than 0.05 was considered significant.

RESULTS

Mean age of study population was 37.6±5.7 years. The mean 25-hydroxyvitamin D_3 was 24.57±5.23 ηg/dl with 95% confidence interval of 23.19–26.39 (Table-1).

Normal, insufficiency, and deficiency of 25-hydroxyvitamin D_3 were found in 4.4%, 6.6%, and 88.8% as shown in Table-2. (p=0.001). 25-hydroxyvitamin D_3 as low as 7.13 ηg/dl was noted in our study population.

Table-1: Statistical parameters of 25-OH-D_3 (n=180)

Parameter	Findings (ηg/dl)
Mean 25-OH-D_3	24.57±5.23
Range 25-OH-D_3	7.1–35.43
95% Confidence interval	23.19–26.39
Normal 25-OH-D_3 (>30 ηg/dl)	30.55±0.7
Insufficiency 25-OH-D_3 (20–30 ηg/dl)	25.13±1.3
Deficiency 25-OH-D_3 (<20 ηg/dl)	14.91±4.8

Table-2: Frequency of individuals with normal, insufficiency and deficiency of 25-OH-D_3 (n=180)

25-OH-D_3	Frequency	*p*-value
Normal	16 (4.4%)	0.001
Insufficiency	12 (6.6%)	
Deficiency	160 (88.8%)	

DISCUSSION

Worldwide, vitamin D deficiency has erupted as a new global epidemic among children, male and female. The 25-hydroxyvitamin D_3 deficiency is confounded by various factors in general population. Of various factors, some are lack of sunlight exposure, aging, dietary deficiency, lack of balanced diet and overcooking of food, increased demand, and drug related deficiency.[15,16] The 25-hydroxyvitamin D_3 deficiency is associated with other morbidities such as intestinal cancer, prostatic cancer, cardiovascular diseases, and diabetes mellitus, etc.[16,17] The 25-hydroxyvitamin D_3 deficiency secondarily produces hyperparathyroidism. The 25-hydroxyvitamin D_3 deficiency is associated with approximately 200 altered gene expressions in the human body.[18,19] The 25-hydroxyvitamin D_3 deficiency is also an indicator of bone mass density and is used clinically for bone disease interpretation. The 25-hydroxyvitamin D_3 supplements increase muscle power and strength. Body's vigour and vitality is also increased. The 25-hydroxyvitamin D_3 supplements lessen the frequency of body falls by around 50%.[20]

It is recommended to supplement vitamin D_3 supplements every 3rd or 4th month when the levels fall below 10 ηg/ml, or 3 times a week for 30 days.[21] The present study showed high frequency of vitamin D_3 deficiency among healthy male attendants presenting at the outpatient departments of Isra University Hospital. Daly RM *et al* have reported 31% 25-OH-D_3 deficiency in Australians.[11] The findings of 25-hydroxyvitamin D_3 deficiency in the present study are supported by a study from Faisalabad, which had reported 18% 25-OH-D_3 insufficiency and 77.5% 25-OH-D_3 deficiency.[22] Another study had reported 3% had normal 25-OH-D_3, 10% 25-OH-D_3 insufficiency and 87% had 25-OH-D_3 deficiency, however, the study population comprised of pregnant women only.[23] Still another study from Karachi reported 90.1% 25-OH-D_3 deficiency, the study population comprised of pre-menopausal women.[24] The findings of above study are parallel to the findings of present study.

The 25-OH-D_3 deficiency is highly prevalent in both men and women irrespective of exposure to sunlight. It can be recommended to launch public awareness campaigns and vitamin D_3 supplementations should be instituted.

CONCLUSION

There is high frequency of Vitamin D_3 deficiency in normal healthy adults. Vitamin D_3 supplementation is recommended. Further studies are warranted.

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