

# 25-Hydroxyvitamin D<sub>3</sub> Levels in Young Healthy Females Attending Isra University Hospital

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## ABSTRACT

**Objective:** To determine 25-hydroxyvitamin D<sub>3</sub> (25-OH-D<sub>3</sub>) levels in young healthy female attending Isra University Hospital.

**Methods:** This observational study was conducted in the departments of Biochemistry/Obstetrics and Gynecology, Isra University Hospital from June 2013 to December 2013. A sample of 90 females were selected according to pre-defined inclusion and exclusion criteria. Female of 18-28 years were selected through non-probability purposive sampling. Volunteers were asked to sign the consent form. Vitamin D level was detected by the "ARCHITECT I 1000" system. Software SPSS 21.0 version was used for analysis. Numerical values were analyzed by one way ANOVA for differences among groups. Post Hoc Tukey-Cramer was used for differences between groups. Data was analyzed at 95% Confidence Interval (P<0.05).

**Results:** Age of study subjects was noted as 22.6±3.2 years. Mean (±SD) 25-OH-D<sub>3</sub> was noted as 26.20±4.30 ng/dl (CI 24.90-27-49). Normal 25-OH-D<sub>3</sub> was noted in 4 (4.4%) of subjects. Insufficient and deficient 25-OH-D<sub>3</sub> were found in 6 (6.6%) and 80 (88.8%) of subjects respectively (p=0.0001). 25-OH-D<sub>3</sub> values of 8 ng/dl were noted.

**Conclusion:** The present study reports severe deficiency of vitamin D<sub>3</sub> in female attending Isra University. Further studies are recommended to find prevalence of 25-OH-D<sub>3</sub>. Vitamin D supplementations may be prescribed.

**Key words:** Vitamin D<sub>3</sub>, female, Isra University Hyderabad

**Article Citation:** Abbasi ST, Siddiqui S, Qureshi NA, Talpur M, Haider G. 25-Hydroxyvitamin D<sub>3</sub> Levels in Young Healthy Female Attending Isra University Hospital J Peoples Uni Med Health Sci. 2016;6(3):119-23..

## INTRODUCTION:

Vitamin D belongs to class of secosteroids. It is a fat soluble vitamin acting as hormone. It is

essential for intestinal absorption of calcium and phosphate as stimulated by parathyroid hormone. Vitamin D was discovered in 1921. It has 2 specific types; called vitamin D<sub>3</sub> and vitamin D<sub>2</sub>, collectively known as the calciferols. Vitamin D<sub>3</sub> is termed as cholecalciferol and vitamin D<sub>2</sub> as ergocalciferol. It is synthesized in the skin by sun exposure and is also present in diet. Sun light (UVB 290315 nm) exposure of skin may produce sufficient vitamin D in many people, but this depends upon time exposure and timings of sunlight.<sup>1</sup>

Vitamin D<sub>3</sub> forms major part of total vitamin D. Vitamin D<sub>3</sub> has endogenous source as synthesized by sun light and exogenous source as

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present in foods. Combination of both sources prevents deficiency.

Approximately 95% of circulating vitamin D is D<sub>3</sub>, while vitamin D<sub>2</sub> comprises 5%. Subjects taking Vitamin D<sub>2</sub> supplements may show its levels in blood more than 5%.<sup>2-4</sup>

Vitamin D<sub>3</sub> is hydroxylated in liver at position 25, hence termed as 25-OH-D<sub>3</sub>, which further gets a hydroxylation group at position 1, in kidney now called 1, 25-dihydroxyvitamin D<sub>3</sub>. Only 1, 25-OH-D<sub>3</sub> is active vitamin hormone. It is essential for bone health.<sup>5</sup> It is reported to reduce mortality in matured women.<sup>6</sup> Deficiency of 25-OH-D<sub>3</sub> causes bone disease called osteomalacia and rickets. These both disorders are characterized by painful fragile bones.<sup>7</sup> 25-OH-D<sub>3</sub> deficiency also shows less bone mineral density (BMD).<sup>8</sup> 25-OH-D<sub>3</sub> has got a lot of attention these days due to reported deficiency in various social classes of different countries. A study from United States reported 36% deficiency in adults and 57% of subjects presenting at hospitals.<sup>8</sup> Vitamin D insufficiency and deficiency is now running as an epidemic in the United States.<sup>9</sup>

Similar rates of deficiency have been reported from Europe, Australia and Pakistan.<sup>10-12</sup> One in three is vitamin D deficient, has been reported from Australia.<sup>10</sup> Severe deficiency have been reported from Pakistan.<sup>11-14</sup>

Keeping in view the above studies reporting severe deficiency, the present study was planned to evaluate the 25-hydroxyvitamin D<sub>3</sub> in healthy young adult female attending Isra University Hospital.

#### METHODS:

The present study took place at the Departments of Biochemistry/Obstetrics and Gynecology, Isra University Hospital from June 2013 to December 2013. Inclusion and exclusion criteria were exercised for sampling through non-probability (purposive) sampling. A sample of 90 young healthy volunteer female attendants of patients attending the Gynae & Obs OPD of age 18-28 years were selected. Female with normal menstrual cycle and not taking any vitamin drug

supplements were eligible for inclusion in study protocol. A history of vitamin D supplementation, multivitamin formulations and female suffering from chronic debilitating illness were for exclusion. Cut off values of vitamin D<sub>3</sub> in present study were defined as vitamin D deficiency < 20ng/dl, vitamin D values between 20-30 ng/dl as insufficiency and > 30ng/dl as normal vitamin D<sub>3</sub>.

The study was approved by ethical committee. Volunteer's subjects were asked to sign consent form. They were asked for venous blood sampling, 5 ml of venous blood samples were taken and processed for centrifugation at 4000rpm for 10 minutes. Sera were frozen at -20°C. Vitamin D was estimated by the "ARCHITECT I 1000" system. A structured proforma was pre designed for data entry.

Software SPSS 21.0 version was used for analysis. Numerical values were analyzed by one way ANOVA for differences among groups. Post Hoc Tukey-Cramer was used for differences between groups. Data was analyzed at 95% Confidence Interval (P<0.05).

#### RESULTS:

Age of study subjects was noted as 22.6±3.2 years. Mean (±SD) 25-OH-D<sub>3</sub> was noted as 26.20±4.30 ng/dl (CI 24.90-27.49) (table I & graph I). Normal 25-OH-D<sub>3</sub> was noted in 8 (4.4%) of subjects (table II). Insufficient and deficient 25-OH-D<sub>3</sub> were found in 6 (6.6%) and 80 (88.8%) of subjects respectively (p=0.0001) (table III).

**Table-1:** 25 Hydroxyvitamin D<sub>3</sub> (ng/dl) of Study Subjects (n=90)

Mean	Std. Dev	Range	95% Confidence Interval
26.20	4.30	19.10-36.50	24.90-27.49

#### DISCUSSION

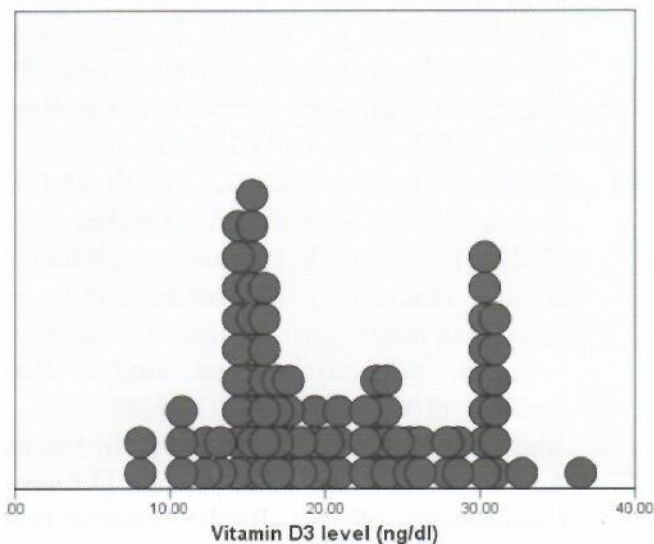
There are numerous elements which add to the 25-OH-D<sub>3</sub> deficiency and insufficiency throughout the World. Reduced exposure to sunlight, sun screens, modern life style and reduced vitamin D food supplements, all add to the growing problem. 25-OH-D<sub>3</sub> insufficiency is

**Table-2:** Normal, Insufficiency & Deficiency of 25-Hydroxyvitamin D<sub>3</sub> (ng/dl) (n=90)

25 Hydroxyvitamin D <sub>3</sub> (mean±SD)	Normal Levels (>30ng/dl)	Insufficiency (20-30 ng/dl)	Deficiency (<20ng/dl)	p=value
	30.55±0.7	25.13±1.3	14.91±4.8	p<0.01

**Table-3:** 25 Hydroxyvitamin D<sub>3</sub> (ng/dl) of Study Subjects (n=90)

25 Hydroxyvitamin D <sub>3</sub> No. (%)	Normal Levels (>30ng/dl)	Insufficiency (20-30 ng/dl)	Deficiency (<20ng/dl)
	8 (4.4%)	6 (6.6%)	80 (88.8%)

**Figure-1:** 25 Hydroxyvitamin D<sub>3</sub> distribution in study population

getting pandemic among older and young populations of the World over.<sup>15,16</sup> There are no proofs of a firm association of 25-OH-D<sub>3</sub> inadequacy with different disease states prevailing in the society such as the coronary heart disease, gut problems, cancers and diabetes mellitus.<sup>16,17</sup> 25-OH-D<sub>3</sub> deficiency augments the hyper parathyroid state.<sup>18,19</sup> There are about 200 genes whose expression is modified by normal vitamin D which become disturbed due to its deficiency. Hence the link between gastrointestinal system and bone is established. Supplements of 25-OH-D<sub>3</sub> improve muscular-skeletal system and reduce fall rate by 50%, has been reported.<sup>20</sup>

When the 25-OH-D<sub>3</sub> blood levels fall

below 10 ng/ml, the clinicians recommend and use 50,000 IU of this vitamin. This vitamin dose is used once orally per week for approximately 60-90 days. Three times a week for 30 days is the alternative protocol.<sup>21</sup> The present study showed high frequency of 25-OH-D<sub>3</sub> deficiency in young otherwise healthy female attendants of patients presenting at the Isra University Hospital, Hyderabad.

A previous study, included 11,247 adults, from Australia had reported 31% deficiency<sup>22</sup> which is in support to the present study.

The findings of present study are bolstered by a study reported from Faisalabad, Punjab. They reported 77.5% of vitamin D deficiency and additional insufficiency in 18% of subjects.<sup>23</sup> That previous study reported deficiency was prevalent among female noticeably. Another previous study reported deficiency, insufficiency and normal levels in 87%, 10% and 3% of pregnant female.<sup>24</sup>

90.1% deficiency of vitamin D has been noted in pre menopausal women as has been reported from Karachi.<sup>25</sup> This is comparable to 88.8% deficiency noted in the present study. The high frequency of vitamin D deficiency most probably is due to lack of sun exposure which is because of social taboos. The covered bodies are never exposed to sun light; hence they don't synthesize vitamin D. As a mark of social value, our female population wears burqa; don't expose hand and face, hence not exposed to sun light. This practice of covering is because of the social and religious standards existing in our general public.

Eating habits, overcooking of foods and eating junk foods also add to vitamin D deficiency. We are of opinion, based on the evidence, that the female should get vitamin D screening and supplementation if deficient. Nationwide strategies of vitamin D screening and supplementation are recommended.

## CONCLUSION

The present study reports severe deficiency of vitamin D<sub>3</sub> in female attendants of patients attending Isra University. Further studies are recommended to find prevalence of 25-OH-D<sub>3</sub>. Normal female may be screened and supplemented with vitamin D supplements.

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