

Vitamin D Status in Islamic Lactating Women and Impact of Vitamin D Injection

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Abstract

Background: Vitamin D deficiency is related to low sunlight exposure, diet, skin type, covering of the skin, use of sunscreens, aging and low dietary vitamin D and calcium intake and has long been recognized as a medical condition characterized by muscle weakness, bone pain and fragility fractures. **Objective:** To determine prevalence of 25-hydroxy vitamin D [25(OH) D] deficiency in lactating Islamic women and impact of vitamin D injection in deficient group. **Methods:** Baseline determination of serum calcium (Ca), phosphorus (P), Alkaline-phosphatase (ALP), Parathyroid hormone (PTH) and 25 (OH) D levels in participants and according to their biochemical findings divided in three groups, sufficient, insufficient and deficient and intervention with 600000 IU vitamin D injection in deficient group and compare with baseline deficient group. **Results:** Participants included 286 lactating women with mean ages 28 years. 28 (9.7%) of participants were sufficient, 123 (43%) insufficient and 135 (47.2%) deficient according to their serum 25 (OH) D levels. Baseline mean \pm SD serum 25 (OH) D and PTH in deficient and normal groups were 6.8 ± 2 ng/ml, 56.5 ± 45 pg/ml and 33.6 ± 0.8 ng/ml, 45.5 ± 15 pg/ml respectively. After intervention in deficient group serum PTH decreased and 25 [OH] D significantly increased. All serum Ca, P and ALP did not significantly altered. There were not significant differences in all variables between normal groups with after intervention in deficient group. **Conclusion:** Vitamin D deficiency is most prevalent in Iranian lactating Islamic women and can cause medical problem in future life if it is not prevented by supplementation and information to women and also if medical or health government authorities not pay attention to it.

Keywords

Vitamin D, Sunlight Exposure, Parathyroid Hormone, Supplementation

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1. Introduction

Human get vitamin D from exposure to sunlight, from their diet, and from dietary supplements¹⁻². A diet high in oily fish prevents vitamin D deficiency³. Besides skin type, low sunshine exposure, covering of the skin, use of sunscreens, aging and low dietary vitamin D and Calcium intake contribute to a deficient vitamin D status⁴. Solar ultraviolet B radiation (wavelength, 290 to 315 nm) penetrates the skin and converts 7-dehydrocholesterol (provitamin D₃) to

previtamin D₃¹. Because any excess previtamin D₃ or provitamin D₃ is destroyed by sunlight, excessive exposure to sunlight does not cause vitamin D₃ intoxication². Whereas frank vitamin D deficiency, serum level of 25(OH) D below 10ng per milliliter (25 nmol per liter) has long been recognized as a medical condition characterized by muscle weakness, bone pain and fragility fractures. Vitamin D insufficiency, characterized as a serum level of 25(OH) D of 10 to 30 ng-per milliliter (25 to 75 nmol per liter) without overt clinical symptoms, has recently become a concern of the part of physicians and patients⁵. Vitamin D deficiency is

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highly prevalent in the United States and worldwide⁶. Low levels of 25 (OH) D, principal circulating storage form of vitamin D, are present in as many as one third to one half of otherwise healthy middle-aged to elderly adults⁷. Limited cutaneous synthesis due to inadequate sunlight exposure or pigmented skin and inadequate dietary intake are principal causes of low 25 (OH) D levels.

2. Methods

2.1. Study Objective

To determine prevalence of vitamin D deficiency in healthy lactating women in a randomized control trial and intramuscular injection of 600,000 IU vitamin D in deficient women and comparing their serum vitamin D levels after one month with before intervention.

2.2. Study Population

The participants were apparently healthy white lactating women with various ages who wanted to consult with me (pediatrician) in a private practice medical office for their infants. After a brief explanation about causes, symptoms and signs of osteomalacia such as muscle weakness, bone pain and deformity and hip fracture in future years, if they agreed and accepted recruited in study and blood examination were requested to analyze for Ca, P, ALP, PTH and 25(OH) D levels. The Islamic women have to put on long dark garments and maghnaeh (Islamic scarf) for their heads and hairs under compulsion by government. So they can not get vitamin D from sunlight exposure and also consumption of milk products and vitamin D supplementation are insufficient or rare and do not intake supplements. All women were various ages, higher or secondary education and economic and breast fed their infants. Participants were recruited from November 2012 to October 2013 in Tehran, Iran. Potential participants

were excluded if they had been treated for vitamin D deficiency or intake supplementation within the last 3 months or had diseases interfering with vitamin D. The total study participants included 389 lactating women at baseline of these 103 (26.4%) did not participate or provide a blood sample were excluded. This resulted in the inclusion of data on 286 participants. The participants divided into three groups according to their serum 25(OH) D levels, normal 25 (OH) D (>30 ng/ml), insufficient (10-30 ng/ml), deficient (<10 ng/ml) and supplemented 600,000 IU vitamin D intramuscular injection in deficient women and blood samples analyzed again after one month.

2.3. Statistical Analysis

Differences in demographic and serum levels of variables were used one way ANOVA analysis and paired t test and pvalue (0.05) was significant.

2.4. Biochemistry

Morning blood samples were taken by venipuncture after an overnight fast. Blood samples were immediately centrifuged and the plasma or serum was used immediately or frozen for later measurements. Serum Ca, P and ALP were measured according to routine laboratory methods in a local laboratory. For serum 25(OH) D were analyzed using Elisa (Hiperion, Diasource Kit, Belgium) and serum PTH Electro-Chemiluminescent immunoassay (Liaison, Roche Kit).

3. Results

The characteristics of 286 participants and their blood samples levels that were included in the study are shown in table 1.

Table 1. Baseline characteristics and biochemical findings in three groups.

Group	N(%)	Age (y)	Ca mg%	P mg%	ALP IU/L	PTH pg/ml	25(OH)D ng/ml
Normal	28(9.7)	28.6±4.3	9.2±0.6	4±0.6	257±85.6	46.5±15.2	33.6±0.8
Insufficient	123(43)	28.4±3	9.1±0.4	3.9±0.6	267±65.6	57.6±18.3	22.7±0.9
Deficient	135(47.2)	28.2±4.4	9.4±0.6	3.9±0.5	229±90.7	56.5±45	6.8±2

All values are mean ± standards deviation

The serum comparison of variables between three groups by using one way variance showed mean Ca (P=0.45), P (P=0.307) and ALP (P= 0.598) but ANOVA showed significant difference between three groups (P=0.022) and also Post hoc analysis showed difference between normal and deficient group. Serum 25 (OH) D level showed significant differences between three groups (P<0.001). The post hoc analysis showed the difference is between insufficient group with normal and deficient group.

Of 136 participants in deficient group only 66 (48.5%) of them accepted to participate to intervention study. The characteristic of them are displayed in table 2.

The Post hoc analysis showed that serum difference of 25(OH) D level is related to mean concentration 25(OH) D in normal with deficient group. The comparison of serum Ca, P, ALP and PTH concentration in before and after intervention in deficient groups with paired t test analysis showed relatively no differences between them but increased in

serum 25(OH) D concentration after intervention.

The comparison of normal group with after intervention group by t test analysis did not show significant difference

between them.

Table 2. Characteristics and biochemical findings in deficient group before and after intervention.

Deficient Groups	N(%)	Age (y)	Ca mg%	P mg%	ALP IU/L	PTH pg/ml	25(OH)D ng/ml
Before Intervention	66(48.5)	27.5±3.6	9.3±0.6	3.9±0.4	235.9±105.8	63±50.2	6.4±2
After intervention	66(48.5)	27.5±3.6	9.3±0.5	3.9±0.5	210±71	51±33	23.4±16.8

All values are mean ± standards deviation

4. Discussion

In our study, first of all, we determined prevalence serum 25 (OH) D deficiencies in volunteers lactating women in a city (Tehran, Iran) with emphatic rules of Islamic orders which women have to cover their bodies and hairs with dark garments and maghnaeh and they do not dare to take off their garments or maghnaeh. So their skin is not exposed to the sunlight which is one of free factors to synthesize vitamin D. As we showed in result section, serum PTH level relatively has increased in deficient group and decreased with vitamin D intervention. As a result of vitamin D deficiency, calcium absorption will be reduced and PTH level will increased (secondary hyper - parathyroidism)⁸. In one study, serum 25(OH)D levels were directly related to bone mineral density, with a medium density achieved when the 25(OH)D level reach 40 ng/ml or more⁹. But serum 25(OH)D level in our study even in normal group and after intervention in deficient group did not reach the above mention study. When serum 25(OH)D level was 30 ng/ml or less, there was a significant decrease in intestinal calcium absorption¹⁰ that was associated with increased parathyroid hormone. Our study demonstrated above investigation and if we see no change in serum calcium level we suppose the women took inadequate calcium and vitamin D supplement during pregnancy and probably after delivery or hypomagnesemia can blunt secondary hyper- parathyroidism which means that parathyroid hormone level are often normal when 25(OH) D levels fall below 20ng/ml¹¹. Unfortunately, we did not measured serum magnesium level in our participants.

In addition, one of factors which has been associated with vitamin D deficiency is bread which is one of the most important foodstuff consume by Iranian people every day. It has been postulated that high phytate content of bread may interfere with enterohepatic circulation of vitamin D metabolites¹² and can be a risk factor for vitamin D deficiency¹³. Dahifar *et al.*¹⁴. have demonstrated asymptomatic Rickets in adolescent girls 11-15 aged year that is similar to present study but the participants in present study are older than them. Whicherts *et al.*¹⁵ demonstrated baseline serum 25(OH)D < 10- ng/ml in a group aged 18-85

years administrated daily 800 IU or 100,000 IU/3 month and sunlight exposure one half hour per day for 6 month. The results of mean serum 25(OH)D in 100,000 IU/3 months group and sunlight exposure group were 20 ng/ml and 11.6 - ng/ml respectively in comparison with our study there is not significant differences between them. But it seems that vitamin D supplementation is insufficient in two studies and in addition Dahifar¹⁴ have demonstrated vitamin D supplementation is better than sunlight exposure in deficient group in Islamic female population.

5. Conclusion

This study demonstrated majority of Iranian women suffer from vitamin D deficiency which will become severe medical problem in futures years if the medical or health government authorities do not pay attention to it and also it can be a trigger for all Islamic countries.

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