Serum Vitamin D Level in Pregnant Women during the First Antenatal Visit

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ABSTRACT

The present study aims to evaluate the serum levels of vitamin D among the pregnant women in their first prenatal visit. All women referring to the prenatal clinics in their first trimester of pregnancy between February 2014 and February 2015 were included in this study. Demographic characteristics including age, weight, BMI and gravid were recorded. For all of them serum 25 (OH) D and FBS were checked and asked about history of diabetes mellitus. Blood levels of 25 (OH) D ≤20 nmol / l, 20-30 nmol / l, > 30 nmol / l were diagnosed as deficiency, insufficiency, and normal, respectively. In this study, blood vitamin D levels in 126 pregnant women in the first trimester were checked. The age of majority of people was 26-30 years. Most of pregnant women were gravid one. Among 126 pregnant women, 85 patients (67.5%) had deficiency of vitamin D and 27 patients (21.4%) had insufficiency and 14 patients (11.1%) had normal vitamin D levels. The BMI of majority of people was within the normal range. Among overweight people, about 70.5%, suffered from lack of vitamin D and in obese people around 64.3% suffered vitamin D deficiency. Low weight people had 100% vitamin D deficiency. 111 patients (88.1%) had normal FBS in which 73 patients (65.8%) suffered from vitamin D deficiency. Given the high prevalence of vitamin D deficiency among pregnant women particularly in developing countries, in this study we demonstrated that in our country despite intense and sunny climate almost in all seasons, vitamin D deficiency can be found in abundance. Therefore we recommend measuring levels of vitamin D in the first trimester of pregnancy in all pregnant women.

Keywords: Pregnant Women, Vitamin D Deficiency, Vitamin D insufficiency, Body Mass Index, Fast Blooding Sugar

INTRODUCTION

During the recent decades, vitamin D has been an important factor for mothers and children health. Rickets in children and problems bone mineralization are related to Vitamin D deficiency and only a small part of it(1, 2).

Vitamin D regulates more than 1,000 human genes and Vitamin D receptors are found in many tissues of the body cells(3). After absorption, vitamin D is transported through the bloodstream to the liver and goes under a two-stage hydroxylation. Primarily in the liver, it is transformed to 25 (OH) VIT D (calcidiol) and ultimately in kidneysit transforms to D (calcitriol) dihydroxy-vitamin 1, 25.that is biologically active form of vitamin D (4). Absorption of vitamin D is through sun exposure and supplements. Skin absorption of vitamin D from UVB has determinant effect
on vitamin D blood level. Foods that contain these vitamins include (liver, fish, eggs, milk, dairy products, soymilk, butter, margarine)(5). People who cover their skin due to cultural and religious reasons with clothing and those who are far from equator during the winter are more at risk of vitamin D deficiency(5, 6).

A large number of studies have shown that lack of vitamin D during pregnancy leads to adverse pregnancy outcomes such as gestational diabetes and preeclampsia and preterm(7-13). Vitamin D deficiency increases the risk of low birth weight(14), wheezing (15-17), respiratory infection (17-19), diabetes(20), Multiple Sclerosis(21), schizophrenia(22) in children born. Vitamin D deficiency in adults is connected with cardiovascular disease(23), infection(24) and cancer(25). Laboratory CUT-OFF has not been determined to identify deficiency or insufficiency. Previous studies have shown that the high levels of vitamin D, more than 30 ng / ml, are more beneficial for health in the adult population.

The general consensus is that the levels of 25(OH) D <20 ng / ml is the lowest level of prevalence of deficiency of vitamin D (one million) is evident all over the world (26). Although most of the year in Iran people is exposed to sunlight, vitamin D deficiency is a common problem among Iranian women due to low consumption of seasonal food. In this study, vitamin D deficiency in prenatal clinics in their first trimester of pregnancy was studied.

**MATERIAL AND METHODS**

All women referring to the prenatal clinics during their first pregnancy trimester between February 2014 and February 2015 were studied in this study. Demographic characteristics including age, weight, BMI and gravid were recorded. For all patients serum 25 (OH) D and FBS were checked and asked about history of diabetes mellitus. Blood levels of 25 (OH) D ≤20 nmol / l, 20-30 nmol / l, > 30 nmol / l were chosen as deficiency, insufficiency, and normal respectively.

**RESULTS**

In this study, blood vitamin D levels in 126 pregnant women in the first trimester were studied. The majority of people were 26-30 years (53.6%), Most of pregnant women were gravid (Tables 1 and 2).

Among 126 pregnant women, 85 patients (67.5%) had deficiency of vitamin D and 27 patients (21.4%) had insufficiency and 14 patients (11.1%) had normal vitamin D levels.

### Table 1. Demographic data of the participants of the study

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>47.6</td>
<td>47.6</td>
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<tr>
<td>2</td>
<td>36</td>
<td>28.6</td>
<td>28.6</td>
<td>76.2</td>
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<td>3</td>
<td>20</td>
<td>15.9</td>
<td>15.9</td>
<td>92.1</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>3.2</td>
<td>3.2</td>
<td>95.2</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>4.8</td>
<td>4.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. The frequency distribution of the patients based on the different levels of vitamin D

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficiency</td>
<td>85</td>
<td>67.5</td>
<td>67.5</td>
<td>67.5</td>
</tr>
<tr>
<td>Insufficiency</td>
<td>27</td>
<td>21.4</td>
<td>21.4</td>
<td>88.9</td>
</tr>
<tr>
<td>Sufficient</td>
<td>14</td>
<td>11.1</td>
<td>11.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
The BMI of majority of people was within the normal range. Among overweight people, about (70.5%), suffered lack of vitamin D and obese people around (64.3%) suffered vitamin D deficient (Fig. 2). Low weight people had 100% vitamin D deficiency. One hundred and eleven patients (88.1%) had normal FBS in which 73 patients (65.8%) suffered vitamin D deficient (Fig. 3).
Table 3. Relationship between fasting blood sugar and different vitamin D types

<table>
<thead>
<tr>
<th>D₃ group</th>
<th>Count</th>
<th>FBS group &lt;95</th>
<th>FBS group &gt;96</th>
<th>Total Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% within D₃ group</td>
<td>85%</td>
<td>14%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>% within FBS group</td>
<td>65.8%</td>
<td>80%</td>
<td>67.5%</td>
<td></td>
</tr>
<tr>
<td>Insufficiency</td>
<td>Count</td>
<td>26</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>% within D₃ group</td>
<td>96.3%</td>
<td>3.7%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>% within FBS group</td>
<td>23.4%</td>
<td>6.7%</td>
<td>21.4%</td>
<td></td>
</tr>
<tr>
<td>Sufficient</td>
<td>Count</td>
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<td>2</td>
<td>14</td>
</tr>
<tr>
<td>% within D₃ group</td>
<td>85.7%</td>
<td>14.3%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>% within FBS group</td>
<td>10.8%</td>
<td>13.3%</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>111</td>
<td>15</td>
<td>126</td>
</tr>
<tr>
<td>% within D₃ group</td>
<td>88.1%</td>
<td>11.9%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>% within FBS group</td>
<td>100.0%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3. Distribution of vitamin D3 versus fasting blood sugar of pregnant women

DISCUSSION

Vitamin D deficiency and insufficiency, especially in pregnant women has been reported in all communities. Vitamin D deficiency and insufficiency in the 126 pregnant women during their first visit were checked. Among them, 85 patients (67.5%) suffered deficiency of vitamin D and 27 patients (21.4%) suffered insufficiency of vitamin D and 14 patients (11.1%) had normal level of vitamin D. Due to the high prevalence of deficiency of vitamin D, no association between BMI and FBS and gravidity was found. In a study in our country, vitamin D deficiency among women in rural areas (61.1%) compared to urban women (46.2%) was more prevalent(27). Vitamin D deficiency in Pakistanis mothers and children has been reported(28). Lack of vitamin D and osteomalacia is abundant among pregnant women of South Asia(29). Other studies suggested that vitamin D deficiency is more prevalent in the winter than in the summer and is associated with increase in BMI(30). In a study, Moreno-Reyes et al reported that vitamin D deficiency is highly prevalent among adult population and those that migrate are at more risk(31).
Wortman et al. stated that the difference in 25 (OH) D serum levels of seasonal changes due to reduced exposure to UBV is one of the main causes of vitamin D deficiency in many European countries. Vitamin D deficiency linked to BMI is due to vitamin D stored in fat tissue(31). In Malaysia, despite the abundant sun exposure a large number of women have insufficient levels of vitamin D. The main cause of this phenomenon is dark skin, avoiding sun exposure and wearing clothes that cover the skin surface of the body outside the house(32). Brot C et al. stated that smoking is effective in vitamin D deficiency with unknown etiology(33).

In a study in 2009 on 300 pregnant women with vitamin D levels less than 37.5 ng/l, the risk of cesarean section was high(34). High levels of vitamin D are associated with lower incidence of preeclampsia and blood pressure in pregnancy(35).In a study in 2011, it was announced that gestational hypertension is more common in winter and rainy seasons in which vitamin D deficiency is more prevalent(36). In a study, POEL et al stated that the level of vitamin D is associated with gestational diabetes(37).Women who had daily intake of 400-4000 IU of vitamin D since 12-16 weeks of pregnancy faced with a decreased risk of preterm delivery(38).It was noted that more than 6000 IU / d during pregnancy is needed(39). Holick MF stated that at least 1500-2000 IU / d during pregnancy to bring blood levels of 25 (OH) D to 30 ng / ml is required(40).

CONCLUSION

Given the high prevalence of vitamin D deficiency among pregnant women particularly women in developing countries, in this study we demonstrated that in our country despite intense and direct sun radiation almost in all seasons, lack of vitamin D can be found in abundance. Therefore we recommend measuring levels of vitamin D in the first trimester of pregnancy in all pregnant women.

Acknowledgment

This study was supported by a research grant from the Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. The present study is extracted from medical doctoral thesis of Dr. Leili Zarei. The authors wish to acknowledge the efforts of Dr. Masoud Hemadi (Vice Chief of the Fertility, Infertility and Perinatology Research Center, Ahvaz Jundishapur University of Medical Sciences (AJUMS), Ahvaz, Iran) for their generous help in processing the study.

REFERENCES


