Original Article

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Assessment of Vitamin D Status in Pregnant Women, a Prospective Observational Study from Northern District of Kashmir Valley

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Abstract

Background: An increased prevalence of vitamin D deficiency has been reported from across the globe including India. Various studies have shown an intrinsic relation between various parameters of maternal and fetal wellbeing with maternal vitamin D status during pregnancy. Aims: To prospectively assess the vitamin D nutritive status in pregnant women in North district of Kashmir Valley and to study the prevalence of suboptimal vitamin D status in apparently healthy pregnant North Kashmiri women.Study Design: Sixty three consenting pregnant women attending the antenatal clinic of the DH Baramulla and Endocrine OPD over the study period of 12 months were enrolled. **Subjects and Methods:** The subjects underwent a detailed history and physical examination as per a pre-formed Performa. History was focused on occupation, dietary history including diet taken in last 24 hours, exposure to sunlight, drug intake, menstrual history and history of any systemic illness. A particular record was made of the women's dressing habits. Of the 63 subjects recruited, only 60 subjects (in whom Vitamin D levels could be estimated) were further analyzed for the study. Serum levels of [25 (OH) D] were estimated by 25-OH-D assay, an RIA based procedure. **Results:** In the present study, vitamin D insufficiency (defined as serum 25[OH] D levels <30 ng/ml) was observed in about 98.2 % of pregnant North Kashmiri women while as vitamin D deficiency (serum 25[OH] D <20 ng/ml)2 was observed in 71.6 %. In only about 3.2 % subjects vitamin D sufficiency (serum 25[OH] D >30 ng/ml) was observed. **Conclusion:** From our study we conclude that vitamin D deficiency is quite prevalent in normal pregnant women in North Kashmir valley. Taking a cut off value of 25 (OH) D of less than 20 ng/ml as vitamin D deficiency, overall 98 % of pregnant women were found to be vitamin D deficient.

Keywords: Vitamin D, Pregnancy.

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Introduction

Obstetric endocrinology is a field characterized by opportunity, challenges and caution. Opportunity, because the antenatal period presents a window during which endocrine and metabolic manipulation can impact not only maternal and fetal health, but also long- term outcomes in offspring.[1] Caution is necessary, too, because the same therapy may lead to unwanted adverse effects in the innocent fetus, and have (as yet unknown) long- term complications. Challenges in obstetric endocrinology are unique, too, as ethical and practical issues make it difficult to conduct randomized placebo controlled trials as many situations. The past two decades have seen a lot of studies regarding vitamin D deficiency during pregnancy from around the globe with a number of implications reported in both mother and the offspring.[2] With increasing evidence of a link between pregnancy and vitamin D deficiency, the present study was carried out in a district hospital to assess the vitamin D status of pregnant women in the first trimester and its association with maternal parameters like dietary calcium intake, vegetarian diet, multivitamin supplementation, extent of sun exposure, and sunscreen use. An increased prevalence of vitamin D deficiency has been reported from across the globe including India.[3] This study aims to look at the 25(OH)D levels in pregnant women and for any association of vitamin D status during pregnancy with the modifiable factors – extent of sun exposure, sunscreen use, vegetarian diet, dietary calcium intake, and multivitamin supplementation. 63 pregnant females were studied during the first trimester of pregnancy.

Subjects and Methods

Of the 63 subjects recruited, only 60 subjects (in whom Vitamin D levels could be estimated) were further analyzed for the study. The subjects found eligible underwent a detailed history and physical examination as per a pre-formed proforma. History was focused on occupation, dietary history including diet taken in last 24 hours, exposure to sunlight, drug intake, menstrual history and history of any systemic illness. A particular record was made of the women's dressing habits. Clinical examination was performed of various systems to rule out any systemic illness. Direct sunlight exposure was assessed by average daily duration of exposure and percentage of body surface area exposed 4. During the study period the average duration

of cloud free sunshine was 4.4 hours/day in winter months (October to March) and 6.5 hours/day in summer months (April to September) in Baramulla district which is situated at an altitude of 1574 feet to 5425 feet above the sea level. Kashmir valley is situated at latitudes 32" 20'-34" 50'N and longitude 73" 45'-75" 35'E as per data provided by Meterology department, Kashmir. On the basis of sunlight exposure subjects were divided into three categories; those having good exposure (20-30 hours/week), moderate exposure (10-19 hours/week) and poor exposure (less than 10 hours per week). The study subjects were visually characterized as dark and fair on the basis of skin pigmentation. Kashmiris as a race are fair and very few study subjects were dark. Nutritional status was assessed by interviewing subjects about their food habits and estimating the composition of daily diet in terms of energy, carbohydrate, protein, fat and calcium intake by using a semi quantitative food frequency questionnaire and published data on the relevant composition of Indian foods.[5,6] On the basis of diet subjects were classified as having good, satisfactory and poor dietary status. The laboratory evaluation comprised the estimation of serum calcium, phosphorus, ALP and 25–hydroxyl vitamin D3 [25 (OH) D] levels. The samples were taken for estimation throughout the study period in both summer and winter months. In addition, detailed hemogram, liver and kidney function tests and lipid levels were estimated in all subjects. Serum levels of [25 (OH) D] were estimated by 25-OH-D assay.Vitamin D levels in the studied subjects were graded as, Deficiency < 20 ng/mL (0-50 nmol/L), Insufficiency 20-30 ng/mL (50-75 nmol/L), Sufficiency 30-100 ng/mL (75-250 nmol/L) and Toxicity > 100 ng /mL (>250nmol/L).[7]

Results and Discussion

Table 1: Circulating 25 [OH] D levels in the study subjects

25[OH]D (ng/ml)	N	Percent
<5	6	10%
5-9	12	20%
10-14	10	16.6%
15-19	15	25 %
20-24	10	16.6 %
25-30	6	10%
30-100	1	1.6%
>100	1	1.6%

Table 2: Vitamin D status of the study population

Vitamin D status	N	Percent
Deficiency (<20 ng/ml)	43	71.6 %
Insufficiency (20-30)	16	26.6 %
Sufficiency (30-100)	1	1.6%
Toxicity >	1	1.6%

63 apparently normal pregnant women were recruited for the study. The mean age of the study subjects was 23±2.3 years. On the basis of sunlight exposure the subjects were classified into those with good exposure, moderate exposure and poor exposure; 12 % of our subjects had poor exposure (<10 hours/week), 56 % had moderate exposure (10 to 20 hours/week) and 32 % were having good exposure (>20 hours/week). Of the 63 subjects recruited, only 60 subjects (in whom Vitamin D levels could be estimated) were further analyzed for the study; 60 (100 %) of these subjects were from rural habitat. Based on duration of pregnancy at the time of sample collection, all 60 women were in the first trimester. Estimation of 25-hydroxy vitamin D levels (25[OH]D) revealed that 25[OH]D ranged from undetectable levels (<0.001 to 400 ng/ml) with a median level of 14.6 ng/ml. About 21 of the studied 60 pregnant women had 25[OH]D levels less than 5ng/ml whereas, 1 (%) had 25[OH]D levels more than 100 ng/ml [Table 1].

The reasons for the very high prevalence of low vitamin D status in our subjects, though disturbing can be only speculative. First, one needs to understand the factors that influence vitamin D status of any population. These factors include unfavourable latitude and Zenith angle at the places studied, cloudy weather and season, time and duration of exposure to sunlight, skin type, colour and texture, use of sunscreens, socioeconomic status and diet.[7-10] Taking <20ng/ml of vitamin D level as deficiency 11, we reported a high prevalence (71.6 %) of vitamin D deficiency in our study. O'Riordan 12 in 2008 reported that 14.3-23.7% of Irish women had vitamin D deficiency (serum 25 (OH) D <25 nmol/l or < 10ng/ml) during pregnancy which was quite low to what we observed in our respective population. We found that only 1.6 % of our study population was having sufficient (>30ng/ml) vitamin D levels. A recent study by Johnson and colleagues, revealed that the mean 25 (OH) D levels in African-American, Hispanic, and Caucasian pregnant women were 15.5±7.2 (standard deviation), 24.1±8.7 and 29.0±8.5 ng/mL, respectively. Ninety-seven percent of African- Americans, 81% of Hispanics, and 67% of Caucasians were deficient (25 (OH) D levels <20 ng/mL) or insufficient (<32 ng/mL). Of these pregnant women, 82% had vitamin D levels <32 ng/mL.27 Our results were consistent with their study as we also found that 97 % of the study subjects were having insufficient vitamin D levels (<30ng/ml). In summary, we report a high prevalence of both vitamin D deficiency (71.6 %) or insufficiency (98%) in pregnant Kashmiri women living in baramulla district of Kashmir valley. Women reporting multivitamin supplement usage during pregnancy did have higher vitamin D status, but many remained vitamin D insufficient. Suboptimal vitamin D status has significant consequences for maternal and neonatal health and, therefore, further research is needed to determine the dietary vitamin D intake required to maintain vitamin D sufficiency during pregnancy, and to underpin guidelines for supplement use during pregnancy.

Conclusion

As in other fields of obstetric endocrinology, there is an urgent need for greater research in vitamin D therapeutics in pregnancy. While we wait for more robust data, we should continue to supplement this nutrient in all pregnant women from the 12th week of gestation onwards. Daily doses of 1000-2000 IU can be recommended in all antenatal women in South Asia, without estimating serum 25(OH) D levels. Higher doses can be used in symptomatic antenatal women, and in those with documented severe deficiency. Recent studies suggest that higher doses, as used in non pregnant women, are safe and effective, and as more data become

available, one may recommend standard weekly regimens. However at present it may be safest to adhere to 4000 IU/day as a standard practice in India.

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