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ORIGINAL ARTICLE

Prevalence of Vitamin D Deficiency Among Antenatal Cases Between Vitamin D Levels and the Possibility of Adverse Pregnancy Outcome

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ABSTRACT

Background: From the beginning till delivery, the embryo relies solely on its mother for all of its nutritional needs. There is a direct link between 25-OHD insufficiency and bad pregnancy outcomes, including preterm and congenital abnormalities. The study's goals were to find out how common deficiencies are among pregnant women at Indus Medical Hospital and to see if there's a link between those deficiencies and pregnancy difficulties.

Material and Methods: Over six months, researchers examined the 25(OH)D levels and obstetrical problems, and risk-factors of 90 women. I observed 25-OHD deficiency in 43 pregnant women, according to the results.

Results: A total of 90 pregnant women were enrolled, of these, 43 (47.77%) women had vitamin D deficiency. 34 (37.77%) of the females did not ate non-vegetarian foods and 20 (22.22%) ate non-vegetarian meals every other day. Milk intake was likewise low, with 37 (41.11%) drinking it every other day or fewer; the normal serving size of milk was 150 ml.

Women below 30 years of age of 23 (53.48%), housewives of 22 (51.16%), and low-income households of 20 (46.51%) showed significantly lower vitamin D levels than women with higher socioeconomic status. Women with low 25(OH)D levels and pregnancies that resulted in over 34 (79.06%) low birth weight babies (<2.5kg) were more likely to experience growth restriction. The baby's growth in utero appears to be being affected by maternal deficiencies.

Conclusions: In conclusion, we observed that the frequency of 25(OH)D insufficiency was quite high.

keywords: Vitamin d deficiency, antenatal cases, adverse pregnancy outcome

INTRODUCTION

Vitamin D has a wide range of non-classical activities, like boosting insulin action and secretion, immunological regulation, and lung growth, which are becoming more well accepted. It can affect a wide range of aspects of the fetus's development. No consensus exists on "target" levels of 25-OHD during pregnancy and breastfeeding, and no studies have addressed the effects of 25 (OH)D supplementation during pregnancy and breastfeeding. The "optimal" supplement dosage is also a mystery. Taking vitamin D supplements can be a simple and effective remedy for this condition. Women and children are increasingly low in vitamin D, which is got through exposure to sunshine. 25-OHD insufficiency has been associated with diabetes, pre-eclampsia, and an increased need for cesarean sections during labor.[1–3] Rickets and soft bone disease can be caused by a deficit in youngsters. Several variables contribute to micronutrient insufficiencies, such as numerous pregnancies, malnutrition (especially among children), and socioeconomic problems. Vitamin D insufficiency research is in its infancy. As a result, we are conducting research to determine the incidence of deficits among pregnant women at our hospital. Pregnant mothers may benefit from the findings of our study in terms of developing methods to prevent insufficiency of these nutrients. These will aid in the introduction of recommendations for prenatal vitamin D supplementation. Fortunately, most of these problems may be avoided with the right approach. 25(OH)D insufficiency in pregnancy and its association with sociodemographic and nutritional intake was the goal of the study. The study also correlated maternal difficulties and perinatal outcomes.

MATERIAL AND METHODS

This observational research was done at the Department of Obstetrics & Gynecology, Indus Medical College, Tando Muhammad Khan with 90 pregnant women. From July 2021 to January 2022 During the study, there was a major focus on determining the occurrence of 25-OHD insufficiency in pregnant women; the secondary goal was to examine parental and fetal effects in pregnant women with Vitamin D insufficiency. The ethics commission at the university gave its blessing, and the investigation could proceed.

Pregnant women aged 18 to 35 years old with a gestational age of at least 28 weeks were recruited for the study during the study period following written and informed permission. Preexisting medical conditions were not allowed in the trial. Surveys on socio-demographic data, religion, pregnancy history, lifestyle, and food habits as well as psychological aspects were completed by pregnant women in the research. During the standard blood collection at the first prenatal check-up, an additional sample of blood (9ml) was obtained for this investigation. An enzyme immunoassay technique was used to evaluate the additional blood sample's serum vitamin D levels. Prospectively gathered information included the due date, gender, weight, height, and length of the baby, as well as the mother's gestational age (as determined by ultrasound or the duration of her previous menstrual cycle).

It was decided to use an enzyme immunoassay approach to assess vitamin D levels (an independent variable). The serum was centrifuged in the lab (1600 revolutions per minute for 10 minutes at room temperature) and kept at 280°C in one-ml aliquots until analysis was completed. Enzyme immunoassay was used to quantify vitamin D levels in the bloodstream. Measurements of 25(OH)D beyond the exposure range (6-544 nmol/l) were not included in the studies. To ensure accuracy, the HIL index was used. Serum specimens may contain Hb (H, hemolysis), bilirubin (I, icterus), and lipids (L, lipaemia), all of which can interfere with clinical chemistry tests. All samples were included in the study since there were no questionable records. Birth weight, small for gestational age, and neonatal weight and length of newborns delivered at term were outcome variables. (gestational age 37 weeks or more). Using data from the whole study population, standard deviation scores (SDS) for each sex and age group were derived from each measurement to derive neonatal weight and length trends.

Statistical analysis: In this study, descriptive and inferential statistical analysis was performed. Mean ±SD (Min-Max) for continuous measures and Numbers for categorical measurements are used (%). 5 % significance threshold is used to determine importance. Assumptions about data include the following:

1 There should be a normal distribution for the dependent variables.

2 A random sample should be taken from the population, and the individuals in the sample should be independent of one another.

Fisher's Chi-square Two or more groups were compared on a categorical scale to determine the relevance of research

parameters. The SPSS statistical package was used to conduct all of the research (version 12.0.1, SPSS Inc, Chicago, IL).

RESULTS

During the study period of six months, participants in this research were those who visited I.M.H. OPD or were admitted to the ward of the Obstetrics and Gynecology department at Indus Medical College, Tando Muhammad Khan. A total of 90 pregnant women were enrolled, of these, 43 (47.77%) women had vitamin D deficiency.

The women's food habits are shown in **Table 1**. According to the semi-quantitative food frequency questionnaire, 34 (37.77 %) of the female did not ate non-vegetarian foods and only 20 (22.22 %) ate non-vegetarian meals every other day. Milk intake was likewise low, with 37 (41.11 %) drinking it every other day or fewer; the normal size of milk was 150 ml. Though milk intake should not be linked to 25 (OH)D levels, calcium metabolism and its consequences are significant and must be treated carefully.

Based on the study of pregnant women**,** the demographic parameters and lifestyle habits of study participants are presented in **Table 2**. The study found that 47.77% of pregnant women were deficient in 25(OH)D. Women below 30 years of age of 23 (53.48%), housewives of 22 (51.16%), and low-income households of 20 (46.51%) revealed significantly lower vitamin D levels than women with higher socioeconomic status. 25-OHD insufficiency 8 was also related with a lack of education (18.60%) in comparison to literate. As expected, women without vitamin D supplements 30 (69.76%) and those who had little sun exposure 25 (58.13%) were more likely to be vitamin D deficient.

Vitamin D levels in high-risk patients are displayed in **Table 3**. When it came to women with anemia, there was no significant difference between those who had normal vitamin D levels (17) and those who had low vitamin D levels (10). Symptoms such as tingling and numbness, bone pain, and pregnancy-related disorders such as gestational hypertension, oligohydramnios, IUGR, diabetes, and congenital abnormalities all fit this description. The two groups had similar circumstances, and there was no evidence of a link between high-risk variables and mortality.

Table 1: Food preferences

Food	Number	%
Vegetarian	34	37.77%
Common non-vegetarian	36	40.0%
Uncommon non-vegetarian	20	22.22%
Milk intake	37	41.11%

Table 2: Baseline characteristics of the patients (n=90)

Variables	Total (n=90) %	CD (n=43) %
Age		
<30years >30years	61 (67.77%) 29 (32.22%)	23 (53.48%) 20 (46.51%)
Education Ill Primary-sec >secondary	14 (15.55%) 29 (32.22%) 47 (52.22%)	8 (18.60%) 24 (55.81%) 11 (25.58%)
Housewife Working	56 (62.22%) 34 (37.77%)	22 (51.16%) 21 (48.83%)
Urban Rural	77 (85.55%) 13 (14.44%)	24 (55.81%) 19 (44.18%)
Income <10,000 >10,000 >20,000	39 (43.33%) 27(30%) 24 (26.66%)	20 (46.51%) 14 (32.55%) 9 (20.93%)
Exposure to sun More Less	 34 (37.77%) 56 (62.22%)	 18 (41.86%) 25 (58.13%)
Supplement Yes No	 34 (37.77%) 56 (62.22%)	 13 (30.23%) 30 (69.76%)

It is important to note that **Table 4** deals with the mode of delivery because vitamin D deficient women are at a higher risk for cesarean sections because of a defective pelvis and bone malformations. In general, cesarean section rates were higher among vitamin D deficient women 12 (27.30%) compared to those with normal 25(OH)D levels 9 (19.14%).

A lack of vitamin D affects babies' health in several ways, as shown in **Table 5**. Women with low 25-OHD levels and pregnancies that resulted in more than 34 (79.06%) low birth weight babies (<2.5kg) were more likely to experience growth restriction. The baby's growth in utero appears to be being impacted by maternal deficiencies.

Table 3: Vitamin D insufficiency in high-risk patient (n=90)

Variable	Normal Range 25(OH)D	Vitamin D deficiency
Hb < 11 gm%	17	10
Tingling and numbness	7	04
GHTN	4	06
Bony pain	5	8
Oligo and IUGR	12	13
Diabetic Mellitus	01	01
Cong anomaly	01	01

Table 4: Method of delivery (n=90)

Method	Total	Normal Range	Vitamin D deficient
Vaginal	78	38	31
LSCS	12	9 (19.14%)	12 (27.90%)

Table 5: Neonatal outcome (n=90)

Weight	Total	Normal Range	Vitamin D deficient
>2.5KG	46	36(76.95%)	9 (20.93%)
<2.5Kg	40	11(23.40%)	34 (79.06%)
IUD	3	2	0
NTD	3	0	2

DISCUSSION

Pregnant women in this study had a vitamin D deficiency rate of 47.77 %. Researchers in South Carolina found that 41% of expectant mothers had vitamin D deficiency (25(OH) D<50 nmol/L) and another 41% had inadequate levels of vitamin D during early pregnancy (25(OH) D between 50 and 80 nmol/L).[4] In early pregnancy, 62% of Caucasian pregnant women and 96% of African American pregnant women did not reach the vitamin D threshold (25(OH) D<80 nmol/L).[2]

When it comes to vitamin D deficiency among pregnant African American teenagers, small research found that 52% and 36% of those surveyed had (25(OH)D <50 nmol/L)in the 14 to 26 weeks and 27 to 40 weeks respectively.[5]

Demographic status: Pregnancy-related 25 (OH)D insufficiency was more prevalent among housewives (65.3%) and in urban areas (59.1%) (86.8%). Housewives (65.3%, P = 0.008), those with low monthly household earnings (QR5,000–9,999) (49.2%, P = 0.03), and those under 30 years old (43.2%, P = 0.032) were all substantially more likely to have low 25(OH)D levels than those with adequate levels in the Doha research. In Bener's research, A Pregnant woman who were deficient in vitamin D had lower levels of sunshine exposure (63.4%, P = 0.05), daily physical activity (64.4%, P = 0.05), and 25-OHD supplementation (89.7%, P < 0.001).[1,6] Our study found that individuals who had greater sun exposure and supplemented their vitamin D intake had less deficit than those who had more sun exposure and supplemented their vitamin D intake. Housewives and those with lower monthly family incomes have a higher risk of 25-OHD insufficiency.[7] They influence the deficit by one's religious beliefs besides its need for sunshine exposure. The prevalence of 25-OHD insufficiency is higher among Muslim women who wear the burqa. This study found that preeclampsia, IUGR, diabetes, obesity, and neonatal anomalies were all linked to vitamin D insufficiency in women with normal 25-OHD levels.

Increased cesarean delivery rates: Primary cesarean section (a cesarean section for the first time) is related to a four-fold increase in the risk of 25(OH)D insufficiency (<37.5 nmol/L), however, this has not been proven in all research. After the birth of a baby, Merewood et al. tested the vitamin D levels of 253 women.[8] Those

with vitamin D values < 37.5 nmol/l had a main cesarean section risk that was nearly four times greater than that of women with higher 25-OHD concentrations. Vitamin D level may be linked to the risk of a primary cesarean section through calcium's function in the beginning and progression of labor, or by raising preeclampsia risk. At the moment of vaginal delivery, mother blood calcium concentrations rose significantly, according to research [9]. Vitamin D deficiency and cesarean births appear to be linked, according to our research. Vitamin D insufficiency was found in 23.5% of cesarean delivery ladies, however, this is not statistically significant. Understanding the part of 25-OHD in labor start or its relationship with calcium metabolism will be easier if vitamin D insufficiency is separated from the signs and symptoms of cesarean delivery.

Pre-eclampsia: Hypertension and preeclampsia may be connected with pregnancy-induced hypovitaminosis D; however, the data is inconsistent. 25-OHD levels below 50 nmol/l were linked to a five-fold increase in the risk of severe preeclampsia in three trials including women who had preeclampsia.[10–12] Vitamin D inadequacy during pregnancy is not connected with an increased risk of preeclampsia, according to our research results. Only 8 of the 21 pregnant women who experienced gestational hypertension were deficient in vitamin D. Approximately 38.09% of all hypertensive individuals fall within this category. Pregnant women who are lacking in vitamin D are more likely to have hypertensive problems, according to several studies. Since preeclampsia may be prevented by avoiding using vitamin D supplements throughout pregnancy.

Low birth weight: Vitamin D levels in pregnant women have been demonstrated to have a favorable correlation with the baby's birth weight.[12] Holland researchers found a 2.4-fold increase in the probability of delivering an SGA infant in mothers with vitamin D insufficiency.[13] Patients with 25-OHD insufficiency were more likely to give birth to growth-restricted children in our study (80%).

Impaired glucose tolerance: The risk of glucose tolerance varies according to ethnicity. Some evidence suggests that the link between vitamin D levels and the risk of GDM is ethnically specific. Vitamin D absorptions at 16 weeks of gestation were considerably lower in GDM cases than in controls in a predominantly non-Hispanic white population, but no such link was detected in Indian women when vitamin D absorptions were evaluated at 30 weeks of pregnancy.[14] Only two of the patients in our research developed gestational diabetes, and both were vitamin D deficient. The sample size is too small to draw any conclusions on the relationship between glucose tolerance and vitamin D insufficiency.

CONCLUSION

Vitamin D insufficiency affects a considerable number of people in our population. Further study should be done on the possible advantages and ideal dosage of vitamin D usage during pregnancy. In our research, we observed that the frequency of 25(OH)D insufficiency was quite high. We don't have enough data to draw any conclusions on the possessions of 25(OH)D insufficiency on fetal and parental health. This led us to conclude that all pregnant women should be supplemented. It is more cost-effective and acceptable to our community to supplement vitamin D universally.

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