

Original Research Article

IMPACT OF SERUM VITAMIN D LEVELS ON THE PRETERM RUPTURE OF THE MEMBRANE IN PREGNANT WOMEN. A CROSS-SECTIONAL STUDY

ABSTRACT

Aim: To assess the association between premature rupture of membrane and maternal blood vitamin D levels.

Study design: A cross-sectional study

Place and duration: Abbasi Shaheed Hospital, Karachi Medical and Dental College from April 2020 to April 2021.

Methodology: Over the duration of one year, a total of 100 patients with vitamin D levels, as well as obstetrical abnormalities and risk factors, were monitored. In 88 pregnant women, vitamin D deficiency was observed. Pregnant women who have a thyroid disorder, such as thyroiditis or Grave's disease, or who had calcium or parathyroid disease in the past, or who need cardiac medication therapy, & diuretic particularly calcium channel blockers were excluded from the study.

Results: Vitamin D deficiency was found in 88 pregnant women out of 100. It was more prevalent among housewives (86.36 percent) and multiparous women (68.0 percent). Pregnancy complications were present in 33.0 percent of cases such as preeclampsia, gestational hypertension, and diabetes, and PROM was less prevalent in the deficient group.

Conclusion: Our data indicate that pregnant females are at a greater risk of Vitamin D deficiency, and associated pregnancy complications. The correlation between maternal vitamin D levels & preterm rupture of the membrane was not statistically significant.

Keywords: Vitamin D Level, Premature Rupture of Membrane, Pregnant women.

INTRODUCTION: For all nourishment, the requirement from conception to delivery of the embryo is fully dependent on the mother. Deficiency of vitamins is very common among pregnant women, and it can have a severe influence on the pregnancy's outcome. (1) Several clinical investigations have suggested an association between low Vitamin D levels and the risk of a negative pregnancy outcome. (2, 3) Numerous studies have shown that part of the harm caused by vitamin D deficiency starts while the fetus is still growing. Much of the damage may be irreversible, and taking Vitamin D after delivery will not be able to totally repair it. Vitamin D deficiency has been found to affect anywhere from 15% to 80% of the population. (4)(5, 6) The liver is the first place where increased 25 (OH) D is hydroxylated. The Kidney is mainly accountable for the second hydroxylation of 1, 25 (OH) D to the active state, which is controlled by phosphorus, calcium, and parathyroid hormones levels. (7) Vitamin D has minimal biological activity on its own, but enzymatic conversion to [1, 25 (OH) 2D] results in a hormone with a range of biological effects. The impact of 1,25 (OH)2D is sustained by its high affinity for the Vitamin D receptor, which may be found in a variety of tissues such as the placenta, indicating that Vitamin D serves a role other than bone metabolism. (2) The blood level of 1, 25 (OH) D doubled throughout pregnancy, starting at 10-12 weeks of pregnancy & peaking in the

third trimester. Through the placenta, calcium is transferred to the fetus from the mother. The fetal Skeleton has acquired roughly 25-30g of calcium at the time of delivery the majority of which is transported at the last trimester. (8) Deficiency of vitamin D may be detected by measuring the circulation concentration of 25 (OH) D, while there is no general agreement on what amount of 25 (OH) D is optimal, many experts think that a range of 75 nmol/L is appropriate, and also that serum Vitamin D amounts below 50 nmol/L suggest insufficiency. (9) Vitamin D play a role in preterm labor' pathophysiology by affecting inflammation and immunomodulation pathways. During pregnancy the deficiency of vitamin has been associated to preeclampsia, insulin sensitivity, gestational diabetes mellitus, due to its non-classical effect. (10) This current study was performed with the goal of determining the association between maternal vitamin D levels and premature rupture of membrane.

METHODOLOGY

In coordination with the Biochemistry department, cross-sectional observational study was conducted in the OBG' department. The study included 100 pregnant females in their third trimester who were admitted to the labour ward. The Institute Ethics Committee authorized this study. After counselling and informed permission, all pregnant females were submitted to serum Vitamin D testing. All pregnant females at term, regardless of age or parity were included in this study. Pregnant women who have a present thyroid disorder, such as thyroiditis or Grave's disease, or who had calcium or parathyroid disease in the past, or who need cardiac medication therapy, & diuretic particularly calcium channel blockers were excluded from the study.

A questionnaire was used to acquire information from the mother about her age, parity, and obstetric history. The beginning day of the last menstrual cycle was used to calculate gestational

age (in weeks). In addition, a history of iron and calcium intake was recorded. Hemoglobin and serum vitamin D levels were tested in the blood. High risk factors included anemia, preeclampsia, & diabetes. The levels of vitamin D in the blood were measured. According to the study, vitamin D deficiency was less than 30ng/ml, and sufficient was 30-100ng/ml.(11, 12)

Data was put in SPSS-20 version for analysis. The relationship between Vitamin D Category, Maternal Outcome, was investigated using the Chi Square type/Fisher Exact type and provided as a frequency and percentage.

RESULTS:

The current study involved 100 participants admitted to the Obstetrics and Gynecology department. The majority of patients in the Vitamin D Deficient group were >30 years old (31.82%), housewives (86.36%), had less sun exposure (63.64%), were not supplemented with Vitamin D (90.90%), were multigravida (68.18%), and lived in cities (72.73 percent) (As shown in Table 1)

Table 2 demonstrates that just 12% of pregnant women were Vitamin D adequate, while the rest were Vitamin D deficient. Table 3 summarizes the maternal consequences in the Vitamin D deficient group without problems, which is not statistically significant. Table 4 shows the Pregnancy with complications

Table 1: Sociodemographic profile of individuals based on vitamin D levels.

Parameters	Total n = 100	Vitamin D deficient	Vitamin D sufficient	P-value

< 30 years	69	60	9	0.750
>30 years	31	28	3	
House wife	86	76	10	0.67
Working	14	12	2	
Exposure to sun				0.003
More	42	32	10	
Less	58	56	2	
Supplement				0.000
Yes	18	8	10	
No	82	80	2	
Number of gravida				0.025
Primiparous	36	28	8	
Multiparous	64	60	4	
Rural	33	24	9	0.002
Urban	67	64	3	

Table 2: Vitamin D status of study participants

Status of vitamin D	Number	%
>30ng/ml	12	12

<30ng/ml	88	88
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Table 3: Vitamin D levels and maternal outcomes

Vitamin D level	Pregnancy without complication n = 63	Pregnancy with complications n = 37	P-value
Vitamin D sufficient n = 13	9	4	0.61
Deficient of vitamin D n = 87	54	33	0.614

Table 4: Pregnancy with complications

Level of Vitamin D	Preterm labor	Infection	Gestational diabetes	Pre-eclampsia	Hypertension	PROM
Sufficient Vitamin D	Nil	2	Nil	Nil	1	Nil
Deficient Vitamin D	13	5	4	2	3	6

DISCUSSION

Deficiency of vitamin D is caused by the female's lifestyle, insufficient dietary Vitamin D consumption, and the lack of Vitamin supplements, as well as spending the most of the day in the room. Females over the age of 30 (68.18 percent, $P=0.75$), housewives (8 percent, $P = 0.674$), with less sunlight exposure (63.64 percent, $P = 0.003$), who did not take vitamin D supplements (90.90 percent, $P = 0.000$), who've lived in cities (72.73 percent, $P = 0.002$), as well as multiparous (68.18 percent, $P = 0.026$) deficiency of Vitamin D was more common. Our data show a statistically significant relationship between low vitamin D levels, lack of vitamin D supplementation, and multiparous women.

Andiran et al observed deficiency of Vitamin D in the group of low socioeconomic status (13) whereas Atiq et al observed lower blood levels of Vitamin D in mothers and newborns from the upper socioeconomic group, who typically chose to live indoors and avoided direct sunlight.(14) Vitamin intake is likely to be higher in numerous pregnancies. Vitamin D levels in the diet should be 400 IU/day if sunlight exposure is insufficient.

This study shows that Vitamin D deficiency was substantially more frequent in our study, with values of less than 30 ng/ml in the third trimester in 88% of the patients. The findings were comparable to those of I. Pehlivan, S. Hatun, and colleagues in 2000.(15) Alagol et al. detected low serum 25-hydroxyvitamin D3 in 66 percent of reproductive-age women in a study conducted in Istanbul in August 1998.(16) deficiency of Vitamin D was shown to be prevalent in 48.2 percent of pregnant women in a study performed by Dava A et al (17)

Vitamin D deficiency has been connected to negative health effects. The vitamin D deficient group had no maternal problems in 54 percent ($P=0.618$) in this study, although this correlation was not significant statistically. When compared to females with normal vitamin D levels, vitamin D deficiency was connected to same maternal outcomes in terms of PROM, preterm

labour, diabetes, and hypertension. According to Abdulbari B. 2013, pregnant women with deficiency of vitamin D have a higher risk of maternal complications than those with normal vitamin D levels.(18)

CONCLUSION

According to the findings of this study, pregnant women have a significant prevalence of Vitamin D deficiency, and pregnancy complications like premature rupture of membrane preterm labor, gestational diabetes and hypertension, are not statistically significant. On the contrary, many academics and experts are increasingly disputing the link between vitamin D deficiency medical complications. In fact, there have been reports of connections with pregnancy-related problems. We suggest increasing vitamin D supplementation or sun exposure in all pregnant women.

Permission

Permission was taken from the ethical review committee of the institute

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