



PREVALENCE AND IMPACT OF VITAMIN D DEFICIENCY ON MATERNAL AND FETAL OUTCOMES

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Abstract

Many people are now interested in the importance of vitamin D because it does more than just help regulate calcium levels. More and more studies are being done to understand how vitamin D during pregnancy supports various aspects of health, as well as the consequences of not having enough of it. The goal of this research is to find out how common vitamin D deficiency is among pregnant women and the effects it has on both the mother and the baby.

Patients and Methods: 200 women who were about to give birth were chosen to participate in a study while they were in the hospital. We gathered information about the health of all the participants from their medical records. They also kept track of when the babies were born and what happened during delivery. A blood test that measures how much vitamin D is in the body. The enzyme-linked immunosorbent assay is a test that uses enzymes to find and measure things in the body, like antibodies or antigens.

Results: Out of all the cases, 9 had a good level of vitamin D, 20 had a bit of a low level, and 171 had a very low level. The groups had similar information about the people's characteristics and reproductive history, and the differences between the groups were not significant. There were no significant differences in vitamin D levels among those who had higher body weight, gestational diabetes, pre-eclampsia, and growth problems in the baby in the womb. But, women who did not have enough vitamin D were more likely to have high blood pressure during pregnancy. There were not many differences in how babies were born and how they did soon after birth for women with different amounts of vitamin D.

Conclusion: Not having enough vitamin D is a common health problem in pregnant women in Iraq and is called hypovitaminosis D. When a woman is pregnant and has low weight, there is a greater possibility that she may develop gestational hypertension, which is a negative condition. 25(OH)D is a type of vitamin D that is checked in the blood.

Keywords: Vitamin , pregnancy , deficiency , fetal , outcome

Background

Vitamin D is a crucial hormone that our bodies need. Many studies suggest that vitamin D is important for many parts of the body besides bone and muscle health because it can be found in many cells and tissues throughout the body. (Umar M et al, 2018).

During pregnancy, it is important for the growth of a baby's bones and for keeping the right amount of calcium in their body. Not having enough vitamin D is a big health issue that is becoming more common everywhere. This can happen to both adults and children. (Arshad R et al, 2022).

Several studies have found that more pregnant women are lacking in vitamin D. This can cause problems for both the mother and baby, including complications like gestational diabetes, high blood pressure during pregnancy, having a smaller baby than expected, and giving birth prematurely. (Zhang H et al.,2022)

Patients and Methods

This is a research study that looked at 200 pregnant women who were in the labor ward and asked them to participate. All important information about the study was explained to everyone who took part. They were also told that leaving the study would not have any impact on their medical care. A brief study information paper was given to all participants and they had to agree to it verbally. At last, the nurse got permission from someone who knew what was happening and listened to them say "yes. " We made a log book with the participant's study number and the date they agreed to participate. The research board (IRB) removed the need for getting written permission because the study was not very likely to cause harm to the participants and did not involve any procedures that could potentially harm them and require written permission.

Inclusion criteria

Pregnant women in the early stages of labor were chosen to participate from the room where they give birth.

Exclusion criteria included

We are looking for people who have certain long-term illnesses (excluding high blood pressure and diabetes), problems with their bones, trouble absorbing nutrients, or any issues with their liver, kidneys, or digestive system. We also want to know if you take vitamin D supplements or any other medications that can affect your vitamin D levels. These are medicines used to treat seizures and tuberculosis.

Methods

All included participants were subjected to:

Information about people's age, gender, medical history, and past pregnancies was gathered from everyone participating in the study. The medical records were studied to determine a person's physical characteristics and medical condition during pregnancy. We did not have information about the weight of the participants before they were pregnant. To figure out their body mass index (BMI) during pregnancy, we used their weight when they were admitted for pregnancy.

Height measurements are observations or calculations of how tall a person or object is.

Everyone who participated had a test for gestational diabetes by drinking a sweet drink and monitoring how their body responded during the 24th and 28th week of pregnancy. We studied and looked at data on four pregnancy complications: miscarriage, giving birth too early, diabetes during pregnancy, and high blood pressure during pregnancy. The research found that there is a relationship between the results of a test called Oral glucose tolerance test (OGTT) and these bad effects. We collected information about Gestational diabetes mellitus (GDM), gestational hypertension, preeclampsia, and intrauterine growth restriction. We looked at their files and checked if the measurements were taken at least 2 weeks apart. Preeclampsia is a condition in pregnant women when they have high blood pressure (blood pressure above 140 mm Hg for the top number or 90 mm Hg for the bottom number) and protein in their urine (above 300 mg in a 24-hour period) after

20 weeks of pregnancy. Gestational hypertension is when a pregnant woman develops high blood pressure after 20 weeks, even though she didn't have it before. (Brown MA et al.,2001)

Packages being delivered where customers can receive their packages or designate an alternate person or location for delivery. babies being born too early, having a surgical delivery) and the results of the birth (like the health and well-being of the baby). After giving birth, the baby's size and measurements, the baby's initial health score, and whether the baby needed to go to the intensive care unit were recorded.

They took blood samples to check how much vitamin D was in the body. The samples were changed and stored at a really cold temperature until they could be tested. We used a test we bought from a store to see how much vitamin D is in the blood. This test is called ELISA and it was created by a company called Immunodiagnostic from the Netherlands. The discovery amount was in a range of 5 to 300 nmol/L. We looked at 25(OH)D levels to see how much vitamin D patients had. If the levels were lower than 50 nmol/L (20 ng/ml), it meant the patient didn't have enough of something. If the levels were between 51 and 74 nmol/L (21-29 ng/ml), it meant the patient did not have enough. If the levels were 75 nmol/L (30 ng/ml) or higher, it meant the patient had a normal amount. If the levels were 75 or higher, it meant the patient had a normal amount. (Holick MF et al.,2007;2011)

Statistical analysis

We used a computer program called SPSS version 20. 0 for Windows® to perform statistical analysis. We transformed the values of 25(OH)D in a way that made them more normal. All the tests used in the study looked at both sides of the data, and if the p-value was less than 0. 05, it was seen as a strong indication that there was a significant difference.

Result

200 women were included mean age was 29.13 years , 70% of them had high school education , 30% university or higher 85.5% of them were housewives and 14.5% were employee as shown in table 1

As regard reproductive history 31.5% of women were primiparous , 68.5% multiparous , positive history of multiple pregnancy founded among 5.5% of cases and 24.5% of women had history of miscarriage as shown in table 2

The current pregnancy report found that 1% of women were smokers. The average length of pregnancy was 38. 9 The average weight gain during pregnancy was 31. 1 11% of women developed gestational diabetes, 2% had pre-diabetes, 2% had gestational hypertension, 1% had preeclampsia, and 1. 5% had growth problems with the baby. These findings are summarized in table 3.

Delivery and neonatal outcomes were as follow , preterm labor in 8% of women 13% of women had induction of labor, regarding mode of delivery 76% of women had spontaneous delivery , 7% had instrumental delivery , 17% had cesarean section

Regarding the outcomes of newborns, the average weight of the babies was 3. 14 kg On average, babies were about 49. 5 cm long, their heads were about 33. 7 cm in circumference, and their APGAR score was 8. 6

As regard mean Vitamin D level was 30.46 ,NICU admission was in 3% of women as shown in table 4

Out of the total cases, 9 had a normal level of vitamin D, 20 had a low level of vitamin D, and 171 had a very low level of vitamin D. The groups did not differ much in terms of demographic information and reproductive history, as indicated in tables 5 and 6.

The study found that there were no noticeable differences in vitamin D levels based on BMI, GD preeclampsia, and IUGR. However, the results showed that women with vitamin D deficiency had a higher rate of gestational hypertension, as seen in table 7.

The table shows that there were no important differences between women who had different levels of vitamin D in their bodies. This also applied to how their deliveries went and the outcomes for their babies.

Table (1): demographic information

Studied group (N=200)	
Age	
(Years; mean \pm SD)	29.13 \pm 5.6
[range]	[17–47]
Less than 25 years	65 (32.5%)
25–35 years	102 (51%)
More than 35	33 (16.5%)
Education	
High school	140 (70%)
University or higher	60 (30%)
Working status	
Housewife	171 (85.5%)
Employee	29 (14.5%)

Table (2): Reproductive history

Studied group (N=200)	
Parity	
Primiparous	63 (31.5%)
Multiparous	137 (68.5%)
Positive history of multiple pregnancies	11 (5.5%)
Positive history of miscarriage	49 (24.5%)

Table (3): Status of current pregnancy

Studied group (N=200)	
Smoking during pregnancy	2 (1%)
Gestational age till delivery	
(Weeks; mean \pm SD)	38.9 \pm 1.7
[range]	[23–42]
Pregnancy BMI	
(Kg/m ² ; mean \pm SD)	31.1 \pm 6.3
[range]	[14.5–55.8]
Gestational diabetes	22 (11%)
Pre-GD	4 (2%)
Pre-existing HTN	2 (1%)
GHTN	4 (2%)
Preeclampsia	2 (1%)
IUGR	3 (1.5%)

Table (4): Delivery and neonatal outcomes

Studied group (N=200)	
Preterm labor	16 (8%)
Induction of labor	26 (13%)
Mode of delivery	
Spontaneous	152 (76%)
Instrumental delivery	14 (7%)
Caesarian Section	34 (17%)
Baby's weight	
(Kg; mean \pm SD)	3.14 \pm 0.53
[range]	[1.07–5.3]
Baby's length	

(cm; mean \pm SD)	49.5 \pm 2.7
[range]	[34–62]
Baby's head circumference	
(cm; mean \pm SD)	33.7 \pm 1.91
[range]	[25–50]
APGAR score	
(min; mean \pm SD)	8.6 \pm 0.63
[range]	[7–9]
Neonatal admission to ICU	6 (3%)
Vitamin D level	
(nmol/L; mean \pm SD)	30.46 \pm 19.6
[range]	[7.1–150]

Table (5): demographic information among the studied groups.

	Normal vitamin D N = 9	Insufficient vitamin D N = 20	Deficient vitamin D N = 171	P value
Age				
Less than 25 years	3 (33.3%)	4 (20%)	58 (33.9%)	0.345
25–35 years	3 (33.3%)	11 (55%)	88 (51.46%)	
More than 35	3 (33.3%)	5 (25%)	25 (14.6%)	
Education				
High school	6 (66.6%)	12 (60%)	122 (71.34%)	0.563
University or higher	3 (33.3%)	8 (40%)	49 (28.65%)	
Working status				
Housewife	7 (77.7%)	16 (80%)	148 (86.54%)	0.584
Employee	2 (22.2%)	4 (20%)	23 (13.45%)	

Table (6): Reproductive history among the studied groups.

	Normal vitamin D N = 9	Insufficient vitamin D N = 20	Deficient vitamin D N = 171	P value
Parity				
Primiparous	3 (33.3%)	5 (25%)	55 (32.16%)	0.802
Multiparous	6 (66.6%)	15 (75%)	116 (67.83%)	
Positive history of miscarriage	2 (22.2%)	7 (35%)	40 (23.39%)	0.514

Table (7): Status of current pregnancy among the studied groups.

	Normal vitamin D N = 9	Insufficient vitamin D N = 20	Deficient vitamin D N = 171	P value
Pregnancy BMI (Kg/m ² ; mean \pm SD)	30.7 \pm 5.5	30.7 \pm 6.2	31.1 \pm 6.9	0.9578
Gestational diabetes	2 (22.2%)	3 (15%)	17 (9.94%)	0.431
Pre-Gestational diabetes	0 (0.0)	1 (5%)	3 (1.75%)	0.561
Pre-existing hypertension	0 (0.0)	0 (0.0)	2 (1.16%)	0.842
Gestational hypertension	0 (0.0)	2 (10%)	2 (1.16%)	0.025*
Preeclampsia	0 (0.0)	0 (0.0)	2 (1.16)	0.842
Intrauterine growth restriction	0 (0.0)	0 (0.0)	3 (1.75%)	0.772

Table (8): Delivery and neonatal outcomes among the studied groups.

	Normal vitamin D N = 9	Insufficient vitamin D N = 20	Deficient vitamin D N = 171	P value
Preterm labor	1 (11.1%)	3 (15%)	12 (7.01%)	0.433
Mode of delivery				
Spontaneous	6 (66.6%)	16 (80%)	130 (76.02%)	0.955
Instrumental delivery	1 (11.1%)	1 (5%)	12 (7.01%)	
Caesarian Section	2 (22.2%)	3 (15%)	29 (16.95%)	
Baby's weight (Kg; mean \pm SD)	3.1 \pm 0.5	3.2 \pm 0.4	3.1 \pm 0.5	0.689
Baby's length (Cm; mean \pm SD)	49.5 \pm 2.2	49.7 \pm 2.2	49.5 \pm 2.8	0.952
Baby's head circumference (Cm; mean \pm SD)	34.1 \pm 1.1	34.4 \pm 1.7	34.1 \pm 2.2	0.835
APGAR score (Min; mean \pm SD)	8.3 \pm 1.9	8.9 \pm 0.3	8.8 \pm 0.8	0.183
Neonatal admission to ICU	1 (11.1%)	0 (0.0)	5 (2.92%)	0.264

Discussion

In simple words: Out of 200 women, the average age was 29. 1370% of these women had completed high school, while 30% had studied at university or beyond. Among these women, 85. 5% were taking care of their households, while 14. 5% were working as employees.

According to the latest information, 1% of pregnant women were smokers, the average number of weeks of pregnancy at delivery was 38. 9, the average BMI during pregnancy was 31. 1, 11% of women developed gestational diabetes, 2% had pre-diabetes, 2% had gestational hypertension, 1% had preeclampsia, and 1. 5% experienced stunted growth in the womb.

GDM was a common problem for pregnant women. In this research. The number of cases was similar to what was found worldwide (between 4. 1% and 275%) (Guariguata L et al.,2014). In the past, studies have connected a lack of vitamin D with gestational diabetes mellitus. (Bener A et al.,2013; Wei SQ et al ,2013), and in several countries like Iran (Hossein-Nezhad A et al.,2007), Australia (Clifton-Bligh RJ et al ,2008) and the United States (Zhang C et al .,2008)

according to Rodriguez A and colleagues. In 2015, Flood-Nichols SK et al. conducted a study. In 2015, no important link was discovered. But it's important to note that taking vitamin D during early pregnancy reduced the chances of getting GDM in women with low vitamin D levels below 80 nmol/L. The number of times these women experienced something was not significantly different from those who did not consume vitamin D. (Yap C et al.,2014)

Regarding vitamin D level, it was found that the average value was 30. 46Out of the total cases, 9 had a normal level, 20 had a slightly low level, and 171 had a severely low level of vitamin D. When comparing different groups based on their demographic information and reproductive history, no significant differences were observed.

The recent research showed that there is a lack of vitamin D.

Many older pregnant women experienced this frequently. Overall, there was no connection found between the levels of vitamin D and the possibility of negative effects during pregnancy and on the health of newborn babies.

In a research conducted by Hong-Bi S et al, the average level of vitamin D in the blood was found to be 29. The level of vitamin D in pregnant women was 5 to 58 Nano moles per liter. More than 90% of pregnant women had low levels of vitamin D. Furthermore, a total of 384 percent of women did not have sufficient vitamin D, while only 22 percent did. 2% of women who did not have enough vitamin D had bad results during their pregnancy and giving birth. (Hong-Bi S et al.,2018).

Studies have found that pregnant women in the Middle East have low levels of vitamin D during the early stages of pregnancy, with an average concentration of less than 25 nmol/L. (Lips P et al .,2010; Bassil D et al ,2014). In China, a research in Beijing discovered that many healthy women had less vitamin 25-(OH)D. The middle level was about 27. Out of every 100 women, almost all of them (99) have a level of 28 Nano moles per liter. 4% did not have enough of this vitamin. A very tiny amount (0. 001%) 6% of the people were tired of it. (Holick MF.,2007)

The writers Wang and his group. It was discovered that pregnant women in Xi'an city, Shanxi Province, had an average vitamin D level of 38. Around 90% of the people had a low level of 25-(OH)D, which was measured to be in the range of 54-1718 nmol/L..(Wang XY et al.,2012)

Additionally, Xie and his team. Researchers discovered that expectant mothers in Nanjing city, Jiangsu Province, had an average level of 25-(OH)D at 26. In the summer, the measure of something is 4 to 107 nmol/L and 22. 7 to 48 Nano moles per liter during the winter. (Xie EF et al.,2013)

These studies discovered that over 96% of pregnant women did not have enough vitamin D in their bodies. The level of vitamin D can vary in pregnant women in different locations because they have different diets, take supplements, and get different amounts of sunlight. (Holick MF.,2007)

In this study, they found that there were not any important differences in vitamin D levels based on BMI, GD preeclampsia, and IUGR. However, women with a deficiency in vitamin D had a higher risk of developing gestational hypertension

People are still unsure if not having enough vitamin D is connected to preeclampsia while pregnant. Also, it is not known if taking vitamin D supplements can lower the chances of getting preeclampsia. (Perez-Lopez FR et al.,2015)

Vitamin D helps keep the immune system in check, which stops blood vessels in the placenta from getting too narrow. This helps prevent a condition called preeclampsia. Vitamin D helps manage the growth of cells in blood vessels and muscles. It helps control blood pressure through the RAAS system. Vitamin D helps in controlling the growth of new blood vessels by turning on specific parts of the VEGF promoter, which leads to the production of VEGF in muscle cells within blood vessels. Calcitriol stops cholesterol from being taken in by certain cells in the walls of blood vessels, which is an issue in pregnant women with a condition called preeclampsia. (Hyppönen E et al, 2013).

In this study, women with different levels of vitamin D did not have significant differences in their delivery and neonatal outcomes.

The studies that have been written down didn't agree with each other on whether low vitamin D levels can cause problems for moms and newborn babies. (Karras SN et al.2015) So far, giving pregnant women vitamin D supplements has not been found to have any effect on the chances of experiencing problems like preeclampsia, gestational diabetes, giving birth too early, having smaller babies, or needing a cesarean section.. (Perez-Lopez FR et al.,2015)

But, the data was obtained from tests conducted on individuals residing in cold regions of the world. This statement doesn't work for countries like Iraq because they have a lot of sunlight. The habit of covering up the body, head, and face, and not spending much time outside, can reduce the good effects of sunlight. (Thorne-Lyman A et al.,2012)

It's really important to take into account every aspect of the group of people when researching how not having enough vitamin D can impact pregnancy results. We should be cautious when thinking about things like where we live and how sunny it is, our ethnicity, how our skin looks and reacts to the sun, our age, how much we move around, and how healthy our diet is. (Karras SN et al.,2014;2015)

We need to change the amount of vitamin D that pregnant women in countries with low levels of vitamin D should take.

Conclusion

Many pregnant women in Iraq often have low levels of vitamin D, which is a common health concern. This condition means that their bodies don't have enough vitamin D, which is worse for pregnant women with low incomes. They have a greater chance of having high blood pressure while they are pregnant.

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