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The Relationship Between Vitamin D Levels in Pregnant Women and Spontaneous Abortion During Early Pregnancy

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Background: About 10-15% of clinically detectable pregnancies end in a spontaneous abortion. This research set out to examine Iraqi pregnant women's vitamin D levels in connection to their risk of miscarriage. Our goal is to learn more about the correlation between vitamin D insufficiency and abortion rates by analyzing blood vitamin D concentrations in women who have experienced spontaneous miscarriages. Materials and methods: An investigation of a cross-sectional nature was carried out at the Al Diwaniya Maternity and Child Teaching Hospital in Iraq between the months of August 2016 and August 2017. Using well-established laboratory procedures, 42 women who had previously experienced an abortion of their own accord provided blood samples for the purpose of determining their vitamin D levels. Result: The average concentration of vitamin D in the serum was 21.48 ± 11.82 ng/ml, while sixty percent of the participants had levels that were insufficient (less than twenty ng/ml). It was shown that there was a significant negative correlation ($r = -0.717$, $p < 0.001$) between the levels of vitamin D and the occurrence of miscarriages. Using regression analysis, it was discovered that vitamin D levels were responsible for explaining 51.4% of the variance in the incidences of miscarriage. Conclusion: Vitamin D deficiency is significantly associated with an increased risk of spontaneous miscarriage. Preventing vitamin D insufficiency may reduce miscarriage rates among Iraqi women.

Keywords : vitamin D, pregnant, spontaneous abortion, early pregnancy.

INTRODUCTION

Miscarriage, also known as spontaneous abortion, occurs when a pregnancy ends before the twentieth week of gestation. This frequent reproductive issue affects around 10-15% of all clinically diagnosed pregnancies (Pandey et al., 2005). Early miscarriages that occur before the 12th week are the most upsetting of all and can have a substantial psychological impact on the women who have them. More than half of all miscarriages remain unaccounted for, despite significant advances in maternal healthcare, emphasizing the crucial need for continuous research into the underlying mechanisms and potential risk factors (Cuenca, 2023). The role of vitamin D in calcium homeostasis and bone health has long been recognized. However, emerging evidence indicates that vitamin D has significant regulatory effects on inflammation, cell proliferation, immunological function, and hormonal balance—all of which are required for a successful pregnancy (E et al., 2021). The bioactive form of vitamin D, known as 1,25-dihydroxyvitamin D3 (cholecalciferol or vitamin D3), is mostly generated in the skin following exposure to ultraviolet B (UVB) radiation and is regarded to be more effective than its analogue, vitamin D2 (ergocalciferol) (Judistiani et al., 2019). The placenta and decidua have large levels of vitamin D receptors (VDRs), indicating that this nutrient is biologically important during pregnancy (Karras et al., 2018). A vitamin D deficit affects around one billion individuals worldwide, posing a major health risk. Women who are pregnant are particularly vulnerable due to the increased physiological demands of pregnancy. Even in nations with lots of sunlight, like Iraq, certain communities suffer from widespread vitamin D insufficiency due to cultural norms, clothing, and a lack of outdoor activity (Amirfaiz, 2018; Roth et al., 2018). Several investigations have linked maternal vitamin D deficiency to unfavorable obstetric outcomes such as preterm birth, gestational diabetes, and preeclampsia (Amegah et al., 2017; Flood-Nichols et al., 2015). There hasn't been enough study on the link between low vitamin D levels and early pregnancy loss. Vitamin D is thought to increase maternal-fetal immunological tolerance by modulating the immune system, specifically by encouraging a change from pro-inflammatory Th1 to anti-inflammatory Th2 responses—a critical process for embryo implantation and survival (Cyprian et al., 2019; Khatiwada et al., 2021). Furthermore, its effect on cytokine modulation emphasizes its involvement in maintaining pregnancy and preventing immune-mediated disorders such as spontaneous abortion (Wu et al., 2022).

Given the global interest in vitamin D's non-skeletal effects, the goal of this study is to investigate the association between serum vitamin D levels and the risk of spontaneous miscarriage in early pregnancy among Iraqi women. By exploring this link within a culturally and geographically diverse community, this study hopes to improve reproductive healthcare and influence future clinical and public health strategies aimed at improving pregnancy outcomes.

METHODOLOGY

This cross-sectional study was conducted in the Al Diwaniya Maternity and Child Teaching Hospital in Iraq between August 2016 and August 2017. After giving their informed agreement, 42 women of reproductive age who had previously experienced a spontaneous abortion were enrolled. The selection of participants was based on inclusion criteria that assessed past pregnancy outcomes and medical history.

In order to measure serum vitamin D levels using accepted laboratory methods, venous blood samples were collected. SPSS version 23 was used to analyze the data. The averages and standard deviations of vitamin D levels and abortion rates were determined using descriptive statistics. The relationship between vitamin D levels and the frequency of miscarriages was assessed using Spearman's correlation. Statistical significance was defined as a p-value of less than 0.05.

RESULT AND DISCUSSION

This study investigated the association between serum Vitamin D levels and abortion rates at different stages of pregnancy among 42 women in Iraq.

The mean age of the participants is approximately 24.95 years, accompanied by a standard deviation of 5.09 years. This suggests an age range of 17 to 36 years. The mean number of abortions is 2.57, accompanied by a standard deviation of 1.42, indicating variability in the number of abortions experienced by individuals. The average vitamin D level is 21.48 ng/ml, accompanied by a notable standard deviation of 11.82 ng/ml, indicating a broad range from 5 to 50 ng/ml.

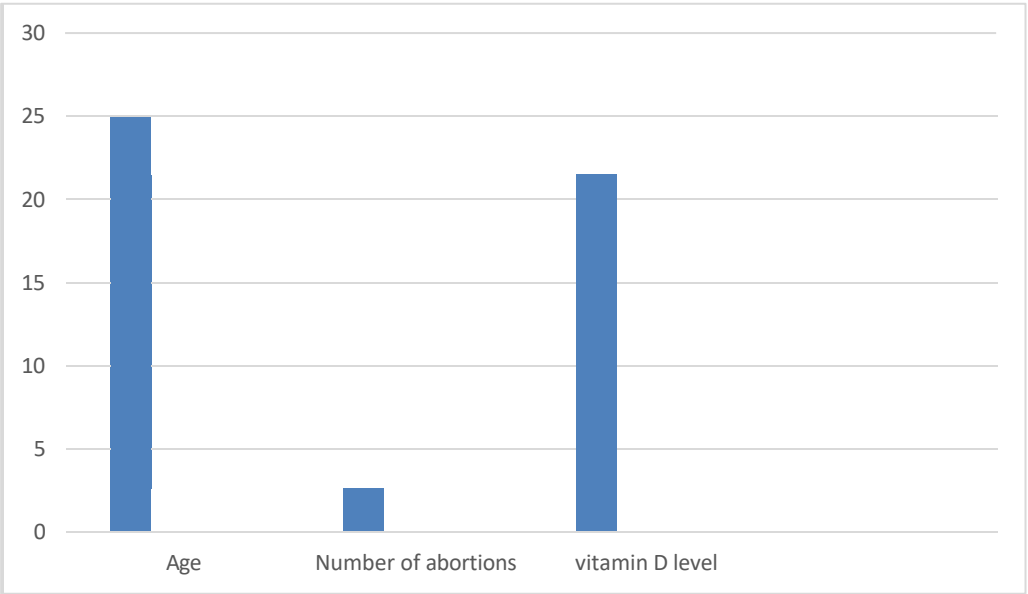

Figure 1. Characteristics of the Study Population

The average age of participants was 24.95 years, with a standard deviation of 5.09 years, and ranged from 17 to 36 years. The mean number of previous abortions was 2.57 with a standard deviation of 1.42. The mean serum vitamin D concentration was 21.48 ± 11.82 ng/ml, with a range of 5 to 50 ng/ml.

Table 1. Vitamin D Levels Distribution

Vitamin D Level (ng/ml)	Number of Women	Percentage (%)
< 20	25	60%
≥ 20	17	40%

Among the 42 women, 25 (60%) had vitamin D levels below 20 ng/ml, indicating deficiency, while 17 (40%) had sufficient levels (≥20 ng/ml).

Table 2. Relationship between Serum Vitamin D Levels and Number of Abortions

Variable	Correlation Coefficient (r)	p-value
Serum Vitamin D vs. Number of Abortions	-0.717	< 0.001

A substantial negative connection was identified ($r = -0.717$, $p < 0.001$), suggesting that diminished vitamin D levels correlated with an increased incidence of spontaneous miscarriages. Regression study indicated that vitamin D levels explained 51.4% of the variance in abortion frequency ($R^2 = 0.514$).

Table 3. Regression Analysis for Predicting Spontaneous Abortion

Model	R^2	Standard Error
Vitamin D Levels	0.514	0.717

The results of the regression analysis indicated that serum Vitamin D levels may be used to predict 51.4% of the variation in the incidence of abortions ($R^2 = 0.514$). This indicates that Vitamin D has a considerable impact on predicting early pregnancy loss.

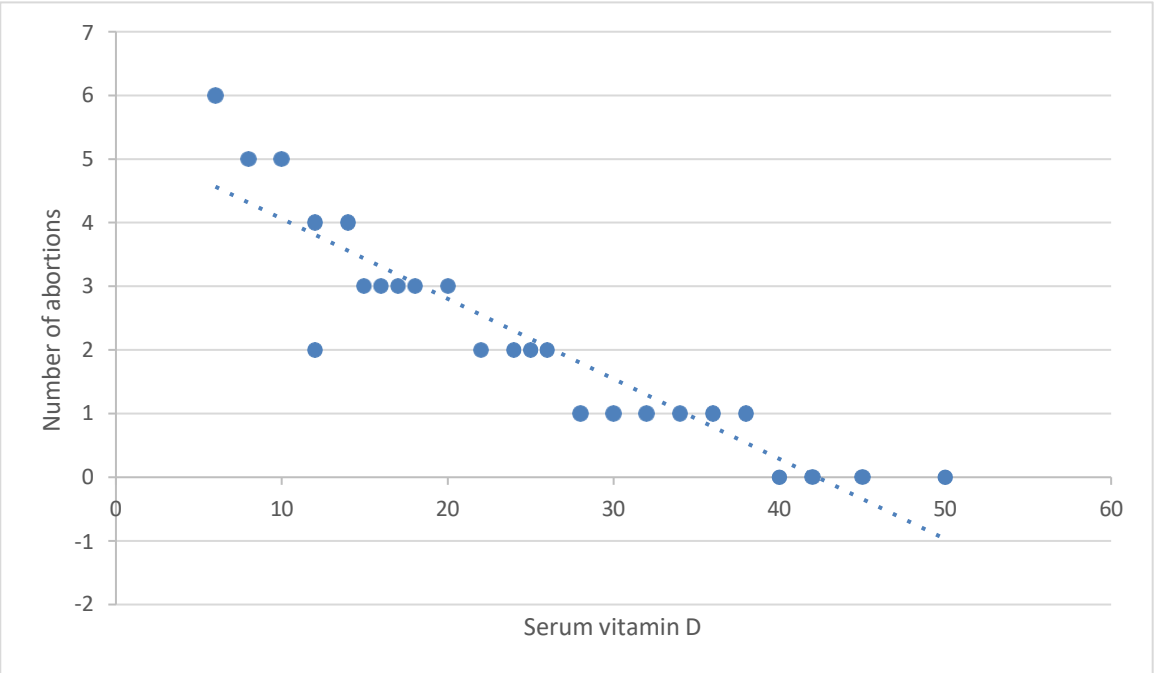

Figure 2. Correlation between the number of spontaneous abortions and the level of vitamin D in the mother's blood

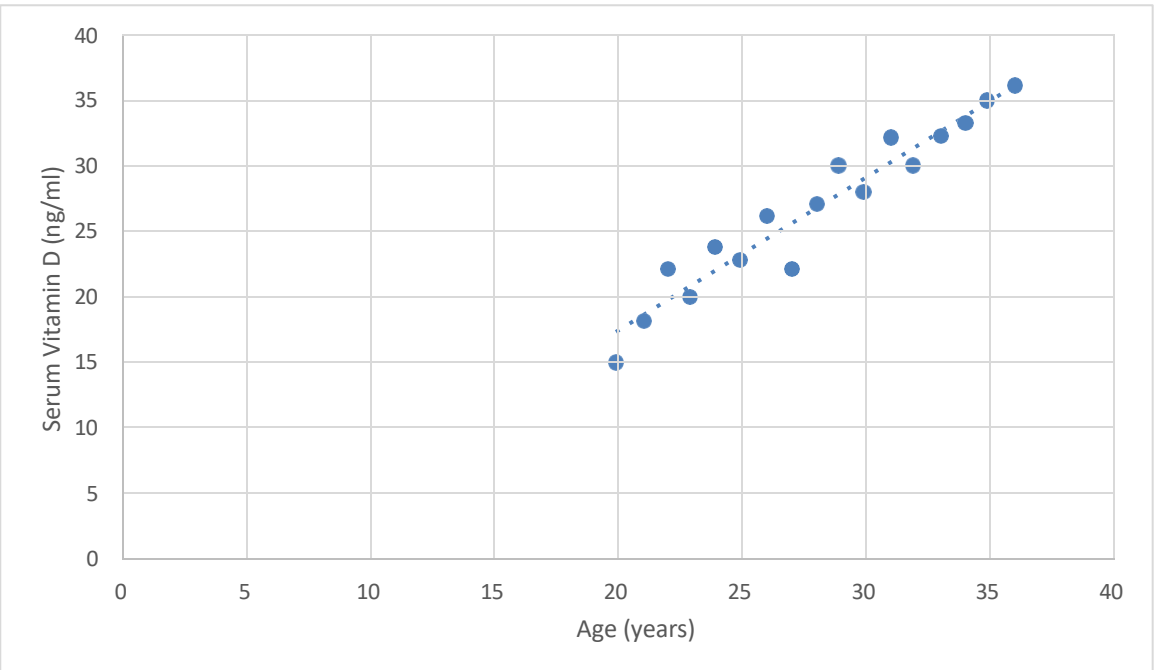

Figure 3. Correlation between Maternal Age and Serum Vitamin D Concentration

Discussion

According to the findings of this study, there is a significant connection between low levels of serum vitamin D and the occurrence of spontaneous abortions in the early stages of pregnancy among Iraqi women. Approximately sixty percent of the participants had vitamin D levels that were lower than twenty nanograms per milliliter, which indicates that there is a pervasive deficiency in this population. The fact that there is a strong positive association between blood vitamin D content and spontaneous abortion, as indicated by a correlation value of 0.717, lends credence to the idea that vitamin D insufficiency may play a role in the loss of an early pregnancy (A. K. Mohammed & Alqani, 2018).

In addition to its well-known participation in calcium metabolism and the maintenance of healthy bones, vitamin D has a wider and more complex role in human physiology. One of the most important functions that vitamin D plays during pregnancy is the modulation of the adaptive immune response, the reduction of inflammation, and the facilitation of trophoblastic growth. All of these functions are essential for the successful implantation of the embryo and the maintenance of the pregnancy. Through its ability to regulate the balance of Th1 and Th2 cytokines, vitamin D's anti-inflammatory properties enable it to create an immunological environment that is favorable for the development of the fetus. In the event that this equilibrium is disrupted, it may lead to immune-mediated pregnancy complications, such as the loss of consciousness (Cuenca, 2023; E et al., 2021).

It has been demonstrated in previous studies that inadequate levels of vitamin D are linked to unfavorable outcomes during pregnancy. The findings of this investigation are consistent with those findings. According to Ota et al. (2014), a lack of vitamin D in pregnant women was found to be connected with increased natural killer (NK) cell activity. This is a factor that is linked to fetal rejection and miscarriage. It has been found via additional study that vitamin D deficiency is connected with an increased risk of recurrent pregnancy loss. This is particularly true for women who suffer from autoimmune disorders such as antiphospholipid syndrome. The immunomodulatory function of vitamin D in improving maternal-fetal tolerance is brought to light by these findings (Ota et al., 2014).

Nonetheless, certain limitations of this study must be recognized. The cross-sectional design prevents the establishment of causation between low vitamin D levels and miscarriage. The limited sample size may restrict the generalizability of the results. Future longitudinal and interventional research with bigger cohorts are necessary to validate these findings and elucidate the causal processes linking vitamin D deficiency and early pregnancy loss. Notwithstanding these constraints, the study provides significant insights into maternal health in Iraq, where cultural traditions and insufficient sun exposure may intensify vitamin D deficiency among women of reproductive age. Our findings indicate that monitoring vitamin D levels and maintaining sufficient intake by food, supplementation, or regulated sun exposure may function

as a preventive measure to mitigate the likelihood of spontaneous abortion in at-risk groups (Iqbal & Samanje, 2024; R. A. Mohammed & Kokaz, 2019).

CONCLUSION

This study highlights the importance of monitoring and managing vitamin D levels in pregnant women, particularly those with a history of early pregnancy loss. The integration of vitamin D assessment and supplementation into prenatal care protocols could enhance maternal outcomes and decrease the prevalence of spontaneous abortion. These results support the need for public health strategies in Iraq that promote vitamin D sufficiency among women of childbearing age.

REFERENCES

Amegah, A. K., Klevor, M. K., & Wagner, C. L. (2017). Maternal vitamin D insufficiency and risk of adverse pregnancy and birth outcomes: a systematic review and meta-analysis of longitudinal studies. *PLoS One*, *12*(3).

Amirfaiz, S. (2018). *Knowledge and Awareness of Vitamin D among Pregnant or Lactating Iraqi Refugee Women: A Call for Different Approaches in Health Education and Outreach*. Seattle University.

Cuenca, D. (2023). Pregnancy loss: Consequences for mental health. *Frontiers in Global Women's Health*, *3*(1032212).

Cyprian, F., Lefkou, E., Varoudi, K., & Girardi, G. (2019). Immunomodulatory effects of vitamin D in pregnancy and beyond. *Frontiers in Immunology*, *10*(2739).

E, L. B., A, I., S, D., M, H., & JH, W. (2021). Vitamin D and immune regulation: antibacterial, antiviral, anti-inflammatory. *Journal of Bone and Mineral Research Plus*, *5*(1).

Flood-Nichols, S. K., Tinnemore, D., Huang, R. R., Napolitano, P. G., & Ippolito, D. L. (2015). Vitamin D deficiency in early pregnancy. *PLoS One*, *10*(4).

Iqbal, M. N., & Samanje, J. (2024). Estimation of IL-8, IL-38, Vitamin D, TPO Ab, and CRP Levels in Iraqi Hashimoto Thyroiditis Patients. *Medical Journal of Babylon*, *21*(2), 425–430,. https://doi.org/10.4103/MJBL.MJBL_1503_23

Judistiani, R. T. D., Nirmala, S. A., Rahmawati, M., Ghrahani, R., Natalia, Y. A., & Sugianli, A. K. (2019). Optimizing ultraviolet B radiation exposure to prevent vitamin D deficiency among pregnant women in the tropical zone: report from cohort study on vitamin D status and its impact during pregnancy in Indonesia. *BMC Pregnancy and Childbirth*, *19*, 1–9.

Karras, S. N., Wagner, C. L., & Castracane, V. D. (2018). Understanding vitamin D metabolism in pregnancy: From physiology to pathophysiology and clinical outcomes. *Metabolism*, *86*, 112–23.

Khatiwada, A., Wolf, B. J., Mulligan, J. K., Shary JR, H., M, B., & J.E. (2021). Effects of vitamin D supplementation on circulating concentrations of growth factors and immune-mediators in healthy women during pregnancy. *Pediatric Research*, *89*(3), 554–62.

Mohammed, A. K., & Alqani, V. H. A. (2018). Association between maternal serum vitamin D and early pregnancy spontaneous abortion in Iraqi women. *Asian J Pharm Clin Res*, *11*(2), 432–4.

Mohammed, R. A., & Kokaz, M. T. (2019). Rubella Virus Seroprevalence and Associated Factors in Pregnant Women with and Without Previous Spontaneous Abortion. *Medical Journal of Babylon*, *16*(3), 243–247,. https://doi.org/10.4103/MJBL.MJBL_43_19

Ota, K., Dambaeva, S., Han, A.-R., Beaman, K., Gilman-Sachs, A., & Kwak-Kim, J. (2014). Vitamin D deficiency may be a risk factor for recurrent pregnancy losses by increasing cellular immunity and autoimmunity. *Human Reproduction*, *29*(2), 208–19.

Pandey, M. K., Rani, R., & Agrawal, S. (2005). An update in recurrent spontaneous abortion. *Archives of Gynecology and Obstetrics*, *272*, 95–108.

Roth, D. E., Abrams, S. A., Aloia, J., Bergeron, G., Bourassa, M. W., & Brown, K. H. (2018). *Global prevalence*

and disease burden of vitamin D deficiency: a roadmap for action in low-and middle-income countries.

Wu, Z., Liu, D., & Deng, F. (2022). The role of vitamin D in immune system and inflammatory bowel disease. *Journal of Inflammation Research*, 3167–85.