The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 5, 2025

STRONG MOMS, FRAGILE BONES: OSTEOPOROSIS IN PREGNANCY

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DOI: https://doi.org/10.5281/zenodo.15527702

Keywords
Vitamin D, Pregnancy, Osteoporosis, Deficiency.

Article History
Received on 20 April 2025
Accepted on 20 May 2025
Published on 27 May 2025

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Abstract

Background: *Osteoporosis is a common disease characterized by a systemic impairment of bone mass due to the deficiency of Vitamin D, which results in fragility fractures. Osteoporosis poses unique challenges for pregnant individuals, necessitating specialized care to ensure maternal and fetal well-being.*

Aim:*The conduct study is representing the idea in comprehensive literature research and evidence-based interventions, especially in Pregnant women and worsens the lifestyle of their wellbeing to reduce the risk of fracture and improve bone health during pregnancy.*

Methodology:*This study analyzes the complex relations between pregnancy and osteoporosis, highlighting the demand for individualized treatment strategies. The factors examined were physiological alterations, hormonal swings, and probable side effects of this dual diagnosis. The conducted research was divided in two parts in which detailed review of the literature of last 5 years and using that evidence the cross-sectional survey was implemented. The study offers evidence-based therapies such as dietary supplements, exercise advice, and medication.*

Result:*The evaluated results show that 60% of the random women who participated in survey were found to be deficient in Vitamin D. This was comparable to the percentages of pregnant women (53%) and nursing moms (58%), respectively, who were Vitamin D deficient. Additionally, our study revealed that Vitamin D shortage in mothers increases the likelihood of neonatal Vitamin D deficit and puts nursing moms at a higher risk of developing osteoporosis.*

Conclusion: *By addressing this under-researched intersection, healthcare providers can enhance the quality of care for pregnant individuals with osteoporosis, safeguarding both maternal and fetal health.*

INTRODUCTION

Vitamin D, also known as calciferol, is a fat-soluble vitamin found in some foods and sold as a dietary supplement. It plays a crucial role in maintaining adequate serum calcium and phosphate concentrations (1), promoting calcium absorption in the gut, and assisting osteoblasts and osteoclasts in building and repairing bones (2, 3). Without enough Vitamin D, bones may become fragile, deformed, or thin, and adult osteomalacia and childhood rickets can be avoided. Vitamin D, along with calcium, helps prevent osteoporosis in older people.

Approximately 1.3 million osteoporosis-related fractures occur annually in the United States, primarily in the spine, hip, and wrist bones. To prevent bone loss, it is essential to consume foods containing calcium (2, 4), which is an essential mineral for bones. Vitamin D aids in calcium breakdown and absorption, reducing bone loss and fracture chances (3).

In addition to preventing bone loss, calcium supplements can also help prevent tooth loss in older adults. Recommendations for calcium include taking at least 1000mg of calcium for premenopausal females and males, and 1200mg for postmenopausal females (5, 6). However, it is not recommended to take more than 2000mg of calcium in a single day (4, 7).

Vitamin D also reduces the risk of bone fractures, especially in older people, by absorbing calcium. The current recommendation is at least 800IU of Vitamin D per day for people over 70 years and postmenopausal females (1). Low levels of Vitamin D may not be effective, and high doses can be toxic if taken for a long time (4, 6, 8).

Vitamin D deficiency is a prevalent issue among pregnant women, affecting 18-84% of them. This deficiency can lead to various health issues, including type 1 diabetes, postpartum hypoglycemia, eclampsia, pre-eclampsia, gestational diabetes, bone diseases, neoplastic disorders, inflammation, and infections (8, 9). Pregnant and nursing women are more vulnerable to Vitamin D deficiencies due to their diet, which determines the amount of Vitamin D in their milk.

Vitamin D is essential for fetal growth and development, as it enhances calcium absorption in the digestive tract (9). Insufficient exposure to sunlight and poor diet are the main causes of Vitamin D deficiency, which can negatively impact the growth and mineralization of bone in the developing fetus and mother. Early detection of Vitamin D status in pregnant women can help prevent pregnancy problems caused by Vitamin D deficiency (10).

Breastfeeding mothers and non-pregnant and non-breastfeeding women who do not take Vitamin D supplements often have insufficient Vitamin D status. Season and latitude of residence at the time of blood collection also impact the Vitamin D status of nursing women, with summer and autumn having higher concentrations than winter and spring (11-14).

In the absence of individual exposure to ultraviolet radiation and low Vitamin D intake, Vitamin D-containing supplements may be an option to ensure adequate Vitamin D concentrations (15-18).

METHODOLOGY:

Study Setting and Design

This cross-sectional study evaluates the co-relation of Vitamin D deficiency in pregnancy. The study was conducted at Murshid Hospital in Karachi, Pakistan.

Inclusion criteria: Pregnant and lactating women, and women under the age of 35 were included in this study.

Exclusion criteria: Males, children, adolescent girls, elderly women were put into the exclusion criteria of this study.

Sample Size:

Considering the factors of Age, Pregnancy and Nursing women, the criteria set for each category is 50 women were to be at least recruited for the study in each category.

Ethical Approval:
The study is a retrospective study conducted according to the protocols of the previous research. Therefore, no ethical approval is required.

Data Collection
The literatures regarding such topics were searched out using Google and Google scholar search engines and the information was taken from authentic research papers and journals included in category of JCR, WoS, Scopus and HEC recognized were considered for the study.
The collected research data was then compared with the estimation of current study evaluations.

Statistical Analysis
The Vitamin D data of the 60 women was sorted, analyzed, and then compared with the Vitamin D data of the pregnant women and nursing mothers. The data was analyzed using MS excel 2019 version and represented in frequencies and percentages. The evaluated data was the co-related using Fischer test.

RESULT:
The exact percentage of pregnant women affected by osteoporosis can vary. It's important to note that the risk of osteoporosis and fractures can increase in pregnant women with pre-existing osteoporosis or other risk factors. Sixty random reports of Vitamin D were collected including only women below 35 years. Then the random levels of Vitamin D were compared with the Vitamin D levels of pregnant women and nursing mothers. Figure 1.1 shows the Vitamin D levels of the random women according to age. According to it, mostly women have Vitamin D levels below 30ng/ml. Although there is no effect of age seen in the levels of Vitamin D. The normal value of Vitamin D is between 30 ng/ml to 100 ng/ml.

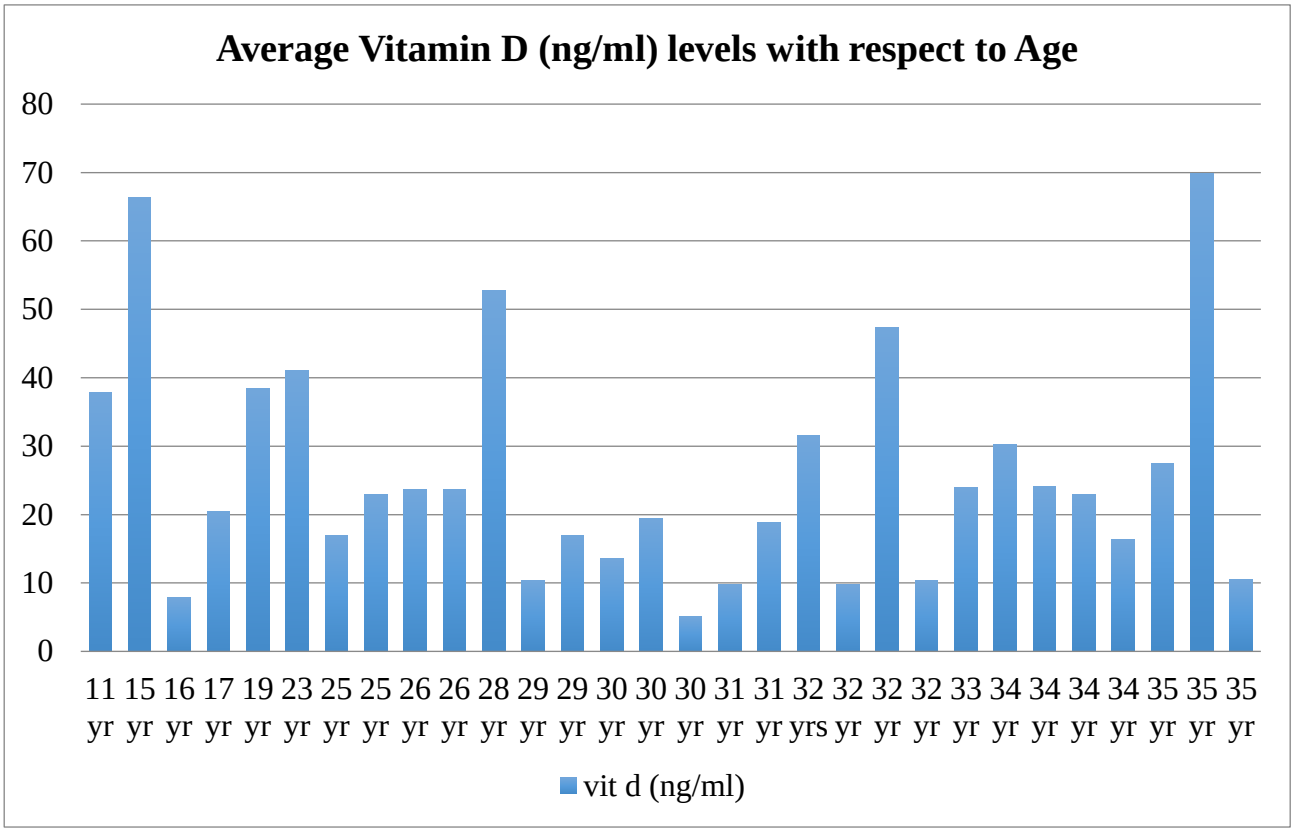

Figure 1: Identifying average Levels of Vitamin D in Pregnant and Lactating mothers with respect to their ages

The evaluated results the lab reports predicted the Levels of Vitamin D in According to conducted research in women under 35 years only 30% of women have sufficient Vitamin D, 60% of women

having insufficient Vitamin D while 10% of women have severely deficient vitamin. Eighty-four pregnant women were studied of approximately same age group, among which 53% women were having insufficient levels of Vitamin D while 9.5% women were having deficiency of Vitamin D. Only 34.5% women were having normal Vitamin D levels. Vitamin D levels of Seventy-five nursing mothers and their infants were also compared. The 36% of women were found Vitamin D deficient and 58.7% were having insufficient levels of Vitamin D. Among infants 66.6% infants were Vitamin D deficient while 12% were having insufficient levels of Vitamin D. In 7% of infant's skeleton deformities were also found. The age of the infants was between 4 to 12 months while the age of women were in between 19 to 37 years.

Table 1: Status of Vitamin D levels in all categories of Women.

Category of Women Inclusion	Parameter	Frequency	Total	Percentage (%)	Vitamin D levels
Women under 35 years	Normal Vitamin D	18	60	30	30-100
	Vitamin D deficient	6		10	Below 10
	Vitamin D insufficient	36		60	10-29
Pregnant Women	Normal Vitamin D	29	84	34.5	30-100
	Vitamin D deficient	8		9.5	Below 10
	Vitamin D insufficient	47		56.0	10-29
Nursing Mothers	Normal Vitamin D	4	75	5.3	30-100
	Vitamin D deficient	27		36.0	Below 10
	Vitamin D insufficient	44		58.7	10-29

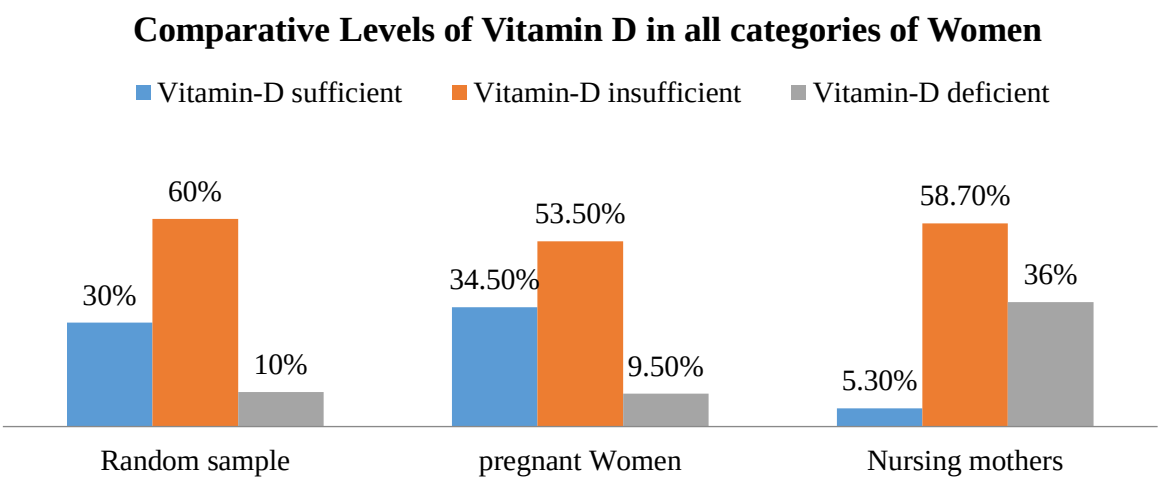

Figure 2: Comparative analysis of Vitamin D status among random women, pregnant women and nursing mothers

Table 2: Fischer test to identify co-relation of Vitamin D levels with respect to pregnancy and Lactation

Category of Women Inclusion	Normal Vitamin D	Vitamin D deficient	Marginal Row Total	P-Value	Significant Difference
Women Under 35 years	18	6	24	P-Value >0.05	No Significant difference
Pregnant women	29	8	37		
Marginal Column Totals	47	14	61 (Grand Total)		
Women Under 35 years	18	6	24		

Pregnant women	29	8	37	P-Value < 0.05	Significant difference
Marginal Column Totals	47	14	61 (Grand Total)		

*P-value is 0.0.5

It has been observed that nursing mothers are at higher risk of Vitamin D deficiency while there is not any significant difference in Vitamin D status of random women and pregnant women, both having insufficient levels of Vitamin D

DISCUSSION:

Taken together, our results have shown that prevalence of osteoporosis is significantly elevated in general population and pregnant and nursing mothers. We have analyzed, using Fischer test to develop a proper co-relation of the levels of Vitamin D in pregnancy and nursing mothers with women under 35 years respectively keeping P-value < 0.05. Data obtained from the survey has shown that 60 % of random women have insufficient Vitamin D levels. While 53% of pregnant women have insufficient levels of Vitamin D levels and 58% of nursing mothers are Vitamin D deficient. The co-relation identified through Fischer Test represented that Pregnancy and Lactation does have connection with Vitamin D deficiency showing significant difference of Lactation and with random women under 35 years The reasons for its deficiency involved mal absorption, less exposure to sunlight, obesity, inactive form of Vitamin D, diet lacking Vitamin D. While in pregnancy it is associated high prevalence of preeclampsia, hemo-dilution, gestational diabetes, low birth weight, incidence of autoimmune disease. According to the international breast-feeding journal Vitamin D deficiency in nursing mothers could be the loss of Vitamin D by breast milk. Pregnant women with osteoporosis may be more prone to fractures due to weakened bones. It's crucial for them to receive appropriate care and support throughout their pregnancy to ensure their well-being (6, 8).

According to the national library of medicine 5 to 50 % of pregnant and 10 to 56% of lactating mothers are Vitamin D deficient and have osteoporosis (1). Pregnancy can potentially worsen osteoporosis in women due to hormonal changes and increased demands on the skeletal system. This can lead to an increased risk of fractures (5). Proper management and close monitoring by healthcare professionals are essential to ensure the well-being of both the mother and the baby. Adequate nutrition, exercise, and potential medication adjustments may be recommended to minimize complications. Article by division of nutritional science states that 5 to 29% of American pregnant women may have insufficient levels of Vitamin D with increase prevalence in African Americans (10). As per to the American journal of obstetrics and gynecology, African American women have greater risk for Vitamin D deficiency when compared with other women because skin pigmentation is increased and insufficient dietary intake. Prevalence of Vitamin D deficiency in African women is 29 to 54% comparing with white pregnant women have 5 to 42% (5).

Comparing our study with different authorized researches have clearly indicates that prevalence of Vitamin D in pregnant and nursing mothers is significantly high and they are more prone to osteoporosis (13). It is necessary to test take multivitamins supplement as study shows that breast fed infants from deficient pregnant women are prone to life threatening conditions like dilated cardiomyopathy and hypo calcemic seizures. To prevent its severe deficiency at early stages physicians must order Vitamin D blood test; among which 25 hydroxy Vitamin D blood test is very common. Using this test, we have gathered our data (16, 18).

CONCLUSION:

Research shows nursing mothers are at higher risk of Vitamin D deficiency, increasing their risk of osteoporosis. Both pregnant and women under 35 years' women have Vitamin D insufficiency, with over half having insufficient levels. Hormonal changes during pregnancy can exacerbate osteoporosis-related fractures. Pregnant women with osteoporosis should work with healthcare providers to manage their condition, including adequate calcium and Vitamin D intake, weight-bearing exercises, and medication. Regular monitoring and follow-up are crucial.

FUNDING:
The conducted study is not funded from any platform or organization.

ACKNOWLEDGMENT:
Through this study we wish to show our gratitude to our organization, Jinnah University for Women who has always motivated and supported in the whole journey of this research.

DECLARATION OF INTEREST:
There is no conflict of interest among authors.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS:
During the preparation of this work the author(s) used ChatGPT to enhance the readability of the article. After using this tool/service, the author(s) reviewed and edited the content as needed and took(s) full responsibility for the content of the publication.

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