

Role of Vitamin D among Pregnant Women with Backache

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Introduction

Backache and pelvic pain are among the most common discomforts experienced during pregnancy, affecting a significant proportion of women worldwide. Approximately 40.5% of pregnant women globally experience back pain, with prevalence increasing across trimesters: 28.3% in the first, 36.8% in the second, and 47.8% in the third trimester, significantly affecting quality of life.¹ These conditions can lead to considerable physical distress, impaired mobility, sleep disturbances, and reduced quality of life. The etiologies of back and pelvic pain in pregnancy are multifactorial, including hormonal changes, altered biomechanics, increased weight, postural adaptations, and ligamentous laxity. However, emerging evidence indicates a strong association between vitamin D deficiency and musculoskeletal pain, suggesting a potential therapeutic role for vitamin D supplementation in managing these symptoms.²

Vitamin D is a fat-soluble vitamin that plays a key role in calcium and phosphate metabolism, bone mineralization, and muscle function. It is

ABSTRACT

Objective: To determine the role of Vitamin D supplement among pregnant women presented with backache.

Methodology: A prospective observational study was carried out at Dept of Obs and Gynae (OPD) from April to June 2024. Pregnant women aged 17 to 40 years old, gestational age of 15-30 weeks, complaint of moderate to severe backache after pregnancy and having diagnosis of vitamin D deficiency (<20 ng/mL) were included. Women were taken on a daily dose of 2,000 IU of vitamin D3 for three months and were followed for monthly basis through VAS for pain. The proportion of participants reporting backache and pelvic pain was recorded during each visit to assess the trend over time. Data was entered and analyzed using SPSS version 26.

Results: The average age of women was 27.65 years, Mean BMI was 22.47 kg/m², mean serum calcium of 6.99 mg/dL, and vitamin D level of 16.11 ng/mL. Over three clinical visits, both serum calcium and vitamin D levels significantly increased. At the first visit, serum calcium was 7.0 mg/dL, and vitamin D was 19.97 ng/mL. By the third visit, serum calcium increased to 8.55 mg/dL, and vitamin D rose to 24.43 ng/mL. Backache and pelvic pain also decreased, with backache dropping from 73% at the first visit to 18.9% at the third, and pelvic pain reducing from 59.5% to 10.8%.

Conclusion: Study revealed that the supplementation of vitamin D is an effective intervention to manage the backache among pregnant women.

Keywords: Pregnancy, Backache, Vitamin D, VAS

synthesized in the skin upon exposure to ultraviolet B (UVB) rays from sunlight and is also obtained from dietary sources and supplements. During pregnancy, maternal vitamin D requirements increase due to fetal skeletal development and calcium demands, rendering pregnant women more susceptible to vitamin D deficiency.³

Vitamin D deficiency is recognized as a global health concern, with pregnant women being among the most vulnerable groups. Despite the availability of sunlight in countries like Pakistan, the prevalence of vitamin D deficiency among women of reproductive age is alarmingly high due to limited sun exposure, conservative clothing, inadequate dietary intake, and poor supplementation practices.⁴ A study conducted in Karachi, Pakistan reported that more than 55.6% of women of childbearing age had serum 25(OH)D levels below 29.5 nmol/L, placing them at risk for a variety of pregnancy-related complications including preeclampsia, gestational diabetes, and impaired fetal growth.⁵

Recent studies have investigated the link between vitamin D deficiency and musculoskeletal pain, including lower backache and pelvic girdle pain during pregnancy. Vitamin D receptors are present in muscle tissue, and deficiency can result in muscle weakness, pain, and poor postural support of the spine and pelvis. A randomized controlled trial by Englund et al. showed that pregnant women with musculoskeletal pain reported significant relief in symptoms and improved muscle strength following vitamin D supplementation.⁶ Similarly, Gokcek et al. found that daily vitamin D supplementation in deficient women significantly reduced pain intensity and improved physical functioning scores on standardized assessments.⁷ Pelvic girdle pain (PGP) during pregnancy has been specifically associated with low levels of vitamin D.

A study by Karahan et al. reported that pregnant women with insufficient vitamin D were more likely to suffer from severe PGP, and that correction of deficiency led to symptomatic improvement.⁸ Moreover, Aydogmus et al. demonstrated a positive relationship between antepartum vitamin D levels and postpartum pelvic floor function, further supporting the role of vitamin D in musculoskeletal health during and after pregnancy.⁹ In addition to musculoskeletal outcomes, vitamin D has immunomodulatory and anti-inflammatory properties that may play a role in reducing inflammation-mediated pain. Studies suggest that sufficient levels of vitamin D may contribute to decreased cytokine activity and enhanced neuromuscular function, which could explain the beneficial effects observed in women with backache and pelvic pain during pregnancy.¹⁰ Despite the global and local burden of vitamin D deficiency and its suspected role in pregnancy-related pain, there is limited literature from South Asian countries, particularly Pakistan, that specifically addresses this association. Cultural, dietary, and lifestyle factors unique to this region necessitate context-specific research to guide clinical practice. The lack of national guidelines and routine screening for vitamin D deficiency in antenatal care further amplifies the need for focused investigations in this area.¹¹ This study aims to evaluate the role of vitamin D in pregnant women presenting with backache and pelvic pain. By assessing baseline serum vitamin D levels and tracking symptom progression over a period of

supplementation, the study seeks to determine whether correcting vitamin D deficiency contributes to the reduction of musculoskeletal discomfort in pregnancy. The findings may provide evidence to support routine screening and supplementation strategies as part of comprehensive antenatal care to improve maternal well-being and functionality.

Methodology

This was a prospective observational study was conducted at Obs and Gynae department (OPD) during six months of period from April to September 2024. ERC was taken from PUMHSW (Ref no PUMHSW/SBA/PVC/ERC/22/2024). Data for the study was collected from a sample of pregnant women attending antenatal clinics. Pregnant women aged 17 to 40 years old, gestational age of 15-30 weeks, complaint of moderate to severe backache after pregnancy and having diagnosis of vitamin D deficiency (<20 ng/mL) were included. All the participants with pre-existing musculoskeletal disorders, women with history of spinal abnormalities, patients with hepatic and renal impairment, medical history of endocrinological disorders specifically thyroid dysfunction and those who were already on vitamin D or calcium supplementation were excluded.

Informed consent was obtained from each case and demographic data including age, gestational age, socioeconomic status and parity status were recorded. Pain assessment was done using a visual analogue scale (VAS), where participants were asked to rate their backache and pelvic pain on a scale of 0 to 10, with 0 indicating no pain and 10 indicating the worst possible pain. This tool was administered at baseline (first visit) and during two subsequent monthly follow-up visits to track changes in pain levels over time. Biochemical evaluation were done including serum calcium and vitamin D levels, which were measured using standard laboratory protocols at three different time points (first, second, and third antenatal visits).

The primary outcomes were the changes in serum calcium and vitamin D levels and their correlation with the reduction in backache and pelvic pain. These were evaluated through repeated clinical visits and symptom tracking. The proportion of participants reporting backache and pelvic pain was recorded during each visit to assess the trend

over time. The observed reduction in symptoms along with improved biochemical values supported the potential therapeutic role of vitamin D in alleviating pregnancy-related musculoskeletal discomfort. All the data were collected using study proforma and analysis was done using SPSS version 26.

Results

Table I presents the descriptive statistics of parity distribution among study participants. The majority of participants had a parity of 1–3 (64.8%), followed by 4–6 (29.7%), and 5.4% with more than six previous births.

Table I: Parity of study participants.		
Parity	Frequency	Percent
1-3	48	64.8%
4-6	22	29.7%
>6	4	5.4%
Total	74	100.0%

The baseline characteristics of the study participants show that the mean age of participants was 27.65±5.45 years, with an average BMI of 22.47±3.31, mean Serum calcium levels of 6.99±1.24 mg/dL, and the mean vitamin D level of the women was 16.11±3.87 ng/mL, as shown in table II.

Table II: Baseline values for study variables, (N=74)			
Study variables	Mean±SD.	Minimum	Maximum
Age	27.65±5.45	18	40
BMI	22.47±3.31	14	29
Serum calcium	6.99±1.24	5	10
Vitamin D	16.11±3.87	10	31

Table III presents the backache and pelvic pain scores among pregnant women across three consecutive monthly clinical visits. At the first visit, 73% of participants reported experiencing backache, and 59.5% reported pelvic pain. By the second visit, reports of backache decreased to 48.6%, and pelvic pain dropped to 32.4%. By the third visit, only 18.9% of participants reported backache and 10.8% reported pelvic pain.

Table III: Backache and Pelvic pain at 1st, 2nd, and 3rd visit.			
Pain	Clinical Visits		
	1 st	2 nd	3 rd
backache			
Yes	54(73%)	36(48.6%)	14(18.9%)
No	20(27%)	38(51.4%)	60(81.1%)
Total	74(100%)	74(100%)	74(100%)
Pelvic Pain			

Yes	44(59.5%)	24(32.4%)	8(10.8%)
No	30(40.5%)	50(67.6%)	66(89.2%)
Total	74(100%)	74(100%)	74(100%)

Table IV shows the changes in mean serum calcium and vitamin D levels across three clinical visits among pregnant women with backache. At the first visit, the mean serum calcium was 7.0±1.23 mg/dL, and the mean vitamin D level was 19.97±22.20 ng/mL. At the second visit, the mean serum calcium increased to 7.88 mg/dL (SD ±1.06), and vitamin D levels slightly rose to 20.09 ±4.43 ng/mL. By the third visit, with further improvement in both nutrient levels, Serum calcium rose to 8.55 mg/dL (SD ±0.81) and vitamin D increased to 24.43 ng/mL (SD ±4.58).

Table IV: Mean calcium and vitamin D levels at 1 st , 2 nd , and 3 rd visit. (N=74)			
Nutrients	Mean	Min	Max
1 st Visit			
Serum Calcium	7.0 ±1.23	5	10
Vitamin D	19.97±22.20	10	150
2 nd Visit			
Serum Calcium	7.88±1.06	5.5	10
Vitamin D	20.09±4.43	12	34
3 rd Visit			
Serum Calcium	8.55±0.81	6.5	10.5
Vitamin D	24.43±4.58	16	36

Discussion

This study evaluated the role of vitamin D among 74 pregnant women presenting with moderate to severe backache and pelvic pain after pregnancy, and diagnosed with vitamin D deficiency (<20 ng/mL). Each participant was prescribed a daily dose of 2,000 IU of vitamin D₃ for three months. Pain levels were assessed using the Visual Analogue Scale (VAS) at monthly follow-ups. This structured follow-up and supplementation plan enabled monitoring of both biochemical and symptomatic changes, allowing for clearer attribution of observed improvements to the intervention. The findings indicate a significant association between low vitamin D levels and the prevalence of backache and pelvic pain during pregnancy. Over the course of the study, improvements in serum calcium and vitamin D levels associated with a reduction in pain symptoms, suggesting a potential therapeutic role for vitamin D supplementation.

In this study, the majority of women experiencing backache and pelvic pain had lower parity, with 64.8% having 1–3 previous deliveries,

while only 5.4% had more than six children. Interestingly, the finding suggests that the prevalence of musculoskeletal pain symptoms decreased with increasing parity. This is contrary to previous research studies conducted by Osazee et al.¹² and Popajewski et al.,¹³ who associated higher parity with increased risk of backache due to cumulative physical strain on the musculoskeletal system. However, our findings may be explained by the fact that low-parity pregnancies are more vulnerable to pain due to a lack of physiological adaptation, weaker core stability, or insufficient awareness of posture and load management during pregnancy. Moreover, multiparous women might adopt more efficient physical coping mechanisms during subsequent pregnancies, leading to reduced reports of pain despite increased biomechanical demand.

In this study, a progressive reduction in prevalence of backache and pelvic pain was observed after vitamin D₃ supplementation. At the first follow-up visit, backache was reported in 73% of participants and pelvic pain in 59.5%. By the second visit, the prevalence had decreased to 48.6% for backache and 32.4% for pelvic pain. At the third and final visit, only 18.9% of participants reported ongoing backache, while pelvic pain persisted in just 10.8% of cases.

This observation is supported by the findings of Ghani et al.,¹⁴ who reported a significant association between vitamin D deficiency and chronic low back pain, with notable pain relief following vitamin D supplementation. Similarly, a randomized controlled trial by Woo et al.¹⁵ demonstrated that vitamin D supplementation significantly improved pain severity and quality of life among women suffering from musculoskeletal pain.¹⁵ Another relevant study by Aydogmus et al.⁹ reported that pregnant women with low serum vitamin D levels were more likely to experience pelvic girdle pain, and pain intensity significantly improved after correcting vitamin D status.

In this study, the mean vitamin D levels increased from 19.97 ng/mL at the first visit to 24.43 ng/mL at the third visit. This improvement coincided with the reduction in backache and pelvic pain, suggesting a potential link between vitamin D status and musculoskeletal discomfort during pregnancy. A systematic review and meta-analysis

by Luo et al.¹⁶ concluded that vitamin D supplementation during pregnancy positively affects bone health and may reduce the risk of musculoskeletal pain.

Additionally, a study by Lee et al.¹⁷ found that maternal vitamin D deficiency in early pregnancy was associated with adverse perinatal outcomes, emphasizing the importance of maintaining adequate vitamin D levels. In our study, Serum calcium levels increased from 7.0 mg/dL at the first visit to 8.55 mg/dL at the third visit. Adequate calcium levels are crucial during pregnancy for both maternal and fetal health. An exploratory study published by Arshad et al.¹⁸ reported that abnormal calcium levels during pregnancy are associated with adverse maternal and fetal outcomes, including preterm delivery and increased neonatal intensive care admissions. Furthermore, a review highlighted that calcium supplementation during pregnancy could reduce the risk of pre-eclampsia, a condition linked to hypertension and potential fetomaternal complications for both mother and child. Given the high prevalence of vitamin D deficiency among pregnant women and its association with musculoskeletal pain, the findings of this study emphasize the importance of monitoring and managing vitamin D and calcium levels during pregnancy. Future studies should include factors such as physical activity, dietary intake, and sun exposure, which can influence vitamin D status to further expose the role of vitamin D supplementation in managing musculoskeletal pain during pregnancy.

Conclusion

Study revealed a significant association between improving vitamin D and calcium levels and the reduction of backache and pelvic pain among pregnant women. On the serum vitamin D and calcium levels progressively increased over the course of the three clinical visits, there was a corresponding and substantial decrease in the prevalence of musculoskeletal discomfort. These results suggest that vitamin D plays a vital role in managing pregnancy-related backache and that its correction may serve as an effective, non-invasive strategy for alleviating such pain. Hence, routine screening and timely supplementation of vitamin D

during pregnancy may be beneficial in improving maternal musculoskeletal health.

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