

Prevalence of Vitamin D Deficiency in Pregnant Ladies

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ABSTRACT

Objective: To find out the prevalence of vitamin D deficiency (VDD) in pregnant ladies.

Study Design: A cross-sectional study.

Place and Duration of the Study: Department of Obstetrics & Gynecology, Sialkot Medical College, Sialkot Pakistan from 1st July 2021 to 30th December 2021.

Methodology: We included a total of 165 pregnant women aged 18 to 40 years having singleton pregnancy with gestational age below 16 weeks. Three cc blood samples were taken during routine antenatal investigation from all pregnant ladies. The serum vitamin D was asked from the institutional laboratory. Prevalence of VDD, insufficiency and sufficiency were calculated.

Results: In a total of 165 pregnant ladies, mean age was noted to be 30.2+5.5 years. There were 90 (54.5%) women who were living in rural areas. Sunlight exposure was less than 1 hour in 104 (63.0%) pregnant ladies. Ninety four (57.0%) women belonged to low socio-economic status. Evaluation of Vitamin D status revealed that 87 (52.7%) women had VDD, 52 (31.5%) vitamin D insufficiency while 26 (15.8%) had normal vitamin D levels. Sunlight exposure < 1 hour (p=0.0001) and low socio-economic status (p=0.0001) were noted to have significantly association with VDD.

Conclusion: Among pregnancy ladies, prevalence of VDD was very high. Poor sunlight exposure and low socio-economic status were revealed to have significant association with VDD.

Keywords: Pregnant, singleton, sunlight exposure, Vitamin D.

INTRODUCTION

Vitamin D is known to be a complex steroid hormone that plays variety of roles including involvement in bone metabolism.¹ Researchers have estimated around 1 billion individuals living with vitamin D deficiency (VDD) or insufficiency all around the globe.² In pregnancy ladies, serum levels of 25(OH)D rises up to 2-folds from 10 to 12 weeks of gestation reaching its maximum level in the 3rd trimester.³ The significant increase in the active form of vitamin D during pregnancy is expected to favor bigger cellular exposure to vitamin D especially in the 2nd and 3rd trimester and suggests a major role of vitamin D in the obstetrics well-being.^{4,5}

Data shows that VDD is frequent among pregnant ladies and this deficiency is thought to impact pregnancy outcomes.⁶ Vitamin D has immune modulation property which could be important in maintaining appropriate maternal immune response to the placenta. Vitamin D also has a role in regulation of target genes linked with appropriated implantation of the placenta.⁷ The exact mechanism of Vitamin D involvement in obstetrics well-being is not fully understood.

A study from Karachi found that prevalence of VDD to be high among pregnant ladies (46%).⁸ A recent study from Nepal noted 81% of the pregnant ladies to have VDD.⁹ Difference exists regarding estimates about the prevalence of VDD and not many studies have been conducted to identify linkage between various factors affecting vitamin D status in pregnant ladies. So, this study was aimed at finding out prevalence of VDD in pregnant ladies.

METHODOLOGY

This cross-sectional sectional study was conducted at Outpatient Department of Obstetrics & Gynecology, Sialkot Medical College, Sialkot Pakistan from 1st July 2021 to 30th December 2021. Approval acquired from the "Institutional Ethical Committee". Written and informed consents were sought. Considering confidence level of 95% with margin of error as 6% and prevalence of VDD as 81% among pregnant ladies,⁹ the sample size was calculated to be 165.

Inclusion criteria was pregnant women aged 18 to 40 years with singleton pregnancy, <16 weeks of gestational age and visited to antenatal clinic of our institute.

Exclusion criteria was pregnant women with a known history of thyroid/parathyroid, adrenal disorder, collagen disorders or those having hepatic or renal diseases.

Medical history was obtained and physical examinations were performed in all cases. Information like age, BMI, gestational age, area of residence, educational status and socioeconomic status were noted. Three cc blood samples were acquired from all study participants during routine antenatal investigations. The serum vitamin D was asked from the institutional laboratory. Prevalence of "vitamin D deficiency (<20 ng/mL)", "insufficiency (20-32 ng/mL)" and "sufficiency (>32 ng/mL)" were calculated.

Data analysis was performed employing SPSS version 26.0. We highlighted qualitative data as frequencies along with percentages while for quantitative data, mean and standard deviation (SD) were calculated. For qualitative data comparisons, chi square test was employed while analysis of variance (ANOVA) was used for quantitative data. P value<0.05 was considered significant.

RESULTS

In a total of 165 pregnant ladies, mean age was 30.2+5.5 years (ranged 18 to 39 years) while 92 (54.5%) women were above 30 years of age. There were 90 (54.5%) women who were living in rural areas. Sunlight exposure was less than 1 hour in 104 (63.0%) pregnant ladies. Educational status of 28 (17.0%) women was illiterate. Ninety four (57.0%) women were from low socio-economic status. Table-1 is showing characteristics of all pregnant ladies.

Table 1: Characteristics of Pregnant Ladies (n=165)

Characteristics		n (%)
Age in Years	<30	73 (44.2%)
	>30	92 (55.8%)
Residence	Rural	90 (54.5%)
	Urban	75 (45.4%)
Sunlight Exposure in hours	<1	104 (63.0%)
	>1	61 (37.0%)
Educational Status	Illiterate	28 (17.0%)
	Literate	137 (83.0%)
Socio-economic Status	Low (< PKR 20,000)	94 (57.0%)
	Medium or Above (> PKR 20,000)	71 (43.0%)
BMI		25.6 ± 2.1 (kg/m ²)

Evaluation of Vitamin D status revealed that 87 (52.7%) women had VDD, 52 (31.5%) vitamin D insufficiency while 26 (15.8%) had normal vitamin D levels (figure 1).

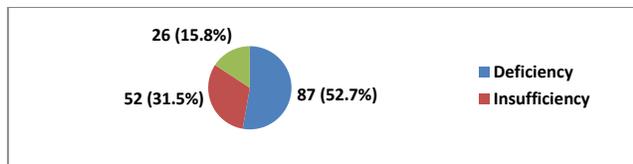


Figure 1: Vitamin D Status among Pregnant Ladies (n=165)

Table 2 is showing stratification of study variables among pregnant ladies with respect to vitamin D status. Sunlight exposure < 1 hour ($p=0.0001$) and low socio-economic status ($p=0.0001$) were noted to have significantly association with VDD

Table 1: Stratification of Study Variables Among Pregnant Ladies (n=165)

Characteristics	Vitamin D Status			P-Value
	Normal (n=26)	Insufficiency (n=52)	Deficiency (n=87)	
Age in Years	<30	12 (46.2%)	23 (44.2%)	0.9754
	>30	14 (53.8%)	29 (55.8%)	
Residence	Rural	11 (42.3%)	26 (50.0%)	0.1800
	Urban	15 (57.7%)	26 (50.0%)	
Sunlight Exposure in hours	<1	7 (26.9%)	35 (67.3%)	0.0001
	>1	19 (73.1%)	17 (32.7%)	
Educational Status	Illiterate	8 (30.8%)	7 (13.5%)	0.1211
	Literate	18 (69.2%)	45 (86.5%)	
Socio-economic Status	Low (< PKR 20,000)	5 (19.2%)	32 (61.5%)	0.0001
	Medium or Above (> PKR 20,000)	21 (80.8%)	20 (38.5%)	
Body Mass Index (kg/m ²), Mean±SD	25.4±2.0	25.8±2.2	25.5±2.0	0.6330

DISCUSSION

Pregnant ladies are more prone to VDD. The VDD among pregnant ladies might be explained due to higher physiological need for skeletal growth of the fetus. We noted high prevalence of VDD in pregnant ladies and these findings correlate well with the local data where the authors found 89% of the pregnant women to have VDD.¹⁰ Regional data has generally found prevalence of VDD between 74 to 95% among pregnancy ladies.^{11,12} Effects of VDD can be more pronounced in pregnant women as this deficiency can lead to adverse fetal or maternal outcomes. As South Asia is considered to be high risk geography for VDD due to its location and dark skin color of the native population, nutrient supplementation containing vitamin D can aid preventing VDD. Bodnar LM et al elaborated VDD among women before 22 weeks of gestation was independently associated with pre-eclampsia and low levels of vitamin D in the newborns.¹³

A meta-analysis evaluating pattern of VDD among pregnant ladies in Pakistan stated need to identify socio-economic and demographic factors linked with VDD in pregnant women.¹⁴ In the present work, we noted that sunlight exposure < 1 hour ($p=0.0001$) and low socio-economic status ($p=0.0001$) were significantly linked with vitamin deficiency/insufficiency. Low socioeconomic status influences dietary and living patterns of people as they are usually eating similar kinds of foods and maintaining similar sorts of daily habits. Moreover, as part of the cultural and social norms in Pakistan, most women are covering their heads and body which can limit sunlight exposure further aggravating underlying VDD.¹⁵ Data from Europe also indicated that Pakistani women living in Europe who usually cover their body and head had increased prevalence of VDD.¹⁶ Sunlight is the major source of vitamin D in certain population sets.¹⁷ Researchers in past highlighted that black skin is 90% less capable of vitamin D synthesis while sunscreen reduces vitamin D production between 95-99%.¹⁸ Higher geographical latitude also results in reduction in vitamin D production.¹⁷ In the past, controversial results have been found regarding beneficial role of vitamin D supplementation aiming reduction in various complications in pregnant women, yet, recent data has been suggestive of vitamin D supplementation for reduction in pregnancy related outcomes.⁶

Global bodies like "Royal College of Obstetricians and Gynecologists (RCOG)" and "American College of Obstetricians and Gynecologists" have recommended minimum 400 IU of vitamin D3 as a supplementary treatment among pregnant females but as the present study yielded very high proportion of pregnant women with VDD, local guidelines/protocols should also be updated about the appropriate dose of vitamin D supplementation during pregnancy. Well-designed randomized prospective trials are needed to further confirm the role of vitamin D supplementation

among pregnant women with VDD aiming reduction in maternal and fetal complications related to VDD.

CONCLUSION

Among pregnancy ladies, prevalence of VDD was very high. Poor sunlight exposure and low socio-economic status were revealed to have significant association with VDD.

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