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Original Article

Assessment of Serum Vitamin D level in 3rd Trimester Primigravidas and its association with Education, Economic Status and Body Mass Index

Abdul Haseeb Khan, Farzana Islam, Muhammad Wasim Aslam Javed, Muhammad Riaz
Department of Pathology, Sargodha Medical College, University of Sargodha

ABSTRACT
Maternal vitamin D deficiency (VDD) during pregnancy has numerous health implications in both the mothers and their newborns. Therefore, it is important to maintain vitamin D (VIT D) levels in pregnant women to prevent VDD. Even in Pakistan, despite abundant sun exposure, VDD is most common during pregnancy.To assess serum VIT D levels in 3rd trimester primigravida females and correlation of VIT D with different risk factors, (education, economic status and body mass index (BMI). It is a Cross sectional study. Duration of study was April 17th to September 17th. Total fifty 3rd trimester primigravida women were included in this study. Based on serum VIT D levels, pregnant women were categorized as: normal (> 30ng/ml), insufficient (20-30 ng/ml) and deficient (< 20ng/ml). Serum VIT D levels were measured by fully-auto Chemiluminescence immunoassay analyzer (CLIA) Maglumi 1000. Questionnaires or performas were used to record data related to BMI, sun exposure and educational level. 50 third trimester primigravida females were included in this study. After analyzing serum VIT D levels by CLIA, we found that 39 (78%) women were vitamin D deficient, 5 (10%) vitamin D insufficient and 6 (12%) had normal VIT D levels. VDD is quite common in 3rd trimester of pregnancy. Different risk factors e.g. BMI, education and economic status also influence VIT D levels. A significant association was observed between VDD and these risk factors i.e. for BMI (chi-square = 27.838; $p < 0.001$); for education (chi-square = 37.180; $p < 0.001$); and for economic status (chi-square = 12.518; $p = 0.002$).
Keywords: Vitamin D, Primigravida, third trimester

Introduction

Pregnancy is a physiological condition and usually has no effect on general health of a pregnant woman.[1] The amount and quality of food taken during pregnancy affects the health of fetus and also affects later health outcomes in the offspring .Maternal weight during pregnancy has a profound effect on both the mother as well as her child through the entire reproductive cycle (Maller et al., 2013**).** If a pregnant woman does not take balanced diet, then there are more chances of occurrence of nutritional anemia and **VIT D** deficiency in pregnant women.[3] VIT D status is influenced it's by dietary intake and factors affecting its absorption or metabolism.[4] The main risk factors of VIT D deficiency are lack of exposure to sunlight, poor diet, lack of dietary VIT D intake and absence VIT D supplementation during pregnancy.[5]

CORRESPONDENCE AUTHOR
Dr. Farzana Islam
Dept. Pathology, Sargodha, Medical College,
University of Georgia
Farzanaislam6630@gmail.com

According to Ali et al., 2013 VDD has been reported in 69.9% of the pregnant females[6] Low levels of VIT D during pregnancy lactating phase can have worse side effects on baby's growth, the formation of tooth enamel and the serum calcium levels[7]. Infants born to mothers with VDD have increased risk of symptomatic hypocalcaemia, small for gestational age and larger fontanelle, suggestive of impaired ossification of skull bone.[8] This study was planned to assess the serum VIT D levels in 3rd trimester primigravidas so that we may enable to generate the attentiveness in obstetricians and general population. VDD may be overcome which will be useful in decreasing feto-maternal disorders associated with VIT D status. The objective of this study was to determine the frequency of VDD during pregnancy in 3rd trimester primigravida females and to determine correlation of VDD with BMI, sun exposure, education and economic status.

Materials & Methods

A cross sectional study was conducted on third trimester primigravidas reporting in government and private health sectors in Sargodha district, Punjab, Pakistan. Duration of the study was 17th April to September 17th, 2017. Fifty 3rd trimester primigravidas women were included in this study. No probability purposive sampling technique had been used. Females included in this study having age of 20-35years, 3rd trimester and no medication history known to affect endocrinal parameters were included in my research work. Females having less than 20 and more than 35 years of age, 1st and 2nd trimester and having history of diabetes mellitus (DM), cardiovascular disorders (CVD), chronic renal failure, chronic hepatic disorders, autoimmune diseases and chronic infections were excluded. I took consent on Performa I from selected and agreed subjects while history and questions related to associate risk factors had been noted down on Performa II. I collected 1.05ml venous blood into blood collection tube, centrifuged and separated serum part. Serum vitamin D levels were estimated by fully automated chemiluminiscence immunoassay analyzer (CLIA) Maglumi 1000. Data was analyzed statistically by SPSS Version 20. Frequencies of Various groups of subjects according to vitamin D status were determined. Correlations of vitamin D to different age groups, daytime of sun exposure, duration of sun exposure were carried out by Chi square test.

Results

Vitamin-D	Frequency	Percent
Vitamin D deficient	39	78.0
Vitamin D insufficient	5	10.0
Normal Vitamin D level	6	12.0
Total	**50**	**100**

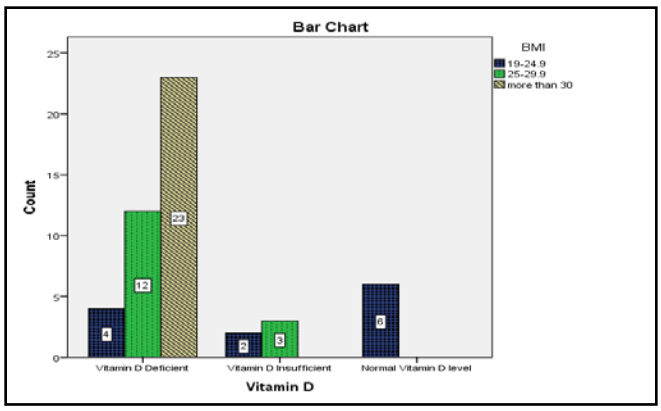

Fig-1

Vitamin D deficiency was observed in 78% primigravidas. 10% primigravidas had vitamin D insufficiency while normal VIT D was fond in 12 % women.

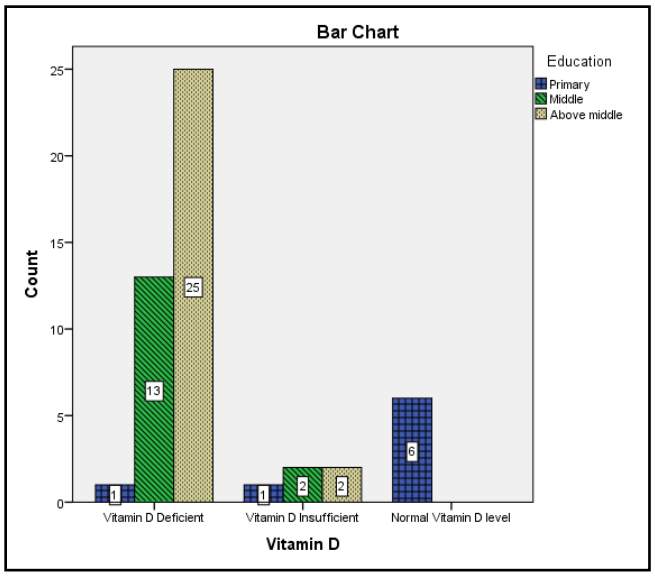

Fig-2

Women having BMI >30, all were VIT D deficient. While 15 women's BMI was 25-29.9, among them 12(80%) were VIT D deficient and 3(20%) were VIT D insufficient. 12 women's BMI range between 19-24.9; out of them 6(50%) had normal VIT D levels, 2(16.6) were VIT D insufficient while 4(33.3) were VIT D deficient. There was a statistically significant association (p<0.001' chi square value 27.8) between serum Vitamin D and BMI.

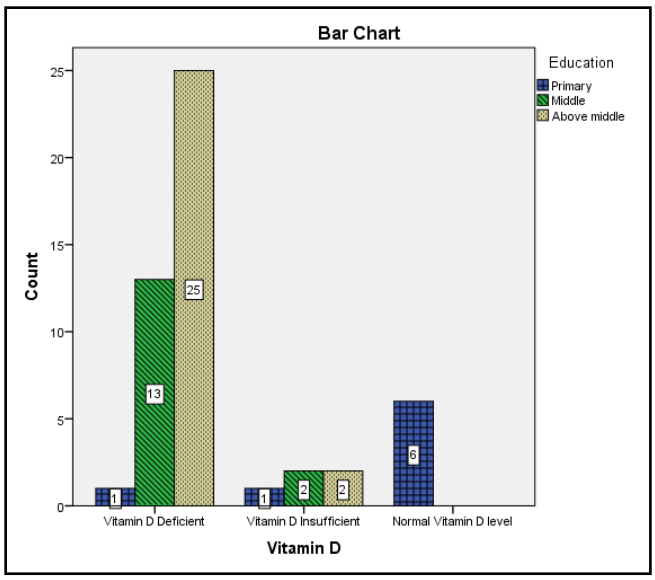

Fig-3

8 women's education was primary; among those 6(75.3%) had normal VIT D levels, 1 woman was VIT D deficient and 1 was VIT D insufficient. 15 women's education level was middle and among them no one had normal VIT D levels. 27 women's education was above middle level and all were VIT D deficient and insufficient and no normal VIT D was observed in those women.

A statistically significant association (p=0.001; chi square value 37.1) was found between VIT D and education levels.

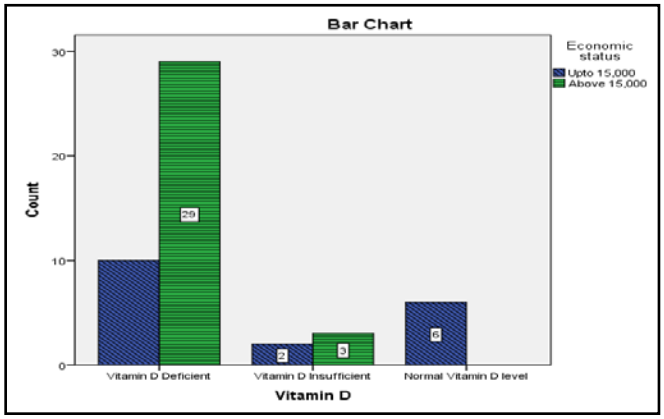

Fig-4: Serum VIT D levels and education

All women having monthly income more than15, 000 were VDD and VDI. Women having normal levels of VIT had monthly income up to 15,000. A statistically significant association (p=0.001; chi square value 12.5) was found between VIT D.

Discussion

During pregnancy mother and newborn both are affected due to VDD. This research work was planned to estimate VDD in primigravidas and association with sun exposure, BMI, education and economic status to create awareness in general population.

Our results are in agreement with a study by Zaman, et al. 2017; they conducted a research to assess VDD during pregnancy in primigravida females irrespective of trimester. They recorded 85% VDD in primigravidas but our study reported 78% VDD in primigravidas.[9]

Overweight and obesity is considered one of the major health problems worldwide, and it is linked to many serious health issues like the cancers heart diseases, diabetes and respiratory diseases.[10] Hypovitaminosis D is also one of the widely spread health problems that can affect the BMI, through the role of vitamin D in the differentiation of the adipocytes.[11]Simon, 2013 concluded that weight reduction leads to increase vitamin D level.[12]Another study resulted in finding a positive correlation between the BMI and the genotype of the vitamin D receptor.[13]

Given above all researches suggest, vitamin D deficiency is more common in obese women as compared to women having normal BMI. Therefore newborns of obese ladies often suffer from vitamin D deficiency and more prone to skeletal disorders and females itself are at greater risk of osteoporotic fracture.

In Lahore, Junaid et al, 2015 had conducted a study to assess prevalence of VIT D deficiency among pregnant women and its association with insufficient sun exposure and illiteracy. They also measured serum Ca and alkaline phosphatase levels. 215 pregnant women participated in the study, out of them 156 (73%) were VIT D deficient. VIT D deficiency was independently associated (P value= 0.04) with illiteracy. Serum calcium levels were deficient and alkaline phosphatase levels were elevated.[14]

Our research work revealed that VDD is more common in women of high income status as compared to low income women. Not any woman had normal levels of VIT D in highly economic class while 33.3% women had normal levels of VIT D in low economic class.

My results are in accordance with Al-Agha et al, 2016 had conducted a study to assess VIT D levels and effects of socioeconomic status on VIT D levels. They observed and suggested that mean VIT D level was elevated in low income families. Those having high

and average socioeconomic status were VIT D deficient.[15] In my study VIT D levels were more elevated and normal in less economic people. While in high economic class all women were VIT D deficient and insufficient. From above researches we can say that VIT D deficiency is more common in people having good economic status rather than low economic people. One of main significant factor of VIT D deficiency in high economic class is less sunlight exposure. Most of time they spend their time in offices, bank jobs, television, computer and other indoor activities that's why VIT D level is deficient despite taking fortified foods.

Finally, we have reached this view that VDD has become a major public health issue in pregnant women. However, data regarding to parity status is deficient worldwide. Our findings are primary and need justification by some other multicenter local trials. Obstetricians should take attention towards this important issue. Educated and riche ones should take sunlight properly as well as fortified foods.

Conclusion

We conclude that frequency of VDD is high in primigravidas, obese, highly educated and rich people. Thus, obstetrician should screen their VIT D levels during their antenatal clinical visits and should create awareness in women regarding VIT D and its benefits.

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CONTRIBUTION OF AUTHORS:

- Abdul Haseeb was involved in conception and participated in conduction of study
- Farzana Islam was involved in conception, participated in conduction of study, analysis and discussion
- Muhammad Wasim Aslam Javedparticipated in conduction of study, analysis and discussion
- participated in conduction of study, analysis and discussion
- Muhammad Riaz participated in discussion and analysis