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Original Research Article

Assessment of awareness level of pregnant women about vitamin D and its relation to pregnancy at a tertiary care centre

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ABSTRACT

Introduction: Vitamin D deficiency (VDD) during pregnancy has been associated with multiple adverse outcomes of pregnancy like preeclampsia, gestational diabetes mellitus, low birth weight, preterm delivery, and cesarean section. Vitamin D deficiency (VDD) is higher in females especially during pregnancy, breast feeding & child bearing age. Studies have reported VDD during pregnancy ranging from 14% to more than ninety percent in our country. Several factors like age, nutrition, socio-cultural practices, geographical conditions etc. contribute to vitamin D deficiency. The lack of awareness about vitamin D is one of the biggest factors.

Objective: To assess the level of awareness about Vitamin D and its relation to pregnancy among pregnant ladies.

Materials and Methods: This cross-sectional study was conducted on 280 pregnant females using a self administered questionnaire. The awareness level of participants was labeled as Poor, Average & Good according to the marks obtained. Statistical analysis was done using Excel Analysis Toolpak.

Results: The age of participants ranged from 19 years to 34 years (mean 24.85 ± 2.98). Majority of the participants were in the age group 20-25 years (66.79%). Most of the participants were living in rural areas (77.5%) while 22.5% belonged to urban areas. The mean score of all the participants was 6.25 with SD 2.29. Educational status showed a linear relationship with the awareness level.

Conclusion: There is a lack of awareness about vitamin D. Awareness campaigns will reduce vit-D deficiency and improve pregnancy outcomes.

1. Introduction

Vitamin D is a fat soluble vitamin produced in skin; the primary source being sunlight. While vitamin D is important for calcium and phosphorus homeostasis and for bone health, it also plays important roles in many other physiologic functions in the body. It is now known to be involved in immune-modulation, cell proliferation, and cell differentiation, and in other physiologic functions in diverse tissues and organs, including the brain, pancreas, and heart.[1–3] There is a wide range of actions of vitamin D in pregnancy, including its effects on placental function and inflammatory response.[4,5] There is an association between low vitamin D status and multiple potential adverse outcomes of pregnancy. Perinatal outcomes related to vitamin D deficiency are preeclampsia, gestational diabetes mellitus, low birth weight, preterm delivery, and cesarean section.[1] Pregnancy is a time of tremendous growth and physiological changes for mother and her developing fetus with lifelong implications for the child.[6] Vitamin D and

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calcium requirements during pregnancy are higher than the normal recommended dose. An important aspect of vitamin D nutrition in pregnancy is that the vitamin D status of the infant at birth and in early infancy depends on the vitamin D status of the mother during pregnancy. Therefore, maintaining optimum vitamin D nutrition during pregnancy is essential for prevention of hypovitaminosis D in the fetus and vitamin D deficiency at birth and in early infancy.[2,7]

There are clear indicators from in vitro and animal in vivo studies that point to vitamin D's indisputable role in both innate and adaptive immunity; however, the translation of these findings to clinical practice, including the care of the pregnant woman, has not occurred.[8]

Reference level of serum 25(OH)D_3 is 30 ng/mL. The level of 20-29 ng/mL is considered as insufficient, while the level 11-20 ng/mL is deficient and level less than 10ng/mL is the marker of severe vitamin D deficiency. Toxic level is more than 150 ng/mL.[9] Distinct cut-offs have been used to define hypovitaminosis D and the level of severity of its deficiency by different experts in their studies.[10–12]

An increased prevalence of vitamin D deficiency (VDD) also known as Hypovitaminosis D has been reported irrespective of age, gender and race throughout the world including India. Vitamin D deficiency is observed worldwide in pregnant women and their neonates.[1–13] It can be present in people who have a vegetarian diet, who are not adequately exposed to sunlight, or consume a low amount of dairy products.Genetic factors leading to vitamin D deficiency in Indians, due to their effect on expression of genes that modulate vitamin D metabolism may not be ruled out.[12] Apart from socio-economic and cultural constraints, other factors like increasing urbanization resulting in poor outdoor activity, rising pollution level, skin pigmentation have further aggravated the problem.[10,11,14]

Vitamin D deficiency has been a public health problem in India. A high prevalence (50-90%) of vitamin D deficiency along with low dietary calcium intake has been documented in Indian population.[10] In a population that already has a high prevalence of VDD and poor dietary calcium intake, the problem is likely to worsen during pregnancy because of the active transplacental transport of calcium to the developing fetus. Reports of profound deficiency among pregnant women, those with 25-hydroxy-vitamin D (25(OH)D) concentrations less than 10 ng/ mL (25 nmol/l), are common throughout the world. Approximately 18% of pregnant women in the UK, 42% in northern India, 61% in New Zealand, 89.5% in Japan, and 60–84% of pregnant non-Western women in The Hague, Netherlands had serum 25(OH)D concentrations <10 ng/mL (25 nmol/L).[14,15]

In our country, the maternal and child health has always been a matter of major public health concern. A high degree of variation is observed on maternal health indicator parameters among different states, rural & urban areas, rich and poor socio-economic strata, educational status and availability of health services. Bihar has consistently been one of the worst performers on maternity and child health indicator in India. It is one of the most populous states of India. This state is further crippled with low literacy rate, a larger part of population living below poverty line and above all the poor health services especially in rural and hard to reach areas. Also there has been scanty of research work and paucity of available data on the prevalence of vitamin D deficiency during pregnancy in this eastern part of India. One of the biggest factors responsible for the maintenance of vitamin D level in body is awareness level of the individual. Therefore, a study was planned with an aim to assess the level of awareness of pregnant women about vitamin D and its importance in pregnancy and overall health.

2. Materials and Methods

This was a cross-sectional study conducted by the Dept. of Biochemistry in collaboration with Dept. of Obstetrics & Gynaecology during December 2019 to June 2021 after approval by the Institutional Ethics Committee.

A total of 280 pregnant females visiting antenatal clinic participated in the study. The inclusion criteria were ability to read Hindi and their willingness to participate in the study. Those who couldn't read Hindi and unwilling to participate were excluded from the study. All the participants were fully explained about the main objective of the study. Confidentiality was assured.

The study was done using a pre-validated self-administered questionnaire typed in Hindi. The questionnaire was validated by doing a pretest in 10 subjects. The Cronbach alpha was estimated to be 0.7, suggesting good internal consistency and an overall reliability. The questionnaire comprised of two parts: Part A containing information about socio-demographic characteristics of the participants like age, residence, educational level, food preferences. The Part B consisted of 15 multiple-choice questions covering several aspects of vitamin D like, general information and sources of, risk factors of VDD, importance of vitamin D in pregnancy and lactation, signs & symptoms and clinical implications of vitamin D deficiency. The questionnaire also contained questions about available preventive methods.The questionnaires were distributed among participants in waiting lounge of the antenatal OPD. The use of phone or access to internet was not allowed.For each correct answer one mark was awarded and zero for wrong or unanswered question. The awareness level of participants was grouped into three levels based on total marks obtained. It was labeled as 'Poor, Average & Good'if the marks obtained was 0-5, 6-10 & 11-15 respectively.

Data was collected and analyzed using computer software MS Excel. Descriptive statistics were used to characterize the study population and to determine

the frequencies of participants'knowledge of vitamin D deficiency. Categorical variables were reported as frequency and percentages while continuous variables were expressed as mean± standard deviation. A p value of<0.05 was considered statistically significant.

2.1. Type of study

Cross- sectional study.

2.2. Sample size

The sample size (n=280) was calculated using EPI INFO ™ STATCALC keeping confidence interval 95% and acceptable margin of error 5% in consideration with the study.[16]

3. Result

A total of 280 pregnant women participated in the study. The age of participants ranged from 19years to 34 years (mean 24.85 ±2.98). Demographic characteristics and clinical information of the study participants is shown in Table 1.

Table 1: Demographic characteristics and clinical information of the study participants

Study variables	Number of participants	Percentage
Age group		
20-25	187	66.79
26-30	74	26.43
31-35	19	6.78
Residence		
Urban	63	22.5
Rural	217	77.5
Food habit		
Vegetarian	95	33.93
Non-vegetarian	185	66.07
Educational Level		
Up to 10^{th}	50	17.86
10^{th}-Graduation	213	76.07
Above Graduation	17	6.07
Parity		
Primigravida	174	62.14
Multigravida	106	37.85

Majority of the participants were in the age group 20-25 years (66.79%), 26.43% in the age group of 26-30 and those above 30 years constituted 6.78% of the total participants. Most of the participants were living in rural areas (77.5%) while 22.5% belonged to urban areas. Two-third of the participants was taking non-veg food.

(**LE-** up to 10^{th}, **ME**- 11^{th} –Graduation, **HE**- above Graduation)

Only 6.07% had educational degree above graduation; majority of participants (76.07%) had degree of Senior

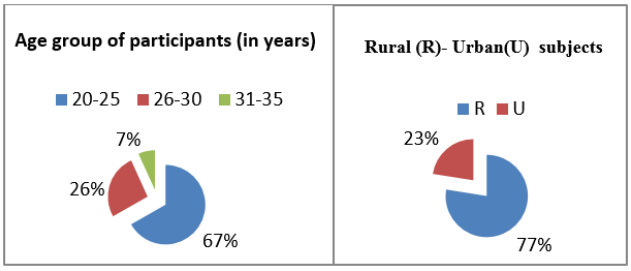

Fig. 1: Showing age group, food habits and place of residence of participants

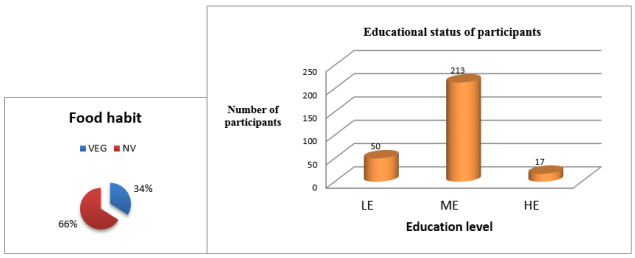

Fig. 2:

secondary orgraduation while 17.86% of the participants had studied below 10^{th} standard.

The mean score of participants was 2.56±0.86, 6.77±1.25 and 10.64±1.27 among those having education level up to 10^{th}, 11^{th}-Graduation and above Graduation respectively. The score showed significant difference (p=0.02) between the three groups based on educational qualification. The mean score of the three groups showed a positive linear relationship. The mean score by multigravida women (7.63) was better than those by primigravida (5.40). The mean score differed significantly between three age groups with better scoring as the age advances.

The mean score of all the participants was 6.25 with SD 2.29. On the basis of marks obtained, the level of awareness of majority (68.30%) of the participants was found to be average (marks 6-10). Poor level of awareness was noted among 14.40% of the participants (marks 0-5). The level of awareness was good among 17.30% of the participants(marks 11-15).

Table 2: Mean score of participants as per educational level

Education level	Mean score	SD
Up to 10^{th}	2.56	0.86
11^{th} -Graduation	6.76	1.25
Above Graduation	10.64	2.28

4. Discussion

Vitamin D deficiency, remains a very common underdiagnosed nutritional deficiency state especially

Table 3: Category of awareness level of participants

Level of awareness of participants	Number of participants (n)	Percentage (%) of participants
Poor	41	14.4
Average	191	68.3
Good	48	17.3

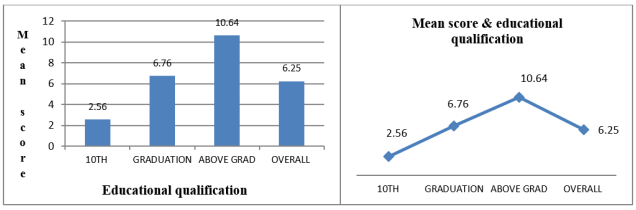

Fig. 3: Positive linear relationship between mean score and the three groups having different education level

among females. In country like ours, there are several factors that complicates this deficiency status further. Several factors are postulated for low Vitamin D levels in females including dietary habits, lack of sun exposure, sunscreen use, skin hyper pigmentation, poor dietary intake, breast feeding, pregnancy, and lactation, their longer indoor stay in the college as well as at home. Lack of awareness among women is one of the contributing factors responsible for poor nutritional state of women especially during pregnancy. The results of the present study showed that majority of the participants (68.3%) had an average level of awareness. Only 17.3% of the participants had good level of awareness. Low level of awareness among pregnant women is one of the contributing factors of vitamin D deficiency not only in India but the whole world. The result of the study is in conformity with other studies done in India or abroad.[17,18] Nowreen et al reported that the majority of participants had poor knowledge about the epidemic nature of deficiency status in Kashmir, India. Participants had poor knowledge regarding sufficient serum levels, only 20.35% knew about other effects of deficiency, only 19.46% knew about recommended daily allowance, and only 7.96% knew about the adequate sun exposure.[19] Most of the participants reported newspaper, magazines and social media as the most common source of information about vitamin D and its benefits. Very few participants mentioned visiting antenatal clinic or hospitals as source of information. Similar findings have been noted by several authors.[20,21] This study showed that majority of women were aware about the good effect of vitamin D on bones but not aware of the health benefits of vitamin D on pregnancy and fetal outcome. Lhamo et al and Arora et al also reported similar trends of knowledge among different populations about vitamin D.[21,22] Most of the participants scored poorly on the questions related to different sources of vitamin D. Majority of them believed milk and other dairy products as the only sources of vitamin D. However most of the women reported the role of sunlight in the maintenance of vitamin D level in body. Similar findings have been noted by other authors in their study on Indian and Asian populations.[23,24] Juanid et al reported that on question regarding production of vitamin D on direct exposure to sunlight, 80% participants responded correctly.[25] Parity has been considered as one of the influential factors on the vitamin D status of the women.[26] This study clearly showed that the awareness level of multiparous women was better compared to the primigravida. Increase in educational qualification was associated with increased awareness level. Other authors also reported increased awareness among well-educated people.[27] The study clearly demonstrates the need of increasing awareness among women especially of reproductive age group. They must be made aware regarding the health benefits of vitamin D on the pregnancy and its outcomes. The prevalence of vitamin D deficiency in our country cannot be lowered unless we focus on the female population. As vitamin deficiency has been associated with adverse pregnancy outcome, reduction invitamin deficiency among females will certainly improve maternal morbidity and mortality. This study will help clinicians in guiding patients on nutritional importance of vitamin during pregnancy.

5. Conclusion

There is a lack of awareness among pregnant females about the health benefits of vitamin D on the pregnancy. Although many are aware about the sources of vitamin but there is acute dearth of knowledge on symptoms and signs of vitamin D deficiency. People were not able to correctly identify preventive actions needed to curb the menace of Vitamin D deficiency. There is a need to enhance educational level of female population. Thus, we should focus on organizing educational campaigns to increase awareness about vitamin especially among pregnant ladies. Since majority of the population is living in rural areas, we will have to target rural population. Strengthening of rural health centres is also required. We must include educational materials in form of newspaper clippings, magazines and videos in the waiting areas of antenatal clinic.

6. Limitation of Study

People included in the study may not be truly representative of the community. The sample size is small. Further research can be undertaken involving larger number of participants.

7. Conflicts of Interest

Authors declare that they have no conflicts of interest.

8. Source of Funding

Nil.

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