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RESEARCH ARTICLE

A STUDY ON PREVALENCE OF VITAMIN D DEFICIENCY IN SOFT WARE PREGNANT WOMEN AND THE FETO MATERNAL OUTCOME.

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Key words:-
25(OH)D) : 25hydroxy vitamin D, Ca : calcium, Software women, Pregnancy.

Abstract

Background: Vitamin D deficiency was associated with the pathogenesis of several chronic disorders of human beings. An increasing number of studies were correlating the role of vitamin D deficiency and feto maternal outcomes. The aim of this study was to determine the prevalence of vitamin D deficiency among the pregnant women working in software offices and its impact on the fetal and maternal outcome.

Methods: A cross sectional study was conducted in 150 pregnant women attending Femina womens hospital Hyderabad, for a period of 6 months from October 2015 to April 2016. The aim was to study the prevalence of vitamin D deficiency in pregnant women working in software offices. The women were given a questionnaire consisting of data regarding occupation, obstetric history, lifestyle ,dietary habits ,working hours. Serum 25hydroxy vitamin D (25(OH)D) level was measured using an enzyme immunoassay method. Data on gestational age ,mode of delivery ,baby sex ,weight of baby were studied.

Results: Mean age of the study population was 27.4±3.1 years in soft ware group and 28.2±2.9 years in non soft ware group. Over all the prevalence of vitamin D deficiency was 56% and severe deficiency was observed in 16%s among pregnant women in this study. The vitamin D serum levels were significantly lower in the soft ware group (p=0.03) and severe deficiency was also more common in the soft ware group (p=0.04) . There was no statistically significant difference between the two groups with respect to the total number of maternal and fetal complications.

Conclusion: Vitamin D concentrations were observed to be low in Soft ware pregnant women when compared with non soft ware pregnant women without any significant differences in feto maternal outcomes.

Introduction:-

Vitamin D is an essential fat-soluble vitamin that is required for regulation of calcium metabolism.Vitamin D orchestrates the "Ca-vitamin D-Parathyroid hormone endocrine axis . Vitamin D and its metabolites are hormones and hormone precursors rather than vitamins. It is unique among vitamins - made in the skin from exposure to sunlight. Vitamin D deficiency has long been associated with poor bone development and has been identified as the cause of rickets in growing children and osteomalacia in adults. With abundant sunlight, Vitamin D deficiency was considered to be rare in India[1]. Vitamin D deficiency has been reported in all age groups including toddlers, school

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children, pregnant women and their neonates and adult males and females residing in rural and urban India[2,3].The prevalence and additional consequences of low serum vitamin D levels have not been recognized until recently. Vitamin D deficiency during pregnancy was a worldwide epidemic studies show a prevalence range from 18-84%[4,5]. Pregnant women in India have shown a prevalence of vitamin D deficiency of 84per cent which correlated significantly with serum 25(OH) D status of their newborn[6]. In women poor dietary intake of calcium and because of the active transplacental transport of calcium to the developing fetus which is likely to worsen during pregnancy[6] .

Vitamin D physiology:-

Vitamin D is a prohormone that is derived from cholesterol. The nutritional forms of vitamin D include D3 (cholecalciferol), which is generated in the skin of humans and animals, and vitamin D2 (ergocalciferol), which is derived from plants; both forms can be absorbed in the gut and used by humans. Vitamin D_2 is found in foods such as cod-liver oil, fatty fish, and egg yolk. Casual exposure to solar radiation wavelengths 290–315 nm results in the cutaneous production of previtamin D_3.[7] The efficiency of vitamin D synthesis depends on a variety of factors, most importantly the number of UVB photons that penetrate the epidermis. More time spent indoors and widespread use of sunscreen have resulted in reduced sun exposure and less vitamin D production[8]. During sun exposure the UVB photons (290–315 nm) that enter the epidermis cause a photochemical transformation of 7-dehydrocholesterol (7-DHC) (provitamin D_3) to previtamin D_3. The percent conversion of 7-DHC to previtamin D and its photoproducts and percent of previtamin D and vitamin D formed was maximal between 11 a.m. to 2 p.m[9]. Physiologically Vitamin D3 and Vitamin D2 are bound to the vitamin D- binding protein (VDBP) in plasma and transported to the liver to become 25-hydroxy vitamin D (Vitamin D (25-OH)). As Vitamin D (25-OH) represents the major storage form, its blood concentration is used to assess the over all Vitamin D status [10]. More than 95% of Vitamin D (25-OH), measurable in serum is Vitamin D3 (25-OH) whereas Vitamin D2 (25-OH) reaches measurable levels only on patients taking Vitamin D2 supplements.

Vitamin D status is usually estimated by measuring the levels of plasma 25(OH)D levels the major storage form of vitamin D. Studies have developed a classification of stages for vitamin D status in non pregnant adults that indicate that levels >30 ng/ml are required for adequacy[11]. During pregnancy and lactation, significant changes in maternal vitamin D and calcium metabolism occur to provide the calcium that is needed for fetal bone mineral accretion these stages correlate with maternal and fetal outcomes, which suggests that they also apply in pregnancy and during lactation.[11]

Stage	Serum 25(OH)D,ng/ml	Maternal adverse effects	New born infant adverse effects
Severe deficiency	≤ 10	Increased risk of preeclampsia ,bone loss ,malabsorption, myopathy, weight gain , higher parathhormones	Small for gestational age, neonatal hypocalcemic seizures, infantile heart failure ,large frontanelle, congential rickets, enamel defects
Insufficiency	11- 29	Bone loss, subclinical myopathy	Neonatal hypocalcemia, reduced bone mineral density, rickets of infancy if breast feed
Adequacy	30 – 100	Adequate calcium balance	None
Toxicity	>100	Hypercalcemia, increased urine calcium loss	Infantile idiopathic hypercalcemia

Table 1:-

There are very few studies reporting the vitamin D deficiency in soft ware pregnant women. The present study was conducted to investigate the prevalence of vitamin D deficiency among software pregnant women. We conducted this study in Hyderabad, one of the soft ware hubs in India.

Methods:-

Between October 2015 and April 2016, 150 apparently healthy pregnant women attending the outpatient department were included in this study. This cross sectional study was conducted at Femina womens hospital Hyderabad. The aim was to study the prevalence of vitamin D deficiency in pregnant women working in software offices. The maternal and fetal outcome were also studied in both the groups. During the study period, all the pregnant women

attending the outpatient for the 1st consultation irrespective of the gestational age were considered in the study after taking a written and informed consent.

Women with any previous medical disorders were excluded from the study. Subjects with known hepatic or renal disease, metabolic bone disease, malabsorption, type 1 diabetes, hypercortisolism, and those already on therauptic Vitamin D supplementations were not included in the study.

The pregnant women were given the questionnaire which covered obstetric history , lifestyle, dietary habits. Blood samples were collected irrespective of the season of the year . Blood samples were centrifuged and stored at −20 °C.

The analysis was done by Elecsys,Chemiluminescence method (Competitive
protein binding assay) on cobas e411, (Roche). The laboratory reference range below 10 ng/ml is considered as deficiency, 10-30 ng/ml is insufficiency and levels between 30-70 ng/ml is optimum for serum total Vitamin D. Data regarding the Gestational age of delivery, baby sex, birth weight, mode of delivery were collected. We divided pregnant women in each group into two subgroups like those with low vitamin D levels less than 30 ng/ml as one group and those with more than 30 ng/ml as other group. Statistical analysis was done by SSS(social science statistics) software and p value≤0.05 was considered as significant . Proportions were compared by using the chi-square test.

Results:-

During the Study period 150 pregnant women attended the outpatient clinic and among them 60 women were working at the soft ware companies remaining 90 women had different other occupations . Mean age of the study population was 27.4±3.1 years in soft ware group and 28.2±2.9 years in non soft ware group with 70% of the soft ware group were primi gravida and only 53.3% were primi gravida in non software group. Over all the prevalence of vitamin D deficiency was 56% and severe deficiency was observed in 16%s among pregnant women in this study .

Table 2:- Gestational age at the time of 1st consultation:

Gestational age	Software (n=60)	Non Software (n=90)	p value
1 st trimester	38 (63.3%)	63 (70 %)	0.393
2 nd trimester	17 (28.3 %)	19 (21.2 %)	0.310
3 rd trimester	5 (8.33%)	8 (8.88%)	0.905

Chi square test (p≤0.05)

Table 3:- Vitamin D levels:

Vitamin D levels	Software (n=60)	Non software (n=90)	p value
Normal (≥30ng/ml)	20 (33.3 %)	46 (51.11 %)	0.031
Insufficient (11-29 ng/ml)	26 (43.3 %)	34 (37.8 %)	0.496
Deficiency (≤10ng.ml)	14(23.3 %)	10 (11.1 %)	0.045

Chi square test (p≤0.05)

There was no significant difference between soft ware and non software group with respect to the gestational age at the time of sample collection. The vitamin D serum levels were significantly lower in the soft ware group (p=0.03) and severe deficiency was also more common in the soft ware group (p=0.04) however there was no significant difference between two groups with vitamin D insufficiency.

Table 4:- Maternal complications according to Vitamin D levels:

	Soft ware			Non soft ware			
	Normal vitamin D (n=20)	Insufficient (n=26)	Deficient (n=14)	Normal vitamin D(n=46)	Insufficient (n=34)	Deficient (n=10)	P value
No complications	18 (90%)	23(88.5%)	12(85.7%)	40(87%)	29 (85.3%)	7(70%)	
GDM	0	0	0	3	1	0	
PIH	1	2	0	0	2	1	
Oligohydramnios	1	1	1	2	2	1	.501
Preterm	0	0	1	1	0	1	

Abruptio placenta	0	0	0	0	0	0	
Total complications	2(10%)	3(11.5%)	2(14.3%)	6 (13%)	5(14.7%)	3 (30%)	

Table 5:- .Fetal complications

	Soft ware			Non soft ware			
Complication	Normal vitamin D (n=20)	Insufficient (n=26)	Deficient (n=14)	Normal vitamin D (n=46)	Insufficient (n=34)	Deficient (n=10)	p value
Birth weight	1	1	4	1	4	1	
<2.5 kg	9	24	9	35	27	7	
2.5-3.5 kg	10	1	1	8	3	2	
>3.5kg							0.460
NICU admission	1	2	1	1	1	1	0.343
IUGR	0	0	1	1	0	0	0.771

There was no statistically significant difference between the two groups with respect to the total number of maternal and fetal complications.

Discussion:-

The reported paradox of the prevalence of vitamin D deficiency in the sun-abundant South Asian countries remains unexplained. The prevalence of vitamin D deficiency was influenced by ethnicity, food habits, dietary supplements, food fortification , clothing, climate, atmospheric pollution ,season of the year and duration of exposure to sun light. Recent reports of low 25(OH)D concentrations in healthy subjects resident in India[12]. Hypo vitaminosis D among pregnant Indian women had been widely reported[3,6]. The prevalence of vitamin D deficiency was 56% in our study and severe deficiency was observed in 16% among pregnant women in this study which was less than to a study published by Marwaha K[13] et al and Sachan A et al[6] . Various other studies by Kovacs et[14] al et al and Choi R et al[15] had shown that the prevalence of vitamin D deficiency is ranging 5-50% in mothers.

Also, to the best of our knowledge, this was the first report of vitamin D status that represents the Soft ware pregnant women who spend more time in air conditioned rooms with low exposure to sun light in a tropical country. The results of the study confirms the high prevalence of vitamin D deficiency (21.6%) and insufficiency (43.35%) among soft ware pregnant women when compared to non soft ware pregnant women (11.1% deficiency and 37.8% insufficiency) of similar gestational age . Since there was a positive correlation between sunlight and Vitamin D status [9,14] the observed decrease in Vitamin D concentration and deficiency in soft ware pregnant women can be attributed to sedentary indoor lifestyle in which there was less exposure to sun and more frequent use of sunscreens. Another possible reason of Vitamin D deficiency in soft ware pregnant women was attributable to diets that were not rich in Vitamin D with poor dietary absorbable calcium content.

The impact of vitamin D deficiency during pregnancy on maternal and neonatal health has attracted much controversy in recent years. However, a causal link between vitamin D deficiency during pregnancy and adverse pregnancy-related outcomes remains to be determined , one meta-analysis supported a possible link between a low 25(OH)D status and poor neonatal outcomes [17], the precise mechanisms underlying this association are yet to be determined. A recent systematic review and meta-analysis found that spontaneous preterm birth and childbirth with SGA were significantly associated with 25(OH)D levels <20 ng/mL[18] .

In our study we did not found any significant difference between the two groups with respect to the total number of maternal and fetal complications similarly Rodriguez et al[19] did not find any association between maternal circulating 25(OH)D3 concentration in pregnancy with GDM and preterm delivery. In our study the serum vitamin D levels in both the groups had no impact on the neonatal birth weight. Similarly in a study published by Maryam et al [20] and Maghbooli et al [21] suggested that there was no significant association of birth weight with serum vitamin D levels. Heather H. Burris et al [22] did not found any association with serum vitamin D levels and hypertensive disorders in pregnancy, in the present study also there was no significant difference between two groups with respect to pregnancy induced Hypertension. Although it was not clear whether maternal vitamin D supplementation will prevent these conditions, a strategy for supplementation and treatment of maternal vitamin D deficiency was

proposed[23]. Further studies with large number of study participants are required to study the effects of vitamin D supplementation and feto maternal outcomes .

Conclusion:-

Vitamin D concentrations were observed to be low in Soft ware pregnant women in all the three trimesters when compared with non soft ware pregnant women with out any significant differences in feto maternal outcomes between soft ware and non software women.

Conflict of interest: The authors declare no conflict of interest

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