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Maternal Vitamin D levels in Hypertensive disorder of Pregnancy and Healthy pregnant women.

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Abstract:- The aim of this study is to assess the levels of vitamin D in cases with gestational hypertension, preeclampsia, eclampsia and healthy pregnant women in their third trimester and to find the association of vitamin D deficiency with hypertensive disorders of pregnancy.

The study population comprised of 60 healthy pregnant women and 60 women with hypertensive disorder of pregnancy.

Assessment of serum 25 Hydroxy vitamin D was done by CLIA method. The result of the two groups were compared and association of level of vit D with severity of hypertensive disorder and maternal prognosis was evaluated.

Result:-Mean maternal serum vit D in HDP was 8.42 $\pm$6.4ng/ml as compared to controls 17.21$\pm$7.06ng/ml,which is statistically significant. Mean vit D level in severe pre eclampsia was 5.76$\pm$2.7ng/ml,in mild pre eclampsia was 8.56$\pm$6.13ng/ml and in gestatonal hypertention was 14.8$\pm$8.9ng/ml showing a significant association of level of vit D levels with HDP.

Conclusion – vitamin D level is lower in women with HDP as compared to healthy pregnancy women also the level of Vitamin D decreases with severity of HDP. Hence substitution of Vitamin D in early trimesters may decrease the incidence and severity of HDP.

Keywords:- HDP (Hypertensive disorders of pregnancy),pre eclampsia.

I. Introduction

Maternal vitamin D deficiency is a wide spread public health problem. Vitamin D deficiency during pregnancy is linked with IUGR, skeletal problems, Diabetes, asthma and other adverse pregnancy outcome.

Preeclampsia is a disease specific to pregnancy- characterized by high blood pressure and proteinuria after the 20 week of pregnancy.

The Pathogenesis of preeclampsia involves various biological processes that may be directly or indirectly affected by vitamin D, like immune dysfunction, placental implantation and abnormal angiogenesis [1, 2, 3.]

Our study aimed to investigate the maternal vitamin D levels in cases with Gestational Hypertension, preeclampsia, eclampsia and healthy pregnant women.

II. Material and Method

The Study was conducted in the department of S.M.S. Medical College, Jaipur.

A total of 120 singleton primigravida in their third trimesters were recruited for the study. 60 were cases with hypertensive disorder of pregnancy and 60 were healthy controls. Pregnancy with known medical disorder such as chronic hypertension, endocrine disorder, epilepsy, hemorrhagic disorders, thrombhophilia, hepatic or renal disorders were excluded. Demographic characteristics such as age, religion, litracy, residence, socio-economic status were noted. Blood pressure was measured by auscultatory method using mercury sphygmomanometer in a sitting position after making patient comfortable and after at least 10 minutes of rest. Systolic blood pressure was recorded at the appearance of the first Korotkoff sound and diastolic was recorded at the disappearance of fifth phase of Korotkoff. The cases with hypertensive disorder were further divided into 4 subgroups according to National High Blood Pressure Education Programme Working Group (2001). It comprised of 10 women with gestational hypertension, 28 women with mild pre-aclampsia , 14 women with severe pre-eclampsia and 8 with eclampsia on the basis of BP, proteinuria and clinical symptoms. As a control group 60 healthy primigravida singleton pregnant women matched according to trimester and age were enrolled. After complete general physical and obstetric examination, blood samples were taken for estimating CBC, LFT ,RFT ,HBsAg ,HIV and serum vitamin D during third trimester. Serum vitamin D level was done using CLIA method on a fully automated platform. All women were followed till delivery and maternal outcome was

noted in the form of mode of delivery, post partum eclampsia , PPH , puerperal pyrexia , sepsis , DIC , renal-hepatic impairment , thromboembolism and mortality.

III. Statistical Analysis

Statistical Analysis was performed with the SPSS, version 20 for Windows statistical software package (SPSS inc., Chicago, il, USA). Data were statistically described in terms of mean ± standard deviation (±SD), median and range or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using one way analysis of variance (ANOVA) test with multiple 2-group comparisons. For comparing categorical data, Chi square (x^2) test was performed. P values less than 0.05 was considered statistically significant.

IV. Observation And Discussion

Out of the 120 pregnant women in the study population, 60 women (group – A) were hypertensive and 60 women (group – B) were normotensive. The mean age of the study population was 24.50±3.43 years.The majority of study subjects came from urban areas (54.17%) belonged to hindu religion(71.66%) were illiterate (71.66%) and were from lower socio economic status.(Table no.1)

Overall 70% women in our study population were found to be Vit D deficient.

The mean maternal serum Vit D level in group A was 8.425±6.47ng/ml and in group B was 17.215±7.06ng/ml.The difference was statistically significant ($p<0.05$) (Table no.2)

Similar results were reported in a study from Turky.In this study the mean Vit D level in healthy pregnant women was 23.7±5.93 and in pre eclampsia was 19.3±4.31 which was statistically significant [4]. There are other studies with similar results[5,6].

An association of serum Vit D levels with severity of hypertensive disorders was also established in our study. The mean serum Vit D level in normotensive pregnant women was 17.215±7.06ng/ml, in women with gestational hypertension was 14.88±8.92ng/ml, in women with mild pre eclampsia was 8.568±6.13ng/ml, in severe pre eclampsia was 5.764±2.70ng/ml and in women with eclampsia mean serum Vit D level was 4.425±0.36ng/ml.This observation shows an inverse relation of Vit D levels with severity of HDP (Table no. 3). Similar relationship of level of Vit D with severity of pre eclampsia was reported [4].

In the present study an association of poor maternal outcome was observed with low serum Vit D levels. The mean serum vit D levels were significantly lower in women with poor maternal outcome (6.602±4.35ng/ml) as compared to women with good maternal outcome (13.702±8.09ng/ml) ($p<0.05$) (Table no. 4).

V. Conclusion

Our observations and reviews of other studies showed a strong association of maternal serum Vit D deficiency with hypertensive disorders of pregnancy.Also the severity of hypertensive disorder during pregnancy was directly propotionl to the degree of deficiency of Vit D in maternal serum.It was also observed that pregnancy outcome was poor in women with low levels of Vit D .

So it is suggested that maternal serum Vit D level should be estimated in early pregnancy in all high risk women . Supplementation of Vit D in early pregnancy can effectively prevent pre eclampsia and thus improve pregnancy outcome and bring down maternal morbidity and mortility.

Table No. 1 Intergroup Comparision Of Demographic Parameters

Demographic Parameters		Cases	Controls	p value*	Statistical Significance
Mean Age (mean±SD) (years)		25.02±3.56	23.98±3.25	0.356	Non Significant
Residence	Rural	31 (51.67%)	24 (40.00%)	0.199	Non Significant
	Urban	29 (48.33%)	36 (60.00%)		
Religion	Hindu	45 (75.00%)	41 (68.33%)	0.4177	Non Significant
	Muslim	25 (25.00%)	19 (31.67%)		
	Others	0.00 (100.0%)	0.00 (100.0%)		
Literacy Status	Literate	19 (31.67%)	11 (18.33%)	0.0917	Non Significant
	Illiterate	41 (68.33%)	49 (81.67%)		
Socio-economic Status	Upper (I)	5(8.33%)	6(10.00%)	0.768	Non Significant
	Upper Middle (II)	7 (11.67%)	11 (18.33%)		
	Middle/ Lower Middle (III)	23 (38.33%)	24 (40.00%)		
	Upper Lower (IV)	17 (28.33%)	13 (21.67%)		
	Lower (V)	8 (18.33%)	6 (10.00%)		

Table No.2 Distribution of study population according to status of maternal Vit D level

Vitamin D status	Group A (case)		Group B (control)		Total	
	No.	%	No.	%	No.	%
Deficient	54	90	30	50	84	70
Insufficient	5	8.33	27	45	32	26.67
Sufficient	1	1.66	3	5	4	3.33
Total	60	100.00	60	100.00	120	100.00
Vit D level (ng/ml)	8.4253±6.4751		17.2150±7.0666		P value=0.0001	

X^2=23.0 df=2 p value=0.000 S

Table No.3 Association of maternal vit D level with severity of HDP

Vitamin D levels	Gestational hypertension		Mild pre-eclampsia		Severe pre-eclampsia		Eclampsia	
	No.	%	No.	%	No.	%	No.	%
Deficient	6	60	26	92.8	14	100.0	8	100.0
Insufficient	3	30	2	7.14	0	0.00	0	0.00
Sufficient	1	10	0	0.00	0	0.00	0	0.00
Total	10	100.	28	100.0	14	100.0	8	100.0
Vit D(ng/ml) (Mean±SD)	14.8890±8.9270		8.5689±6.1313		5.7643±2.7037		4.4250±0.3654	

X^2= 13.8 df=6 p value=0.032 S

Table no.4 Relation between mean maternal vit D level and maternal prognosis

Vitamin D levels	Poor prognosis(n=15)		Good prognosis(n=105)	
	No.	%	No.	%
Deficient	14	93.33	70	66.67
Insufficient	1	6.67	31	29.5
Sufficient	0	0.00	4	3.80
Total	15	100.0	105	100.0
Vit D(ng/ml) Mean±SD	6.6027±4.3555		13.7027±8.095	

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