

**An observational study to analyze the association of serum vitamin D level in hypertensive disorders of pregnancy and normotensive pregnant women in the department of Obstetrics and Gynaecology, SMS Medical College, Jaipur.**

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**Citation this Article:** Dr. Bhawani Kala, Dr. Rashma Gera, “An observational study to analyze the association of serum vitamin D level in hypertensive disorders of pregnancy and normotensive pregnant women in the department of Obstetrics and Gynaecology, SMS Medical College, Jaipur”, IJMSIR- March - 2023, Vol – 8, Issue - 2, P. No. 173 – 177.

**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

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**Abstract**

**Introduction**

Hypertensive disorders of pregnancy are a major cause of maternal and fetal severe acute morbidity, long-term disability, and mortality.

Hyper tension in pregnancy can be classified by the terms chronic hyper tension, gest ational hyper tension, Pree clampsia (PE), or chronic hyper tension with super imposed preeclampsia.<sup>1</sup>Chronic hyper tension refers to a systolic blood pressure (SBP)  $\geq$  140 mm Hg (millimeter of mercury) and/ or a diastolic blood pressure (DBP)  $\geq$  90 mm Hg, on at least two occasions, 4 hours apart, which predates pregnancy or occurs before the 20<sup>th</sup> weeks of gestation. If hypertension develops after 20 weeks of gestation, it is referred to as gestational hyper tension or hypertension during pregnancy (HDP).<sup>2</sup>

Vitamin D (sunshine vitamin) is a pro-hormone which plays significant role in bone metabolism via regulation

of calcium and phosphate homeostasis, in addition to its neuromuscular functions.

Vitamin D has a regulatory action on centrally acting vasodilating agents and has been found to regulate blood pressure.<sup>3</sup>

Recent epidemiological studies have emphasized the role of vitamin D deficiency in the development of Pree clampsia. Vitamin D may play a part in the etiology of Pree clampsia by modulating immune function and in flammatory response and regulating the transcription and function of genes related to placental normal implant ation and angiogenesis.<sup>4</sup>

Vitamin D has also been found to modulate various immuno logical agents and suppress auto immune anti bodies so as to prevent abnormal placentation thereby pre venting hyper tension related to pregnancy.<sup>5</sup>

Increased production of inflammatory cytokines like TNF –alpha is reported in pregnancy complicated by Vitamin D deficiency.<sup>6</sup>

1,25 hydroxy (OH) Vitamin D stimulates the activity of T regulatory cells, which are important in supporting placental implantation through favourable immune response.<sup>7</sup>

### Aim and objectives

#### Aim

- To analyze the association of serum Vitamin D level in hypertensive disorders of pregnancy

#### Objectives

- Primary objective: To correlate serum Vitamin D level in hypertensive disorders of pregnancy and normotensive pregnant women.
- Secondary objective: To assess the maternal and fetal outcome in relation to serum Vitamin D level.

#### Methodology

After applying inclusion and exclusion criteria, selected women with 37 weeks of gestation and onwards were recruited and a written and informed consent was taken. Gestational age was calculated from last menstrual period and first trimester scan.

Approval from the institutional research review board and ethical committee was taken.

All women were classified in two groups

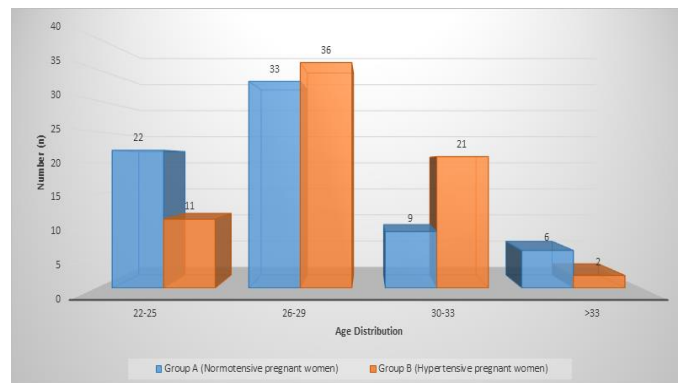
- Group A (70 cases): normotensive pregnant women
- Group B (70 cases): hypertensive pregnant women (pregnant women with blood pressure more than 140/90 mm Hg after 20 weeks of gestation)

All the women in both groups were subjected to measurement of serum Vitamin D level. Venous blood samples for 25-hydroxy Vitamin D estimation were collected after 12 hours overnight fasting.

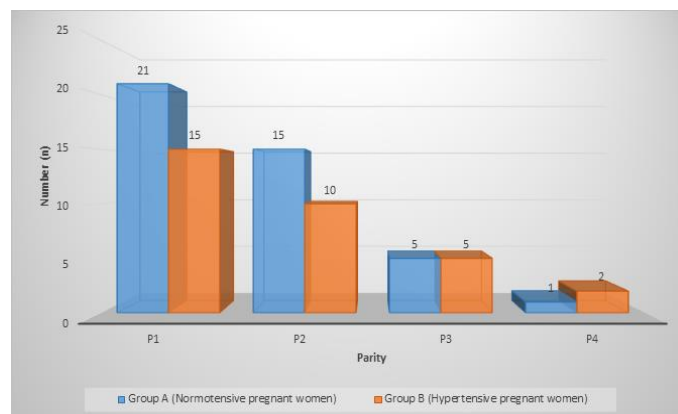
After delivery and Caesarean section of pregnant women, cord blood samples were taken for neonatal serum Vitamin D level and serum calcium level.

### Results

Graph 1: Distribution of pregnant women according to Age



Graph 2: Distribution of pregnant women according to Parity



Graph 3: Distribution of pregnant women according to BMI

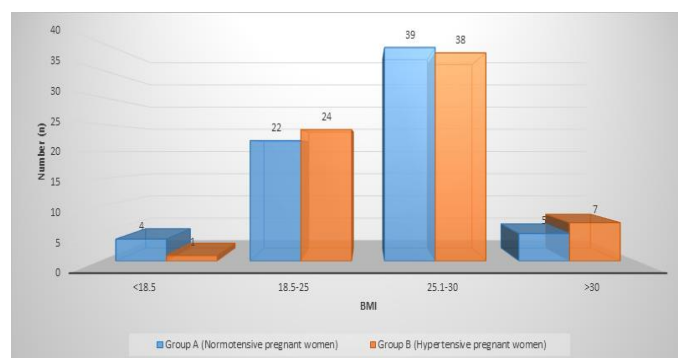


Table 1: Distribution of pregnant women (Group B) according to range of Systolic blood pressure

Systolic BP (mm of Hg)	Group B (Hypertensive pregnantwomen)	
	Number (n)	Percentage (%)
140-150	47	67.14

151-160	13	18.57
>160	10	14.29
Total	70	100

Here we found that majority 67.1% pregnant women had SBP between 140-150mm of Hg followed by 18.5% with 151-160 mm of Hg.

Table 2: Mean systolic blood pressure in Group A and Group B

Parameter	Group A (Normotensive pregnant women)		Group B (Hypertensive pregnant women)		P-value
	Mean	Standard deviation	Mean	Standard deviation	
SBP(mm of Hg)	121.9	6.59	152.34	12.7	<0.0001

Mean systolic blood pressure for group A was 121.9 mm of Hg and for group B it was 152.34 mm of Hg. There was significant difference seen between these group as P-value was <0.05.

Table 3: Distribution of pregnant women (Group B) according to range of Diastolic Blood Pressure

Diastolic BP (mm of Hg)	Group B (Hypertensive pregnant women)	
	Number (n)	Percentage (%)
90-100	55	78.57
101-110	8	11.43
>110	7	10.00
Total	70	100
Mean±SD	98.8±8.85	

Here we found that majority 78.5% pregnant women had DBP between 90-100mm of Hg followed by 11.43% with 101-110 mm of Hg.

Table 4: Mean diastolic blood pressure in Group A and Group B

Parameter	Group A (Normotensive pregnant women)		Group B (Hypertensive pregnant women)		P-value
	Mean	Standard deviation	Mean	Standard deviation	
DBP (mm of Hg)	76.77	6.49	98.8	8.85	<0.0001

Mean diastolic blood pressure for group A was 76.77 mm of Hg and for group B it was 98.8 mm of Hg. There was significant difference seen between these groups as P-value was <0.05.

Table 5: Distribution of pregnant women according to maternal serum vitamin D level (ng/ml)

Maternal serum Vitamin D (ng/ml)	Group A (Normotensive pregnant women)		Group B (Hypertensive pregnant women)	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
<10 (Deficient)	0	0.00	7	10.00
10-30 (Insufficient)	55	78.57	63	90.00
>30 (Normal)	15	21.43	0	0
Total	70	100.00	70	100.00
Mean±SD	25.2±5.34		15.2±5.07	
P-value	<0.0001			

Mean maternal serum vitamin D for group A was 25.2 ng/ml and for group B it was 15.2 ng/ml.

Table 6: Distribution of pregnant women according to neonatal serum vitamin D level

Neonatal serum Vitamin D (ng/ml)	Group A (Normotensive pregnant women)		Group B (Hypertensive pregnant women)	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
	<12 (Deficient)	0	0.00	0
12-19.9 (Insufficient)	0	0.00	5	7.14
20-50 (Normal)	70	100.00	65	92.86
Total	70	100.00	70	100.00
Mean±SD	36.3±5.01		26±4.15	
P-value	<0.0001			

Mean neonatal serum vitamin D level for group A was 36.3ng/ml and for group B it was 26.0ng/ml.

Table 7: Distribution of pregnant women according to NICU admission

NICU admission	Group A (Normotensive pregnant women)		Group B (Hypertensive pregnant women)		P-value
	Number (n)	Percentage (%)	Number (n)	Percentage (%)	
	Yes	10	14.29	38	
No	60	85.71	32	45.71	<0.0001
Total	70	100	70	100	

NICU-neonatal intensive care unit

We found that 14.29% neonates in group A and 54.29% neonates in group B were admitted in NICU.

Table 8: Correlation of Neonatal serum vitamin D level with NICU admission

Neonatal serum Vitamin D(ng/ml)	NICU admission			
	Group A (Normotensive pregnant women)		Group B (Hypertensive pregnant women)	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
<12 (Deficient)	0	0	0	0.00
12-19.9 (Insufficient)	0	0	3	8.33
20-50 (Normal)	10	100	33	91.67
Total	10	100	36	100.00
Mean±SD	37.28±5.38		25.6±3.96	
P-Value	<0.001			

Mean neonatal serum vitamin D levels of NICU admitted neonates showed significant difference in our study.

Table 9: Correlation of maternal serum Vitamin level with gestational age (<37 weeks) (Preterm Delivery)

Maternal serum Vitamin D(ng/ml)	Gestational Age (<37 weeks)			
	Group A (Normotensive Pregnant Women)		Group B (Hypertensive pregnant women)	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
<10 (Deficient)	0	0.00	4	14.29
10-30 (Insufficient)	20	74.07	24	85.71
>30 (Normal)	7	25.93	0	0.00
Total	27	100.00	28	100.00

Mean±SD	25.73±4.84	13.19±4.56
P-Value	<0.0001	

We found that mean serum vitamin D level for gestational age <37 weeks in group A was 25.73 ng/ml and for group B it was 13.19 ng/ml. There was significant difference found between these group as p value was <0.05.

Table 10: Distribution of IUGR baby in group A and group B.

IUGR	Group A (Normotensive Pregnant Women)		Group B (Hypertensive pregnant women)		P-Value
	Number (n)	Percentage (%)	Number (n)	Percentage (%)	
Yes	0	0.00	8	11.43	0.01
No	70	100.00	62	88.57	
Total	70	100.00	70	100.00	

IUGR-intrauterine growth restriction Here we found that 11.43% neonates in group B were IUGR.

**Conclusion**

Our study showed that serum vitamin D levels were low in women with hypertensive disorders of pregnancy (group B) as compared to normotensive pregnant women (group A). Serum vitamin D level deficiency is associated with increased risk of developing hypertension during pregnancy and high-risk pregnancy like preterm labor, Intrauterine growth restriction (IUGR) and NICU admission. So, we suggest that, screening of maternal serum Vitamin D level should be done during pregnancy, so that Vitamin D supplement can effectively prevent hypertensive disorders of pregnancy. Thus, pregnancy outcome can be improved and maternal morbidity and mortality can be brought down.

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