

Study of association of low serum calcium level in pregnancy induced hypertension

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I. Introduction

Pregnancy induced hypertension is characterized by abnormal blood pressure, proteinuria and edema that usually develops after the 20th week of pregnancy.

The pregnant woman's body provides daily doses of 50 to 330 mg calcium to support the developing fetal skeleton. Early studies of blood calcium levels during pregnancy in humans found a significant decrease in the total serum calcium as pregnancy progressed. Regulation of intracellular calcium plays a key role in hypertension. Hypertension has been estimated to complicate 5% of all pregnancies and 11% of first pregnancies. Half of the pregnant women with hypertension have pre-eclampsia

. One of the United Nations' Millennium Development Goals for 2015 is to reduce the maternal mortality ratio by threequarters. Ninety-nine percent of maternal deaths occur in developing countries, and the World Health Organization encourages investigations in these settings to determine the risk factors of maternal deaths. The maternal mortality ratio was 47.3 per 100,000 live births. The main causes of death were hemorrhage (30.9%), pre-eclampsia/ eclampsia (28.2%), and septic shock (10.9%) . PIH is a common condition in Indian pregnant women as observed by practicing doctors.

Objective

The objective of this study was to compare the total serum calcium levels in pregnant women complicated with pre-eclampsia with those in normal pregnant women.

Subjects and Methods This is a case-control hospital based study carried out at Obstetric & Gynaecology department of NMCH, PATNA in period of october 2013 to june 2014

Study Design

Present study is a hospital based case control study involving 135subjects, normotensive pregnant women as controlled (n-45) group and PIH (n-90) group were enrolled.

Methods

Inclusion criteria included

- 1) Pregnant women age between 20-35 years
- 2) Normotensive and PIH women after completion of 20thweeks of gestational age.

Exclusion criteria were women with

- 1)Family history and personal history of hypertension 2) Any other major diseases (cardiac, renal, diabetes, TB)
- 3) H/O smoking, addiction of tobacco and alcohol.

Informed and written consent was obtained from all enrolled subjects.

Questionnaires included personal information's (age, no. of pregnancies, level of education, Ca²⁺ sources in diet) .

PIH was diagnosed based on high blood pressure (two separate readings taken at least six hours apart of 140/90 mmHg or more.

With all aseptic precautions 3ml of venous blood sample was collected in plain blub. Sr Ca²⁺ was estimated using Auto analyzer Dimension RXL Max Machine.

Statistical Analysis To analyze data students't' test was used. 'p' value less than 0.005 was considered significant, 'p' value more than 0.05 was considered non significant and 'p' value less than 0.01 was considered highly significant.

Table No. 1. History of PIH in previous pregnancies among multigravidae

Table no. 1 shows that out of 90 PIH patients of study group total no. of multigravida were 35 out of there 8 patients had history of pre-eclampsia and 27 patients had no history of PIH in previous pregnancy.

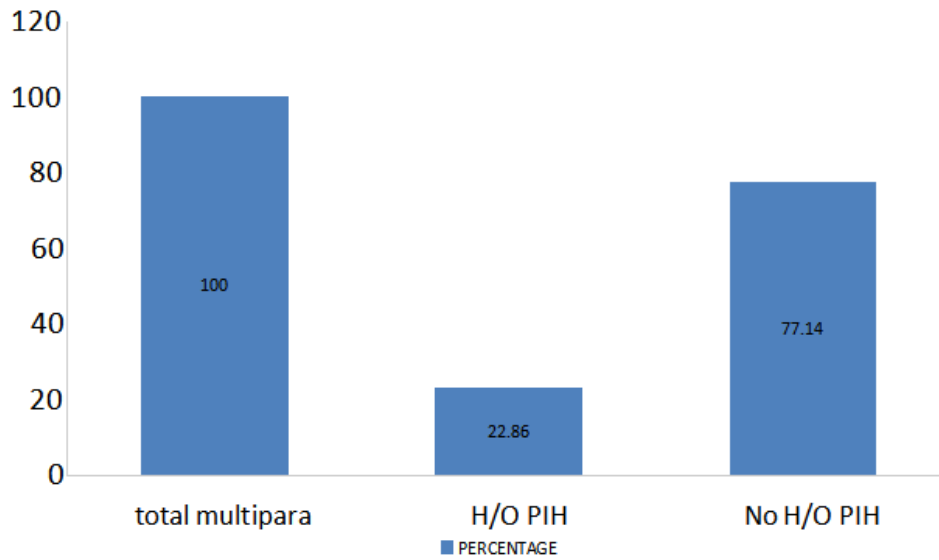


Table No. 2. Number of percentage of cases according to age

Age group	No.of cases	percentages
< 25 yrs	105	78%
> 25 yrs	30	22.22%

Table no. 2 shows that 78% of the patients were below upto 25 yrs thus amplifying that PIH has impact of age.

Number of percentage of cases according to age

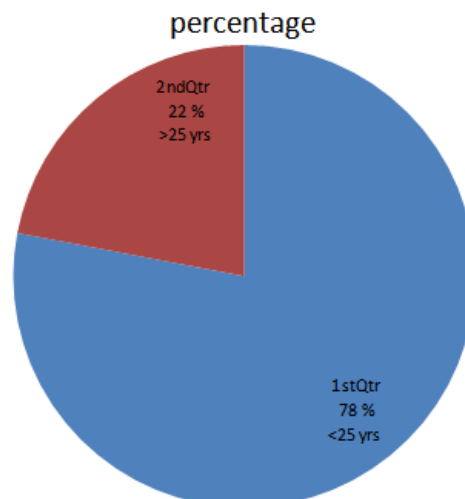
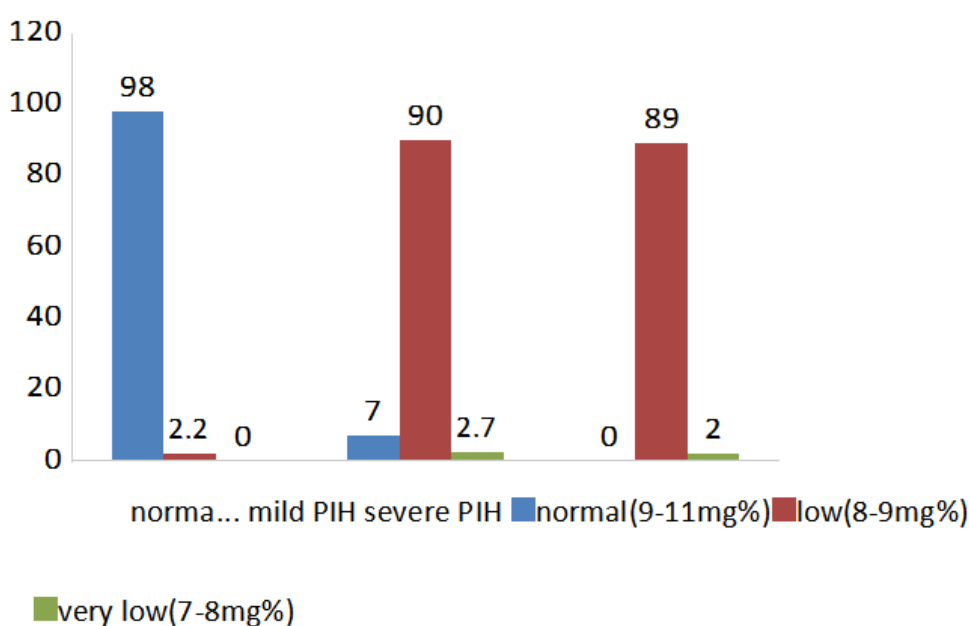


Table No. 3. Comparison of number and percentage of cases with normal, low, very low serum Ca⁺⁺ level between control and study group at term.

Comparison of number and percentage of cases with normal, low, very low serum Ca⁺⁺ level between control and study group at term.

Serum calcium	Normal pregnancy		Mild PIH		Severe PIH	
	No.	%	No.	%	No.	%
Normal (9-10mg%)	44	98%	5	7%	0	0%
Low (8-9mg%)	01	2.2%	65	90%	16	89%
Very low (7-8mg%)	0	0%	02	2.7%	02	02%



II. Discussion

Pre-eclampsia; occurs in about 5 % to 10% of all pregnancies. The exact cause of PIH has not been determined. There are many theories, but all that is known for sure is that its mediator originates in the placenta and is believed to be a woman's immunological " reaction" to the fetus and placenta.

During full-term pregnancy, the fetus takes approximately 30 g from the mother's calcium, at the expense of the mother's bones if calcium intake is insufficient. The effects of dietary calcium on blood pressure regulation appear to be paradoxical, as increasing intracellular calcium increases vascular smooth muscle tone, peripheral vascular resistance, and blood pressure, while increasing dietary calcium exerts the opposite effect. The protective effect of calcium on blood pressure can be explained in part by the influence of calcitrophic hormones on intracellular calcium. 1, 25-dihydroxyvitamin D stimulates calcium influx in a variety of cells, including vascular smooth muscle cells .This effect is rapid, as it is mediated by vitamin D receptor rather than via a classical nuclear-receptor-mediated mechanism. As a consequence, 1,25-dihydroxyvitamin D exerts a repressor effect, serving to promote contraction and increase peripheral vascular resistance.

Consequently, low calcium diets, which elicit a 1, 25dihydroxyvitamin D response, would be expected to increase blood pressure, whereas high calcium diets, by virtue of suppressing 1,25-dihydroxyvitamin D levels, would be expected to reduce vascular smooth muscle cell intracellular calcium, peripheral vascular resistance and blood pressure.

III. Conclusion

There was 45 cases of normal pregnant women who were used as control group. There was 72 cases with mild preeclampsia, 18 cases with severe pre-eclampsia. Total number of multigravidas are 35. Out of these 35, 8 patients had history of pre-eclampsia, 27 patients had no history of PIH in previous pregnancies. The disease is more common in primigravida 78% of case were below 25 years of age.

In mild pre-eclampsia 72.5% were primigravida. In severe preeclampsia 70% primigravida. The mean serum calcium level at term in normal pregnant woman was 9.8 mg%. In mild preeclampsia was 8.74 mg%. In severe pre-eclampsia was 8 mg%. Birth weight of baby was reduced according to the severity of PIH

The mean serum calcium of the study group was (8.38±1.04 mg %), while the mean serum calcium of the control group was (9.04±1.13mg%). There was a statistically significance difference between the two groups P= 0.001, With increasing severity of PIH serum Ca++ become low. The following conclusion was drawn on the basis of our observation from the study of serum calcium level in PIH. Pregnancy induced hypertension is more common among the teenager population. Birth weight was inversely related to severity of PIH .Mild PIH is associated with significant hypocalcaemia compared to normotensive pregnant patient. Also severe PIH is associated with significant change compared to normotensive pregnancies. So, the present study advocates the value of serum Ca++ a marker of pregnancy complicated by hypertension or severe pre-eclampsia.

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