

Incidence of Hypocalcemia in Women Suffering from Preeclampsia

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ABSTRACT

Objective: To estimate the incidence of hypocalcemia in women suffering from preeclampsia.

Study Design: Cross sectional study.

Place and Duration of Study: Department of Obstetrics & Gynaecology, Pakistan Railway Hospital Rawalpindi from 1st July 2020 30th June 2021.

Methodology: One hundred women with preeclampsia were suffering from high blood pressure and amenorrhea 32 weeks' pregnant women with parity between 0-5 were enrolled. They were divided in two groups. Group A consisted of normal pregnant women while Group B consisted of pre-eclamptic pregnant women. Blood pressure was taken at three various times using a mercury based sphygmometer. Urine analysis was initially performed as a confirmation of preeclampsia. Serum Calcium levels were determined through calorimetric method using Human Diagnostic kits (Germany).

Results: The study highlighted the fact that majority of the pre-eclamptic women such as 54% were educated. There was a significant difference in primigravida of group A and Group B with p value <0.05.

Conclusion: Significant association was found between hypocalcemia and preeclampsia among pregnant women.

Keywords: Preeclampsia; Pregnancy; Serum calcium levels; Significance

INTRODUCTION

Pregnancy is a crucial period both for mother and child health. Any kind of disorder within gestational time can lead to serious consequences in mother and child health.^{1,2} Hypertension has globally been reported as a major causative agent of pregnancy related morbidities or mortality. Around 40k annual deaths are reported internationally due to mismanaged hypertensive pregnant cases.³ Preeclampsia is linked with unsuccessful trophoblastic incursion of the spiral arteries that results in ascended vascular-resistance and reduced placental-perfusion. It is a systematic ailment featured by hypertension as well as proteinuria in addition to edema caused by improper endothelial activation.⁴ However, the complete pathophysiological aspects of preeclampsia are not completely understood. Environmental as well as nutritional factors have been associated as major reason of causing preeclampsia. Calcium as a micronutrient is reported to be significantly associated with preeclampsia formation.⁵

Intake of calcium is mandatory requirement of pregnancy. Studies have reported that women who were given low continuous supplementation of calcium in pregnancy were prevented from preeclampsia development than those who were not supplemented.^{6,7} Sanchez-Ramos et al⁸ have supported that five percent of pregnant females suffer from preeclampsia during their second and third trimester leading to serious health consequences.

Preeclampsia is 3rd major death causer during pregnancy time. It has even been reported as second major mortality reason in some Muslim countries with a prevalence as high as 18%.⁹ A disturbed homeostasis between lipid-peroxidation and the antioxidants can damage endothelium resulting into preeclampsia.¹⁰ The present study was designed for assessing the frequency of preeclampsia in pregnant women. The results of this study will assist in better management strategy development against preeclampsia condition and save mother and child from poor outcomes of this disease.

MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Obstetrics & Gynaecology Pakistan Railway Hospital Rawalpindi and 100 pregnant women were enrolled. This study was approved from Ethical Committee before onset. Each participant of this study also gave a written informed consent for participation. The sample size was calculated through WHO calculator keeping a 95% confidence interval and 7% margin of error. The absolute precision was taken as 0.35. 32 weeks' pregnant amenorrhea women with parity between 0-5 were included. Pregnant women having chronic hypertension or eclampsia, liver or thyroidal known disease or any

terminal illness were excluded. They were divided into two groups. Group A consisted of normal pregnant women while Group B consisted of preeclamptic pregnant women. Each group had 50 cases. A complete clinical examination of each patient was performed and their clinical histories and symptoms were documented in addition to their demographic details on a well-structured questionnaire. Blood pressure was taken at three various times using a mercury based sphygmometer. Urine analysis was initially performed as a confirmation of preeclampsia.

A blood pressure systolic ≥ 130 mmHg and diastole as ≥ 90 mmHg was considered as high. A 3cc blood was withdrawn from each participant. Serum was separated and the serum was stored at -20°C until analysis. Serum calcium levels were determined through calorimetric method using Human Diagnostic kits (Germany). Data was analyzed by using SPSS-25.0. Chi square test was used for analysis. p value <0.05 was considered as significant.

RESULTS

The mean age of group A was 28.66 \pm 7.02 years and group B was 27.34 \pm 8.4 years. There was no significant difference between the group A and group B. There were 56% normal cases within the age ≤ 30 years while 60% of preeclampsia women were in the same age (Table 1).

The study highlighted the fact that majority of the pre-eclamptic women such as 54% were educated while only 46% were uneducated. There was no variance in educational status of normal pregnant women (Fig. 1).

There was a significant difference in primigravida of group A and Group B with p value <0.05, where as the multigravida and gestational age had no significant difference among group A and group B respectively (Table 2).

Table 1: Age distribution between normal and preeclampsia women (n=100)

Age (years)	Group A	Group B	P value
	28.66 \pm 7.02	27.34 \pm 8.4	0.61

Table 2: comparison of parity, prima and multigravida of group A and B

Variable	Group A	Group B	P value
Parity	1.92 \pm 1.1	1.76 \pm 1.4	0.55
Primigravida	9.6 \pm 0.54	7.1 \pm 1.49	0.04
Multigravida	8.83 \pm 1.08	7.49 \pm 1.63	0.49
Gestational age	34.90 \pm 4.9	35.3 \pm 1.9	0.51

Only 1 woman in normal group was having high blood pressure which was then managed as normal on follow up and could not be termed as preeclampsia due to other normal clinical

evaluation. Hypocalcemia was presented in 64% of pregnant women with preeclampsia while in only 22% of normal cases (Table 3).

Table 3: Comparison of blood pressure and calcium levels in group A and Group B

Variable	Group A	Group B	P value
Blood Pressure			
Normal	49 (98%)	--	-
Abnormal	1 (2%)	50 (100%)	<0.05
Calcium levels			
>8.5mg/dl as normal	39 (78%)	18 (36%)	0.039
<8.5mg/dl as hypocalcemia	11 (22%)	32 (64%)	0.042

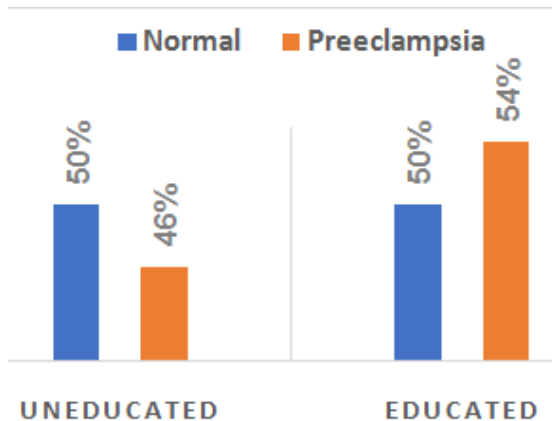


Fig 1: Comparison of educational status within normal and preeclampsia cases

DISCUSSION

Present study was designed for the comparison of serum calcium levels among preeclamptic women and normal pregnant ladies. Significant difference in serum calcium levels was observed in present study. This was in accordance with already published data and proved that calcium level disturbance could be an eminent cause of preeclampsia in women. Few studies also reported the same findings and suggested that reduced calcium levels are considerably associated with abnormal blood pressure in pregnant women.¹¹⁻¹⁴

International data reports that, serum magnesium and calcium levels both are strongly associated with preeclampsia as reported in present study. Present study also showed that, these levels get decreased in preeclamptic women and significant correlation ($p < 0.001$) was determined. This influence can be explained by intracellular levels of calcium. This might accelerate the parathyroid hormone secretion and renin as of result of which calcium level in vascular smooth muscles increased and consequently reduced the serum calcium level. Increased concentration of calcium in smooth muscles cause vasoconstriction thus elevates vascular resistance, ultimately leads to high blood pressure in preeclamptic women.¹⁵⁻¹⁹ Calcium also played protective role through calcitropic hormones against blood pressure. Vitamin D stimulates calcium production in variety of cells even containing smooth muscle cells.

CONCLUSION

There is a strong association and incidence of hypocalcemia in preeclamptic pregnant women and needs to address for promising mother and child health outcomes.

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