



COMPARISON OF SERUM CALCIUM LEVELS IN NORMAL PREGNANCY AND GESTATIONAL HYPERTENSION

Obstetrics & Gynaecology

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ABSTRACT

Background: Pregnancy has a high calcium requirement, which, if unmet, results in the mother's skeleton demineralizing, the fetus growing slowly, the fetal bones becoming less mineralized, and problems with the production of calcium in breast milk. About 25–30 g of the calcium from the mother are transferred to the fetal skeleton by the end of the pregnancy. The calcium builds up at a rate of two to three milligrams per day in the first trimester and increasing to 250 mg daily by the third trimester's end. During lactation, breast milk loses between 200 and 240 mg of calcium per day. Mothers lose three to five percent of their skeletal calcium content. High calcium intake is thought to lower the incidence of PIH, according to early research on the subject. The real cause of this, though, could not be determined. Studies examining the association between serum calcium levels and pregnancy in the Indian population are rare. Consequently, the purpose of this study was to evaluate the calcium levels in both normal and Gestational hypertension. **Objectives:** Comparison of serum calcium levels in normal pregnancy and gestational hypertension **Methods:** This snapshot study was conducted in the Department of Obstetrics and Gynaecology at Alluri Sitarama Raju Academy of Medical Sciences, Eluru during the period of September 2022 – August 2024. Total 200 cases were included in the study. **Results:** When mean serum calcium levels from both groups were compared, it can be seen that patients with gestational hypertension has lower mean serum calcium levels. At $p < 0.005$, the difference is statistically significant. The idea that an increase in intracellular calcium influences blood pressure indirectly is validated. There is a wealth of evidence linking the blood calcium level to preeclampsia and gestational hypertension. Therefore, raising the levels may aid in lessening the negative effects on the mother and the fetus. **Conclusion:** There is a clear correlation between pregnancy-related hypertension problems and serum calcium levels. The results of this study show that pregnant women's blood pressure and serum calcium levels are related, albeit the direction of the association is yet unknown.

KEYWORDS

INTRODUCTION

The presence of a newly diagnosed hypertension in a pregnant women with no proteinuria after 20 weeks of the gestation is known as pregnancy-induced hypertension, or the gestational hypertension. At least two instances spaced out by six hours should occur where the measured blood pressure exceeds 140/90 mm Hg¹. In conjunction with infection, it plays a major role in maternal mortality and morbidity². Gestational hypertension is in fact a multisystem disorder which is specific to pregnancy associated with edema, elevated blood pressure and can be a part of preeclampsia and eclampsia³.

Preeclampsia is a common condition in pregnancy and is strongly associated with morbidity and mortality in mothers prenatally and perinatally⁴. In developed nations, hypertensive disorders have become less serious due to early diagnosis, prevention, and treatment; however, in developing nations such as India, the incidence of gestational hypertension is high⁵.

Calcium in Pregnancy

Pregnancy has a high calcium requirement, which, if unmet, results in the mother's skeleton demineralizing, the fetus growing slowly, the fetal bones becoming less mineralized, and problems with the production of calcium in breast milk⁶. During lactation, breast milk loses between 200 and 240 mg of calcium per day⁷. High calcium intake is thought to lower the incidence of PIH, according to early research on the subject. The real cause of this, though, could not be determined⁸.

MATERIALS AND METHODS

This snapshot study was conducted in the Department of Obstetrics and Gynaecology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru from September 2022 – August 2024 after obtaining approval from the institutional ethical committee and informed consent from the study subjects.

Inclusion Criteria

Study Group:

- Age 20–40 yrs
- Singleton pregnancy as confirmed by USG
- > than 20 weeks gestational age
- Primi and multi gravida
- Diagnosed gestational hypertension based on the criteria – BP $\geq$ 140/90 mmHg on two separate occasions 6 hrs apart

Control Group:

- Age 20–40 years
- Singleton pregnancy
- > than 20 weeks gestational age with BP $\leq$ 130/80 mmHg
- Primi and multigravida gravida

Exclusion Criteria :

- Multiple gestation
- Gestational Age < 20 wks
- Associated co-morbidities like gestational diabetes mellitus, chronic hypertension, heart disease, renal disease, cardiovascular disease

200 pregnant women participated in the study. 100 normotensive pregnant women with gestational ages greater than twenty weeks (control group) and 100 patients with pregnancy-associated hypertension (study group) attending the OP of the Department of Obstetrics and Gynecology at ASRAM. Medical College Hospital provided data for the study.

The controls and cases were matched. The amount of serum calcium were estimated.

Study subjects' confidentiality and privacy was well preserved.

Investigations Required : serum calcium levels

RESULTS :

Table 9 : Serum Calcium Levels

SERUM CALCIUM	NORMOTENSIVE	G.H
Mean	9.239	8.738

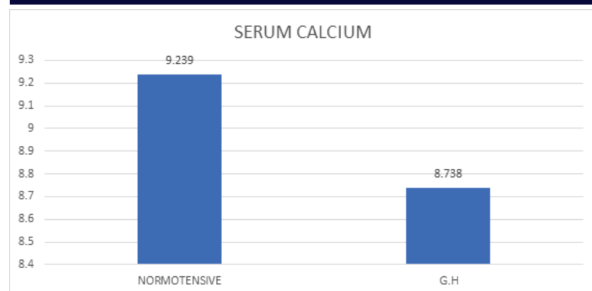


Chart 9 : Serum Calcium Levels.

DISCUSSION

Pregnancy requires proper maintenance of calcium homeostasis because insufficiency can result in a number of problems. Preeclampsia, preterm delivery, and intrauterine growth retardation are just a few of the gestational complications that have been linked to a diet low in calcium during pregnancy.⁹ Akmal et al¹² reported in their publication that the study group 1 involved a 100 pregnant women having normal BP & gestational age which is almost 30-40 weeks; whereas group 2 involved cases with a diastolic BP of 100mmHg and gestational age of 30-40 weeks. Other hypertensive pregnant women with risk factors other than the PIH were excluded from the study. Malas et al¹³ reported that the Median serum calcium level was 8.75 mg/dl. It ranged between 8-9.6 mg/dl. The mean serum calcium level of normotensive group was 9.2 mg/dl (S.D=0.5 mg/dl). The median serum calcium level in controls is 9.1 mg/dl. It ranged between 8.4-10.6 mg/dl. Comparison of mean serum calcium levels between the two groups showed that mean serum calcium was lower in patients with gestational hypertension. The difference was statistically highly significant ($p < 0.005$)

More instances of induced labor (53%) than spontaneous labor (47%), among the hypertension individuals, were reported. It was discovered that among controls, spontaneous labor was more common (61%) than induced labor (39%). This highlights the fact that patients with low calcium levels and high blood pressure have a greater requirement for induction. The results of chi-square and cross-tabulation analysis demonstrate the statistical significance of this discrepancy.

Merely 11% of the gestational hypertensives underwent an instrumental birth, compared to 38% who underwent a caesarean surgery. The majority of deliveries were normal vaginal delivery (51%). The majority of normotensives had their babies vaginally (72%), but the percentages for cesarean sections and instrumental deliveries were comparatively lower (19%) and 9%, respectively. According to chi-square and cross-tabulation analysis, the difference is statistically significant ($p < 0.05$). Patients who have elevated blood pressure and lower calcium levels are more likely to require cesarean sections.

Compared to moms with normal blood pressure (5%), those with G.H. had more complications (37%). Intrauterine Growth Retardation (20%) was the most frequent complication, followed by eclampsia (11%) and abruption (6%). Among patients with G.H., problems were more common. The following were found in a meta-analysis by Tito et al. regarding the connection between low calcium intake and preeclampsia³²: Serum calcium levels are adversely correlated with the occurrence of hypertensive disease, and additional calcium supplementation might be utilized as a preventive medication during pregnancy in high-risk groups. Pregnancy-related hypertension is a complex causatory disease.

Reduced serum calcium levels can lead to a rise in parathyroid hormone levels. Conversely, higher cell calcium levels cause vascular smooth muscle contraction, which in turn raises blood pressure. The idea that an increase in intracellular calcium influences blood pressure indirectly is thus validated. There is a wealth of evidence linking the blood calcium level to preeclampsia and gestational hypertension. Thus, raising the levels may aid in lessening the negative effects on the mother and the developing fetus³³. In order to ensure a safe pregnancy, giving 2 g of calcium supplements daily will eventually lower blood pressure by lessening the contraction of vascular smooth muscle

CONCLUSION

There is a clear correlation between pregnancy-related hypertension problems and serumcalcium levels. The results of this study show that

pregnant women's blood pressure and serum calcium levels are related. It is still unknown what exactly triggers hypertension in preeclampsia. Research has indicated that pathophysiological alterations are visible prior to the disease's clinical manifestation. The present study underscores the need of routinely monitoring patients for these biomarkers, as it can aid in the prompt diagnosis and treatment of pregnancy-induced hypertension. Therefore, careful monitoring of serum calcium levels and calcium supplementation can be highly helpful in reducing maternal morbidity and death as well as assisting in achieving a successful pregnancy outcome.

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