

ORIGINAL RESEARCH

A study of serum zinc and calcium levels in preeclamptic patients

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ABSTRACT

Background: There has been a lot of study done in this area on preeclampsia because it is one of the main causes of maternal death and pregnancy-related complications. The study's primary goal was to assess and contrast the levels of zinc and calcium in the serum in preeclamptic and healthy pregnant women. **Materials and Procedures:** This was carried out at the Department of Biochemistry, Index Medical College, Indore, Madhya Pradesh, India. 40 preeclamptic patients were assigned as case, while 40 healthy pregnant women with similar ages were assigned as control. **Result:** Participants' serum levels of zinc and calcium were examined, and the study group's levels were noticeably lower than those of the control group. According to the study's findings, pregnant women who have lower serum levels of calcium and zinc may be at risk of developing preeclampsia. **Conclusion:** Preeclampsia may thus be prevented by early assessment of these minerals' serum levels during prenatal visits and, if necessary, supplementation.

Key words: Calcium and zinc

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INTRODUCTION

One of the most frequent causes of perinatal and maternity-related deaths worldwide is preeclampsia. Preeclampsia has several causes, and identifying any of these factors can aid in the early prevention of the condition, lowering the death rate for both mothers and infants. There is debate over the validity of the findings of studies on the relationship between zinc deficiency and pregnancies considered hazardous. This study looked into the connection between high-risk pregnancies and mothers' serum zinc levels.

Preeclampsia and eclampsia complicate 2-8% of pregnancies and account for 10-15% of maternal mortality. Due to the terrible consequence of developing eclampsia, which is lethal for both the mother and the foetus, it needs to be identified early and treated properly¹. Globally, preeclampsia affects 10 million women annually. Based on current data, preeclampsia and other hypertension illnesses claim the lives of 76,000 pregnant women annually. Every year, over 500,000 infants born to preeclamptic mothers pass away². A woman's risk of having preeclampsia is seven times higher in developing nations than in industrialised ones³.

Numerous researchers and laboratory studies have connected low calcium levels, either from inadequate food intake or abnormal calcium metabolism, to

elevated blood pressure, or hypertension^{4, 5}. To investigate this association, the "National Centre for Health Statistics" carried out a sizable investigation. They discovered that there is a daily threshold for dietary calcium intake of 400-600 mg; at levels below this threshold, the likelihood of elevated blood pressure increases dramatically⁴. Pregnant women have a greater threshold because their growing foetus needs more calcium to suit its needs (such as bone mineralization).

82% of expectant mothers globally consume insufficient amounts of zinc. Preeclampsia has been linked to dietary zinc variations^{6, 7}.

Zinc is a crucial component of many proteins and is involved in a variety of cellular processes, including DNA repair, defence against free radicals, and cell division and death. One crucial first-line defence enzyme against oxygen radical species, for instance, is superoxide dismutase⁸.

MATERIAL AND METHODS

Between September 2022 and December 2022, forty pregnant women with a gestational age of ≥ 28 weeks who were diagnosed with preeclampsia were taken as cases, and forty normal primigravida with a matching gestational age and a singleton pregnancy were taken

as controls. The study did not include those who were taking mineral supplements.

Under aseptic precaution, 5 ml of venous blood were extracted from each participant's ante-cubital vein. Zinc and calcium levels were estimated from separated serum. A photometric test was used to measure serum calcium levels. Colorimetric analysis was used to measure serum zinc levels. The Department of Biochemistry at Index Medical College in Indore used a fully automated clinical chemistry analyzer for all of the assays.

RESULT AND DISCUSSION

In both groups, the majority of participants (75% in the control group and 82% in the case group) were between the ages of 20 and 40. The majority of study participants (65% group) had never given birth, and the majority of subjects in both groups were ≥ 28 weeks pregnant at the time of sampling.

A number of studies have indicated that the contractility of smooth muscle cells is significantly influenced by serum calcium levels. Reduced serum calcium levels during pregnancy cause the production of renin and parathyroid hormone, which raises intracellular calcium in vascular endothelium smooth muscle cells. Patients with preeclampsia experience an increase in blood pressure due to vasoconstriction brought on by the increased smooth muscle calcium^{8, 9, 10}.

Reactive oxygen species, or ROS, are known to rise throughout a typical pregnancy and are essential for the best possible outcome¹¹. Preeclamptic pregnancy is a difficult pregnancy that arises from a disruption in the balance between the pro-oxidant species and the antioxidant host defences. According to this study, preeclamptic women's serum zinc and calcium levels are noticeably lower than those of typical pregnant women. Our research was linked to many scientists. Reduced serum calcium levels were observed in preeclamptic patients¹². Similarly, a study found that preeclamptic patients had lower levels of zinc and calcium¹³.

CONCLUSION

Our findings imply that low zinc and calcium levels in pre-eclamptic women may have a role in the development of hypertension in these individuals. Since preeclampsia is more common in lower socioeconomic groups, low serum levels of these minerals may be the result of insufficient food consumption; a shortage in these minerals may therefore contribute to the development of preeclampsia and elevated blood pressure.

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