



ROLE OF CALCIUM IN PREVENTION OF PREECLAMPSIA

Obstetrics & Gynaecology

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KEYWORDS

INTRODUCTION:

Preeclampsia is a pregnancy specific multisystemic disorder characterized by proteinuria and onset of hypertension in pregnancy. It is believed to be multifactorial in origin, with risk severity influenced by both maternal and fetal determinants.

Over the years researchers have suggested that calcium may be playing a role in the etiology of hypertensive disorder during pregnancy. Previous studies have reported the impairment of calcium metabolism with low circulating vitamin D concentration and/ or inadequate dietary calcium which may be contributing to the risk of hypertensive diseases of pregnancy (HDP).

After various clinical trials some researchers reported reduced incidence of preeclampsia with calcium supplementation and some studies revealed and inverse relationship between calcium intake during pregnancy and reduced incidence of preeclampsia. However, during pregnancy there are contradictory reports also so research continues till date.

The WHO guidelines state that in populations where calcium intake is low, calcium supplementation as a part of antenatal care is recommended for prevention of preeclampsia among pregnant women particularly among those at higher risk of hypertension. The aim here is to study the role of calcium in prevention of preeclampsia.

Objective

To collect information about the role of calcium in prevention of preeclampsia.

METHODS

This was a prospective randomised controlled trial conducted during the period of December 2019 to December 2020, in the Department of Obstetrics and Gynecology at Patna Medical College and Hospital; Patna.

The study recruited 104 patients visiting outdoor for antenatal care.

They were randomised into two groups:

Group A: 51 patients receiving calcium supplementation

Group B: 53 patients receiving placebo

All participants provided informed written consent.

Inclusion criteria

- Pregnant women carrying singleton live fetus with Gestation age < 12 weeks, of any parity
- Average built
- Age > 18 years, but < 35 years

EXCLUSION CRITERIA

- Age less than 18 years, and more than 35 years
- Already receiving calcium supplementation
- History of hypertension or diabetes
- Unwilling to give consent.

Calcium and placebo tablets were packed in identical bottles. Participants were randomly assigned to a calcium supplementation or placebo group. The calcium group received one tablet daily containing

500 mg elemental calcium (as calcium carbonate).

Participants were asked to chew their allocated tablet in the evening at a time distant from taking food or iron supplements. They were encouraged not to take any additional calcium supplements.

RESULTS

The prevalence of pre-eclampsia was lower in the calcium group, however, the difference was not significant. Also, there were no significant differences in secondary outcomes. In this trial, pre-eclampsia was recorded as an outcome if it was diagnosed and recorded in the participant's medical records or if we identified both high blood pressure and proteinuria, as per the trial definitions of pre-eclampsia, in a participant's medical records.

	Calcium group	Placebo group
Maternal age (years)	23.1	24.2
Parity 0	18	16
Parity 1	26	29
Parity 2 or more	7	18
Gestational age :		
Second trimester	22	33
Third trimester	29	20
Number of ANC visits		
1	15	23
2-4	17	10
>4	19	20
Milk intake (cups) { 1 cup = 246 gm calcium }		
0	12	13
1	20	12
2-3	9	8
>3	10	20

Table1 -comparison of characteristics of participants in both the groups

Table2 -comparison of maternal complications in both the groups

	Calcium group	Placebo group	P value
Preeclampsia	12	15	>0.05
Gestational hypertension	34	36	>0.05
Early onset preeclampsia (<32 weeks)	7	8	>0.05
Severe preeclampsia	8	11	>0.05
Gestational proteinuria	13	17	>0.05

DISCUSSION

Normally, during early pregnancy, blood pressure falls and then slowly rises until the end of pregnancy. However, obesity, diabetes, twin or teenage pregnancies and low calcium consumption alter this equilibrium and increase the risk of developing pre-eclampsia. Calcium supplementation improves calcium intake and consequently reduces the risk of hypertensive disorders during pregnancy.

Pregnancy is a state of high calcium demand, because ~30 g of calcium is transferred to the fetus during gestation. Bone turnover and

intestinal calcium absorption increase markedly in support of fetal calcium demands, and numerous hormonal alterations occur to support calcium homeostasis across pregnancy. Therefore, the recommended dietary intake of calcium during pregnancy is similar to that of nonpregnant women of the same age.

Calcium dose influences the percentage absorbed; as the calcium content of the dose increases, the fractional absorption of calcium decreases.

In our study we find that the mean age of onset of preeclampsia was 23.1 yrs in calcium group compared to 24.2 in placebo group.

In our study the onset of preeclampsia and gestational hypertension was more in placebo group than the calcium group. Severe preeclampsia and gestational proteinuria was less in the people taking calcium.

Role of calcium supplementation during pregnancy in reducing hypertensive disorders has been evaluated before. The review by Hofmeyr et al included studies from both developed and developing countries and their pooled estimate had shown that calcium supplementation during pregnancy significantly reduced occurrence of gestational hypertension [RR 0.70, 95% CI 0.57-0.86] and pre-eclampsia [RR 0.48, 95% CI 0.33-0.69]. On the other hand, a review by Trumbo and Ellwood for US Food and Drug Administration (FDA) has shown that the beneficial effects of calcium supplementation during pregnancy cannot be generalized to USA and populations with adequate baseline calcium intake. If we pool all the studies from both developed and developing countries, the estimates become RR 0.70 (95 % CI 0.57-0.86) for gestational hypertension, and RR 0.47 (95 % CI 0.34-0.66) for pre-eclampsia. Estimates for gestational hypertension and pre-eclampsia are similar to that of Hofmeyr et al. What could be the explanation of protective effect of calcium supplementation during pregnancy in developing countries and no effect in developed countries? The first and the foremost is the difference in baseline calcium intake. In most of the included studies from developing countries the baseline intake was low, while it was adequate in most of the studies from developed countries as reported in review by FDA. Low calcium intake has been hypothesized to cause increase in blood pressure by stimulating the release of parathyroid hormone and/or renin which leads to increased intracellular calcium concentration in vascular smooth muscle cells and causes vasoconstriction. Role of calcium supplementation in reducing hypertensive disorders in pregnancy can possibly be explained by reduction in parathyroid calcium release and intracellular calcium concentration, thereby reducing smooth muscle contractility and promoting vasodilatation.

CONCLUSION

Although calcium supplementation during pregnancy was associated with a reduction in risk of gestational hypertension and pre-eclampsia, however the difference from that of placebo group was not significant.

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