

Comparison of efficacy in terms of prevention of preeclampsia in patients with calcium intake versus without calcium intake

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ABSTRACT

Objective: To compare the efficacy in term of prevention of preeclampsia in patients with calcium intake versus without calcium intake

Materials & Methods: Between April 2021 to October 2021, total 212 Women between 18-35 years of age, having 20 weeks of gestation assessed on LMP, normal blood pressure, no peripheral edema and no proteinuria, women with singleton pregnancy and patients upto para-5 were selected from Department of Obstetrics & Gynecology, MMC General Hospital Peshawar for this randomized controlled trial. Calcium was given to group A while group B was given only routine food. Prevention of preeclampsia in patients with calcium intake versus without calcium intake was assessed.

Results: In group A (calcium intake group) & B (without calcium intake group) mean age was 23.15 ± 6.68 years and 23.41 ± 6.05 years respectively. The mean gestational age in group A was 34.71 ± 4.73 weeks and in group B was 33.42 ± 4.83 weeks. There was development of pre-eclampsia in 07 (6.60%) patients and no pre-eclampsia in 99 (93.40%) patients in Group A, in Group B, it was noted in 19 (17.92%) and 87 (82.08%) patients respectively ($p=0.012$).

Conclusion: This study concluded that calcium intake during pregnancy is associated with higher efficacy in preventing pre-eclampsia compared to those without calcium intake.

Keywords: Calcium supplementation, proteinuria, high blood pressure.

INTRODUCTION

Preeclampsia, formerly known as toxemia, is characterized by elevated blood pressure and an excess of protein in the urine at 20 weeks gestation with previously normal BP.¹ Preeclampsia is typically to blame for the progressive onset of hypertension, proteinuria, and edema during pregnancy, especially in a primigravida. Around the world, 3–5% of pregnancies are affected with preeclampsia.² It occurs far more frequently in first-time mothers and much less frequently in subsequent pregnancies.³⁻⁴ Women with pre-existing hypertension, diabetes, autoimmune conditions like lupus, different genetic thrombophilias like Factor V Leiden, renal disease, women with a family history of pre-eclampsia, obese women and women who have had several pregnancies are also more likely to develop pre-eclampsia (twins or multiple birth). Having had pre-eclampsia in a prior pregnancy is the single greatest risk for getting the condition.⁵ When a pregnant female has high blood pressure and had 300 mg protein in 24 hours urine sample, she is diagnosed with pre-eclampsia (proteinuria). Although an increase in baseline BP of 30 mmHg systolic or 15 mmHg diastolic is not considered diagnostic even though it does not meet the strict criteria of 140/90. "Severe pre-eclampsia" is defined as a blood pressure of 160/110 and associated symptoms.⁶

The use of calcium supplements as a potential strategy to lower a woman's risk of pre-eclampsia is intriguing. The price is reasonable, and it is widely accessible. Furthermore, it is probably safe for the mother and her unborn child, however its safety would need to be clearly shown in pregnant women before any attempt was made to widely implement it in clinical practise.⁷

We have conducted this study to see the efficacy of calcium intake for prevention of preeclampsia in pregnant women and then on the basis of results of this study, we could educate and counsel our general population for the importance of proper calcium intake during pregnancy in order to reduce the mortality and morbidity of both mother and fetus.

MATERIAL AND METHODS

Between April 2021 to October 2021, total 212 Women between 18-35 years of age, having 20 weeks of gestation assessed on LMP, normal blood pressure, no peripheral edema and no proteinuria, women with singleton pregnancy and patients upto para-5 were selected from Department of Obstetrics & Gynecology, MMC General Hospital Peshawar for this randomized

controlled trial. Patients with history of diabetes mellitus, pre-eclampsia, cardiac disease, hepatic dysfunction, patients with chronic renal failure and urolithiasis, history of previous uterine surgery (scarred uterus), patients with para-6 or more and patients with multiple pregnancies (twins and high multiples) were excluded. All selected cases were divided in group A and group B randomly. In the Group A, every case was given 4 tablets (500mg) of calcium per day orally in addition to routine food/diet from the time of enrollment (20 weeks of gestation) till delivery. While in Group B was given only routine food/diet from the time of enrollment (20 weeks of gestation) till delivery. All patients in both groups were followed up fortnightly till the delivery of the baby. Patients were monitored for development of pre-eclampsia i.e. edema feet, hypertension (two consecutive readings of $\geq 140/90$ mmHg six hours apart) and proteinuria (≥ 500 mg/24 hours), and efficacy was declared as yes on the basis of non-development of preeclampsia after 20 weeks of gestation in pregnant women till the delivery of baby, otherwise considered as no. Findings were noted on pre-designed Performa.

SPSS version 20 was used to analyze the collected data. Age and gestational age was presented in form of mean and SD, while categorical variables were presented in form of frequencies.

RESULTS

In group A (calcium intake group) & B (without calcium intake group), mean age was 23.15 ± 6.68 years and 23.41 ± 6.05 years respectively. Most of the patients 115 (54.25%) were between 18 to 25 years. (Table I). Mean gestational age was 33.82 ± 4.35 weeks. The mean gestational age in group A was 34.71 ± 4.73 weeks and in group B was 33.42 ± 4.83 weeks. Percentage of patients according to parity in both groups has shown in Table II. Majority of women i.e. 75 (35.38%) were para-2.

Table-I: Age distribution for both groups.

Age (years)	Group A		Group B		Total	
	N	%	N	%	No. of patients	%age
18-25	58	54.72	57	53.77	115	54.25
26-30	29	27.36	31	29.24	60	28.30
31-35	19	17.92	18	16.98	37	17.45
Mean \pm SD	23.15 ± 6.68		23.41 ± 6.05		23.37 ± 6.32	

There was development of pre-eclampsia in 07 (6.60%) patients and no pre-eclampsia in 99 (93.40%) patients in study

Group A, in Group B, it was seen in 19 (17.92%) and 87 (82.08%) patients respectively. So, efficacy of calcium intake in preventing preeclampsia was 93.40% as shown in Table III. Stratification of age, parity and gestational age according to development of preeclampsia in both groups has shown in Table IV, V and VI respectively.

Table II: Frequency of patients according to parity in both groups.

Parity	Group A		Group B		Total	
	N	%	N	%	N	%
1	28	26.42	29	25.36	57	26.89
2	36	33.96	39	36.79	75	35.38
3	26	24.53	23	21.70	49	23.11
4	12	11.32	10	9.43	22	10.38
5	04	3.77	05	4.72	09	4.25

Table III: Comparison of development of preeclampsia between both Groups (n=212).

		Group A (n=106)		Group B (n=106)	
		N	%	N	%
PRE-ECLMAPSIA	Yes	99	93.40	87	82.08
	No	07	6.60	19	17.92

P = 0.012

Table IV: Stratification of age according to development of preeclampsia.

Age of patients	Group A		Group B		p-value
	Development of preeclampsia		Development of preeclampsia		
	Yes	No	Yes	No	
18-25 years	04 (6.90%)	54 (93.10%)	09 (15.79%)	48 (84.21%)	0.132
26-30 years	02 (6.90%)	27 (93.10%)	06 (19.35%)	25 (80.65%)	0.156
31-35 years	01 (5.26%)	18 (94.74%)	03 (16.67%)	15 (83.33%)	0.264

Table V: Stratification of parity according to development of preeclampsia.

Parity	Group A		Group B		p-value
	Development of preeclampsia		Development of preeclampsia		
	Yes	No	Yes	No	
1	04 (14.29%)	24 (85.71%)	11 (77.27%)	18 (22.73%)	0.043
2	02 (5.56%)	34 (94.44%)	05 (72.34%)	34 (27.66%)	0.280
3	01 (3.85%)	25 (96.15%)	02 (8.70%)	21 (91.30%)	0.480
4	00 (0.0%)	12 (100.0%)	01 (10.0%)	09 (90.0%)	0.262
5	00 (0.0%)	04 (100.0%)	00 (0.0%)	05 (100.0%)	--

Table VI: Stratification of gestational age according to development of preeclampsia.

Gestational Age	Group A		Group B		p-value
	Development of Preeclampsia		Development of Preeclampsia		
	Yes	No	Yes	No	
20-30 weeks	02 (3.70%)	52 (96.30%)	07 (13.46%)	45 (86.54%)	0.072
>30 weeks	05 (9.62%)	47 (90.38%)	12 (22.22%)	42 (77.78%)	0.077

DISCUSSION

This study was aimed to compare the efficacy in term of prevention of preeclampsia in patients with calcium intake versus without calcium intake. Mean age was 23.37 ± 6.32 years and most of the patients belonged to age group 18-25 years. There was development of pre-eclampsia in 07 (6.60%) patients and no pre-eclampsia in 99 (93.40%) patients in study Group A, in Group B, it was seen in 19 (17.92%) and 87 (82.08%) patients respectively. Taherian AA et al⁸ reported in their study mean age as 22 years which is in consistent with our study. On the other hand, Singla P et al⁹ had found a little lower mean age i.e. 20 years. At first pregnancy, Pre-eclampsia is very common and decreased at 2nd pregnancy.¹⁰ In a study conducted by Villar J et al¹² showed that incidence of preeclampsia in the calcium intake was 4.1%. In another study conducted by Lopez-Jaramillo P et al¹³ showed that incidence of preeclampsia in patients without calcium intake was 15.5%. Study by Taherian AA et al¹⁴ showed that there was

statistically significant difference between the calcium and control groups for reducing the frequency of preeclampsia. However, results of a clinical trial done by Levine RJ et al¹⁵ are not in agreement with our results. In another meta-analysis conducted by Patrelli TS et al¹ concluded that during pregnancy, intake of calcium significantly reduced the frequency of preeclampsia. Similar results were also found in a recent review by Hofmeyr GJ et al¹⁶ in their study. Singla P et al¹⁷ has also observed a significant negative correlation between serum Calcium levels and blood pressure. The results of our study are also in accordance with the findings of a meta-analysis done by Bucher HC et al¹⁸ in which they found an inverse relationship between blood pressure and calcium supplementation.

CONCLUSION

This study concluded that calcium intake during pregnancy is associated with higher efficacy in preventing pre-eclampsia compared to those without calcium intake. So, we recommend that in areas where dietary calcium intake is low, patients should be encouraged to take calcium supplementation during pregnancy in order to reduce the mortality and morbidity of both mother and fetus.

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