

A COMPARATIVE STUDY OF SERUM URIC ACID, CALCIUM AND MAGNESIUM IN PREECLAMPSIA AND NORMAL PREGNANCY

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ABSTRACT

The aim of study was to evaluate and compare serum uric acid, calcium and magnesium in pre eclamptic women (mild and severe) and normal pregnant women. A cross sectional case control study was conducted in Civil Hospital Ahmedabad with 90 subjects. The studied population consisted: group I (30 normal pregnant women), group II (30 pregnant women with mild preeclampsia) and group III (30 pregnant women with sever preeclampsia). Their serum uric acid, magnesium and calcium levels were measured by fully automated analyzer ERBA XL-640. During study we found significantly high uric acid level in severe preeclamptic women as compare to normal pregnant and mild preeclamptic women ($p < 0.05$). Also there is significantly low serum magnesium & serum calcium level in severe preeclamptic women as compare to normal pregnant and mild preeclamptic women ($p < 0.05$). There was no significant difference found between normal and mild preeclamptic women ($p > 0.05$).

Key Words : Uric Acid, Calcium, Magnesium, Preeclampsia

INTRODUCTION

Preeclampsia is one of the most common causes of maternal and foetal morbidity and mortality during pregnancy¹. Its incidence is 4-8% of pregnancies². Exact etiology of preeclampsia is still not known but certain hypothesis suggest that it may be associated with an increased vascular resistance of uterine artery and decrease perfusion of placenta³. Many clinical studies show the relationship between hypertensive complication and changes in concentration of various biochemical parameters such as serum uric acid, calcium and magnesium in preeclamptic women⁴⁻⁸.

Physiologically calcium plays an important role in muscle contraction and regulation of water balance in cells. The lowering of serum calcium and the increase of intracellular calcium can cause an elevation of blood pressure in preeclamptic mothers. Magnesium has been known as an essential cofactor for many enzyme systems. It also plays an important role in neurochemical transmission and peripheral vasodilatation. Besides serum calcium and serum magnesium, the hyperuricemia is believed to result from the decreased renal excretion that occurs as a consequence of the preeclampsia and also increased

production secondary to tissue ischemia and oxidative stress. Therefore, modification of calcium, magnesium and uric acid metabolism during pregnancy could be one of the potential causes of preeclampsia^{4, 9, 10-14}.

MATERIAL AND METHOD

The cross sectional case control study was conducted in Civil Hospital Ahmedabad during February 2011 to July 2011. The studied population consisted of 60 pregnant women with preeclampsia and 30 normal pregnant women. 60 pregnant women were divided in two groups depending upon blood pressure level and level of proteinuria group II (30 pregnant women with mild preeclampsia) and group III (30 pregnant women with sever preeclampsia). Mild preeclampsia is defined a blood pressure of at least 140/90 mmHg on two occasions each 6 hours apart accompanied by proteinuria of at least 1+ on dip stick testing I. Severe preeclampsia is defined as a blood pressure of at least 160/110 mmHg on two occasions each 6 hours apart accompanied by proteinuria of at least 3+ on dip stick testing. While in group I included the 30 normal pregnant women.

Blood samples were collected from all subjects for serum uric acid, calcium and magnesium. The serum uric acid was done by uricase method¹⁵ in Erba XL640 auto analyzer. Serum magnesium was measured by calmagite method¹⁶ and serum calcium measured by Arsenazo III 17 in Erba XL640 auto analyzer.

Data was analysed to check statistical significance.

In present study, the mean serum uric acid (7.25 ± 1.08) in severe preeclamptic women was more than normal pregnant women

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and mild preeclamptic women. But there was no significant difference between normal pregnant women and mild preeclamptic women. The mean serum calcium (8.6 ± 0.47) and magnesium (1.64 ± 0.35) in severe preeclamptic women was less

than normal pregnant women and mild preeclamptic women. But there was no significant difference between normal pregnant women and mild preeclamptic women.

RESULTS AND OBSERVATION

Table-1: Comparisons of serum calcium, magnesium and uric acid for the different study group

Groups	I (Normal pregnancy)	II (Mild pre eclampsia)	III (Sever pre eclampsia)
Serum uric acid (mg/dl)	5.03 ± 0.73	5.23 ± 0.82	7.25 ± 1.08
Serum calcium (mg/dl)	9.1 ± 0.42	9.04 ± 0.43	8.6 ± 0.47
Serum magnesium (mg/dl)	2.12 ± 0.17	2.17 ± 0.18	1.64 ± 0.35

DISCUSSION

In present study, elevated serum uric acid level due to decrease renal urate excretion is frequently found in women with preeclampsia that correlates well with the previous studies^{9,14}. Soluble uric acid impairs nitric oxide generation in endothelial cell. Thus, hyperuricemia can induce endothelial dysfunction^{18,19}.

Serum calcium and magnesium are two intracellular ions that are very important for cellular metabolism such as muscles contractibility, secretion, neuronal activity as well as cellular death²⁰. Our results show that there are reduced calcium and magnesium level in patient with sever preeclampsia. These findings correlate well with the other studies²⁴⁻²⁶. The effect of serum calcium on changes in blood pressure could be explained by the level of intracellular concentration of calcium. The

increase of intracellular calcium concentration when serum calcium went lower leading to constriction of smooth muscles in blood vessels and increase of vascular resistance^{7,8,13,21-23}.

The hypomagnesaemia in most pregnant women is associated with hemodilution, renal clearance during pregnancy and consumption of minerals by growing foetus. Magnesium levels may have significant effects on cardiac excitability and on vascular tone, contractility and reactivity^{11,12}. The consequences of low magnesium may lead to a reduction in cerebral blood flow, cerebral vasospasm and increase in neuronal burst. Macdonald et al²⁷ have shown experimentally that magnesium has a vasoprotective effect. And this explains the use of magnesium sulphate as a neuroprotectant and antivasospastic agent.

These finding support that hyperuricemia, hypocalcemia and hypomagnesemia correlate to sever preeclampsia.

Figure-1 : Showing mean±SD of Serum Uric Acid & Diff. Groups

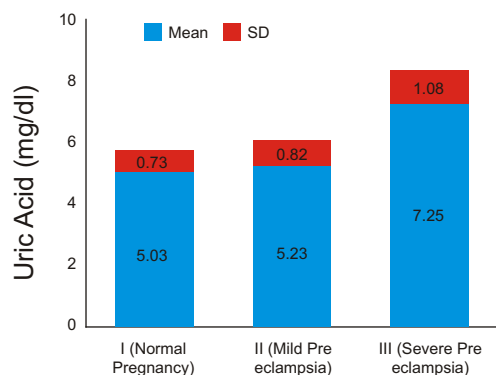
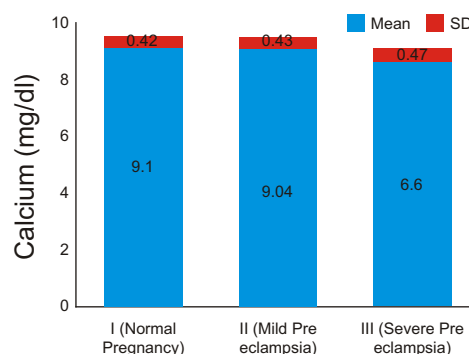


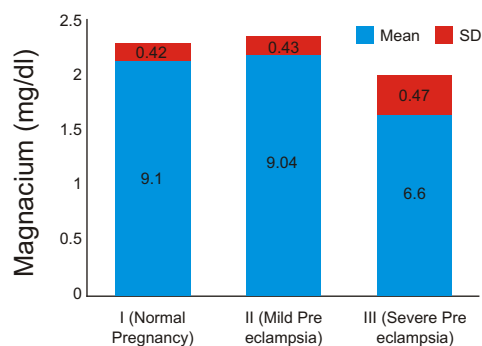
Figure-2 : Showing mean±SD of Serum Calcium & Diff. Groups



Group I versus Group II, $p > 0.05$ (not significant)

Group I versus Group III, $p < 0.05$ (significant)

Figure-3 : Showing mean±SD of Serum Magnesium & Diff. Groups



Group I versus Group II, $p > 0.05$ (not significant)

Group I versus Group III, $p < 0.05$ (significant)

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