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RESEARCH ARTICLE

STUDY OF SERUM CALCIUM, MAGNESIUM AND URIC ACID IN PREECLAMPSIA AND ITS COMPARISON WITH NORMAL PREGNANCY.

Dr. Chaganti Sridevi¹. and Dr. U.V.P.U. Sowjanya².

1. M.D. Assistant professor, Department of Biochemistry, Sree Balaji medical college and hospital, Chromepet, Chennai, Tamil Nadu 600044.
2. M.D. Assistant professor, Department of Biochemistry, NRI institute of medical sciences, Sangivalasa, Visakhapatnam, Andhra Pradesh 531162.

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Key words:-

Pre-eclampsia, Normal pregnancy, calcium, magnesium, uric acid.

Abstract

Preeclampsia is one of the common causes of maternal and foetal morbidities and mortalities. Its incidence is 4-8% of pregnancies. Preeclampsia is defined as the triad of hypertension, proteinuria and oedema occurring after 20 weeks gestation in previously normotensive women. Interestingly, variable serum calcium, magnesium and uric acid levels are found in preeclampsia. The data was collected from normal pregnant women and pre-eclamptic women who were admitted in the Department of Obstetrics and Gynaecology. Samples were collected before commencement of medication and were analysed colorimetrically for calcium, magnesium and uric acid. In pre-eclamptic women Serum calcium, Serum Magnesium were found to be significantly lower ($p < 0.001$) and Serum Uric acid was significantly higher ($p < 0.001$) when compared to normal pregnant women. The findings support that Hypocalcaemia, Hypomagnesaemia and Hyperuricemia correlate to preeclampsia.

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Introduction:-

Preeclampsia is one of the common causes of maternal and foetal morbidities and mortalities. Its incidence is 4-8% of pregnancies. Preeclampsia is defined as the triad of hypertension, proteinuria and oedema occurring after 20 weeks gestation in previously normotensive women. The pathophysiological mechanism is characterized by an increased vascular resistance of the uterine artery and decreased perfusion of placenta. However, the exact aetiology of preeclampsia is still unknown. The results from many studies show the relationship between aggravation of the hypertensive complication and change in concentration of various chemistries in mother's serum. Interestingly, variable serum calcium, magnesium and uric acid levels are found in preeclampsia. On the physiological basis, calcium plays an important role in muscle contraction and regulation of water balance in cells. Modification of plasma calcium concentration leads to the alteration of blood pressure. The lowering of serum calcium and the increase of intracellular calcium can cause an elevation of blood pressure in pre-eclamptic mothers. The serum magnesium also decreases in women with pre-eclampsia. Generally, magnesium has been known as an essential cofactor for many enzyme systems. It also plays an important role in neurochemical transmission and peripheral vasodilatation. Magnesium sulphate appears to be safe and effective for the prevention of seizures and has been used as the drug of choice in severe eclampsia

Corresponding Author:- U. V. P. U. Sowjanya.

Address:- Assistant professor, Department of Biochemistry, NRI institute of medical sciences, Sangivalasa, Visakhapatnam, Andhra Pradesh 531162.

Aims & objectives:

To compare serum calcium, magnesium and uric acid levels in pre-eclamptic women and normal pregnant women.

Materials & methods:-

The data was collected from 50 normal age and sex matched pregnant women, 50 pre-eclamptic women who were admitted in the Department of Obstetrics and Gynaecology at King George Hospital Visakhapatnam. Samples were collected before commencement of medication and were analyzed colorimetrically for Calcium (Arsenazo III), Magnesium (Xylidyl Blue) and Uric acid (Uricase method). Consent was taken about their inclusion in the study.

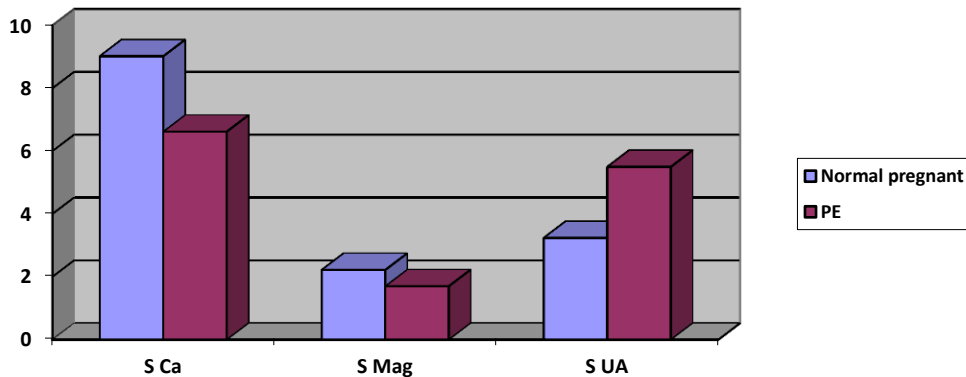
Results & observation:-

In pre-eclamptic women Serum calcium, Serum Magnesium were found to be significantly lower ($p < 0.001$) and Serum Uric acid was significantly higher ($p < 0.001$) when compared to normal pregnant women.

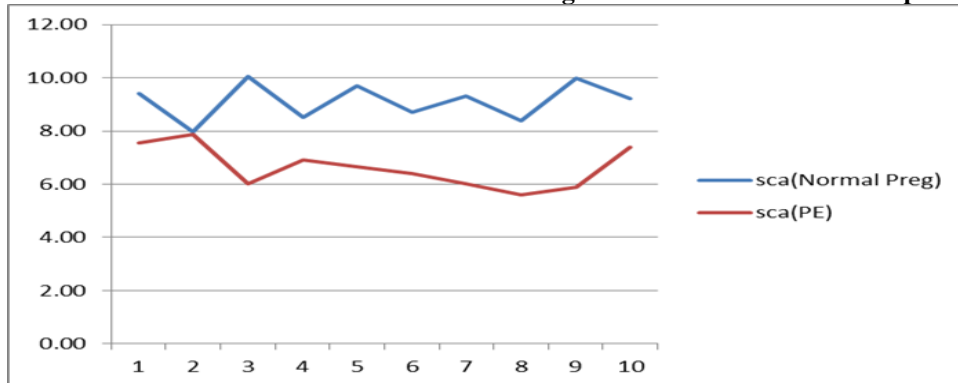
Serum levels of Calcium and Magnesium and Uric acid of Normal pregnant women (n=50) and Pre eclamptic women (n=50)

Parameters	Normal Pregnant Women(n=50)	Pre Eclamptic Women(n=50)	Z value	P value
Diastolic BP	74±4.89	95±5.27		
Systolic BP	110±7.74	140.8±1.93		
Serum calcium	9.02±0.92	6.6±0.70	6.25	0.0002
Serum magnesium	2.22±0.17	1.7±0.20	5.86	0.0003
Serum uric acid	3.24±0.90	5.5±0.54	6.32	0.0002

Comparison Of Serum Calcium, Magnesium And Uric Acid Levels Between Normal Pregnant Women And Pre Eclamptic Women



Comparison Of Serum Calcium Values Between Normal Pregnant Women And Pre Eclamptic Women



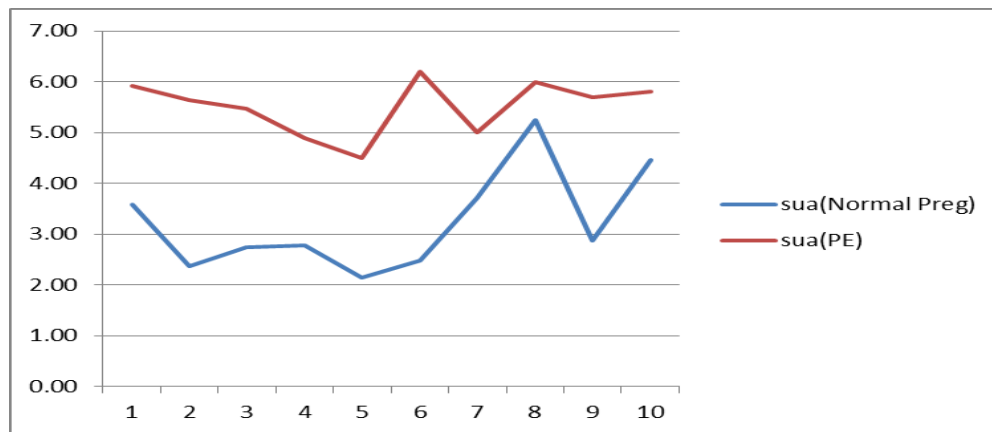
SE(d) = 0.383 by applying Z test $Z > 2$ therefore it is significant

Comparison Of Serum Magnesium Values Between Normal Pregnant Women And Pre Eclamptic Women



SE(d) = 0.088 by applying Z test $Z > 2$ therefore it is significant

Comparison Of Serum Uric Acid Values Between Normal Pregnant Women And Pre Eclamptic Women



SE(d) = 0.359 by applying Z test $Z > 2$ therefore it is significant

Discussion:-

In the present study mean Serum calcium and mean Serum Magnesium levels were found to be decreased in preeclampsia as compared to normal pregnancy. These findings confirmed the hypothesis that Hypocalcaemia and Hypomagnesaemia may be etiologies in development of Preeclampsia.

The mean uric acid levels were more in Preeclampsia than in normal pregnancy. Elevated serum uric acid levels due to decreased renal urate excretion are frequently found in women with Preeclampsia. Soluble uric acid impairs nitric oxide generation in endothelial cells. Thus, hyperuricemia can induce endothelial dysfunction.

Magnesium sulphate is used for treatment of seizure and prophylaxis in women with eclampsia and preeclampsia worldwide. Magnesium may act by opposing calcium - dependent arterial constriction and may also antagonize the increase in intracellular calcium concentration. Aali et al. rejected this idea that magnesium exerts its effect in pre-eclampsia by modulating serum level of ionized calcium. Dietary calcium deficiency has been proposed as a possible cause of pre-eclampsia. In a prospective study, researchers administered two grams of elemental calcium in women after 13 – 21 weeks of pregnancy to assess the role of calcium for preventing preeclampsia. The results of that study showed that calcium supplementation during pregnancy did not prevent pre-eclampsia in healthy nullipara women.

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 led to constriction of smooth muscles in blood vessels and increase of vascular resistance.

These findings support that Hypocalcaemia, Hypomagnesaemia and Hyperuricemia correlate to preeclampsia.

Conclusion:-

This present cross sectional study shows that both serum calcium and serum magnesium levels in pre eclamptic pregnant women are lower than normal pregnant women. Serum Uric acid levels are more in preeclamptic pregnant women. So this study advocates the value of serum calcium, magnesium and uric acid as markers of preeclampsia.

However therapeutic intervention to supplement calcium and magnesium levels in pregnant women for prevention of preeclampsia requires further study.

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