Original Research Article

Serum electrolyte study among patients with preeclampsia at tertiary health care center

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Abstract

Background: Pregnancy induced hypertension is an important cause of fetal and maternal mortality in India. Recently it is proven that serum electrolytes play a role in preeclampsia as it is a vascular endothelial disorder. **Objectives:** To Study profile of serum electrolyte among patients with preeclampsia at tertiary health care center. **Material and Methods:** This was a case control study. 100 subjects were divided into pre eclamaptic cases (50) group I and group II of control (50). All the socio demographic data was asked using a proforma after taking consent. Serum electrolyte test was done on venous blood from all cases. **Results:** The mean SBP and mean DBP in group I was 153.2±3.7 and 104.5±4.1 mm Hg. The mean SBP and DBP in group II was 118.2±2.6 and 74.3±3.4 mm Hg. The mean gestational age for group I was 31.7±2.4 weeks and for group II was 29.1±1.2 weeks. Group I SBP and DBP was significantly higher when compared with groups II. The sodium levels in in group I (143.2 ± 2.3) were significantly higher than group II (135.3 ± 4.01). Similarly potassium, calcium, magnesium levels in group I were significantly lower than levels in group II in this study. **Conclusions:** hypernatremia, hypokalemia, hypocalcaemia and hypomagnesaemia were significantly associated with pre eclampsia, timely serum electrolyte estimation and appropriate treatment might help in improved maternal and fetal outcome in cases with pre eclampsia .

Key Words: Sodium, Potassium, Calcium, Magnesium, Preeclampsia

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INTRODUCTION

Preeclampsia (PE), the gestational hypertensive disorder is a major cause of maternal and foetal morbidity and mortality.[1,2]This disorder generally involves hypertension related conditions occurring primarily during pregnancy or may be pre-existing and which may persist during and or after pregnancy.[3] The incidence rate of the pregnancy induced hypertension is 3-10% globally and about 6% in India.[4-5]Preeclampsia is associated with an increased risk of abruption of placenta, premature birth, intrauterine growth restriction (IUGR of fetus), acute kidney failure, cerebrovascular and cardiovascular complications, disseminated intravascular coagulation, and most serious maternal death.[6]Theories of the pathophysiology of preeclampsia related to both mother and the fetus exist. Though the exact cause of preeclampsia remains unclear, most theories suggest abnormal placental implantation and abnormal trophoblastic invasion as among the possible causes. It has been said that changes in maternal serum ions may be the aggravating cause of elevated blood pressures in preeclampsia.[7]Previous studies have considered the relation between hypertensive disorders of pregnancy and serum electrolytes, particularly Ca^{2+} and magnesium (Mg^{2+})[8-10]. It has been reported that there are reduced levels of Ca^{2+} and Mg^{2+} in pre-eclampsia. Na^{+} and K^{+} also has direct affect on blood pressure.[11,12]In view of the above evidences, the present study was carried out to Study the profile of these electrolytes in cases presenting with preeclampsia at tertiary health care center.

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MATERIAL AND METHODS

This case control study was carried out at ESIC Medical College, Kalaburgi for a period from march to November 2018. Study included total of 100 pregnant women selected from OBGY OPD/ward.50 age matched normal pregnant women were taken as controls and 50 pre eclamptic women were taken as cases. They were divided into two groups namely group I cases (50) with preeclampsia and group II controls (50) with normal pregnancy. The study was approved by hospital's ethics committee. Informed consent was obtained from patients before history taking. After consent detailed history was taken with the help of predesigned proforma. Preeclampsia was defined prior to study.[13]All cases included were aged between 18-35 years and were in their third trimester (gestational age of ≥24 weeks). Patients with systemic disorders like heart failure, kidney disorders, any thyroid disorders, liver problems were excluded from the study. After centrifuge, serum was separated and was assayed for sodium and potassium levels using electrolyte analyser which worked under the principle of potentiometry using ion selective electrode. (B.) Serum calcium by Arsenazo III colorimetric method and serum magnesium by Xylidyl blue method. The results were expressed as Mean ± S.D. Statistical analysis was performed using SPSS software version 20.

RESULTS

Table 1: Distribution as per blood pressure and gestational age

Variables	Group I	Group II	p value
SBP*	153.2±3.7	118.2±2.6	< 0.05
DBP**	104.5±4.1	74.3±3.4	< 0.05
Gestational age (weeks)	31.7±2.4	29.1±1.2	> 0.05

SBP*-Systolic blood pressure DBP** - Diastolic blood pressure

The mean SBP and mean DBP in group I was 153.2±3.7 and 104.5±4.1 mm Hg. The mean SBP and DBP in group II was 118.2±2.6 and 74.3±3.4 mm Hg. The mean gestational age for group I was 31.7±2.4 weeks and for group II was 29.1±1.2 weeks. Group I SBP and DBP was significantly higher when compared with groups II.

Table 2: Distribution a per serum electrolyte profile in study subjects

Variables	Group I/Pre eclampsia	Group II /Normal pregnancy	p value
Sodium (mmol/l)	143.2 ± 2.3	135.3 ± 4.01	< 0.05
Potassium (mmol/l)	3.21± 0.16	3.82±0.22	< 0.05
Calcium (mg/dl)	7.1 ± 0.50	8.2 ± 1.5	< 0.05
Magnesium (mg/dl)	1.11 ± 0.8	1.92 ± 0.12	< 0.05

The sodium levels in in group I (143.2 ± 2.3) were significantly higher than group II (135.3 ± 4.01). Similarly potassium, calcium, magnesium levels in group I were significantly lower than levels in group II in this study.

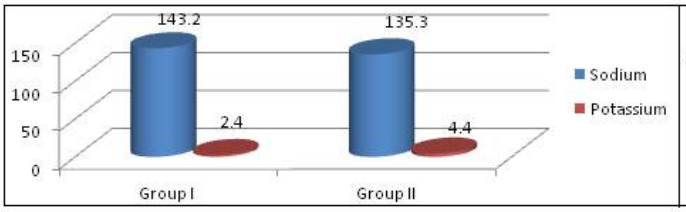

Figure 1: Bar diagram showing sodium and potassium levels

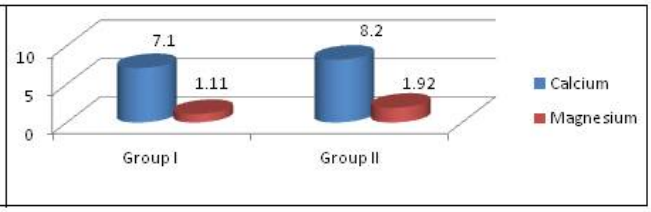

Figure 2: Bar diagram showing calcium and magnesium levels

DISCUSSION

Preeclampsia is associated with sodium retention and changes in the intracellular water and electrolyte concentration. This ultimately responsible for changes seen in pre eclampsia.As per Guly LU *et al*[14]Few obvious changes we see are in serum electrolytes like Na^+, K^+,Ca^{2+} and Mg^{2+}.In this study the mean duration of gestation was found to be 31.7±2.4 weeks and 29.1±1.2 weeks in group I and in group II respectively, there was no any significant statistical association between duration of gestation in these two groups in this study. Ephraim *et al*[15] study mean duration of gestation was found to be 31.92 ± 4.69weeks in controls and 30.72 ± 2.84 weeks in pre eclamptic patients and there was no any significant association between two groups. This was in accordance with our study.The mean SBP in group I and II was found to be 153.2±3.7 mmHg and 118.2±2.6mm Hg respectively. Here the group I mean SBP was significantly higher when compared with group II. Similarly there was significant association between mean DBP in two groups, in group I it was 104.5±4.1 mm Hg and in group II it was 74.3±3.4 mm Hg. This finding was

supported by Darkwa O *et al*[16], Tabassum H *et al*[17] and Ephraim *et al*.[15]In this study serum Na+ levels were found to be significantly raised in pre eclampsia cases than in normal pregnant women. The possible mechanism behind this hypernatremia in our study was may be due to the fact that vasoconstriction in pre eclampsia cases leads to decrease in glomerular filtration rate and stimulation of renin angiotensin aldosterone system that send signals to retain sodium from urine. Though the mechanism of hypernatremia is not clear.[18]Preeclampsia is accompanied by amplification of the sodium retention that is a feature ofnormal pregnancy.[12] In this study hypernatremia was significantly associated with pre eclampsia. Similar results were seen in studies done by Priso EB *et al*[19], Yussif MN *et al*[20], and Bhaskar N *et al*.[21] Hypokalemia in this study in group I was significantly associated with pre eclampsia. These hypokalemic changes are said to be due to elevated levels of aldosterol (14). This was in accordance with Uma S *et al*[1] Priso EB *et al*[19], Anjum KS *et al*[22] and Tabassum H *et al*[17]. In this study hypocalcaemia was significantly associated with pre eclampsia. Renin related wih hypocalcaemia causes increase in blood pressure. Similar was seen with Ephraim *et al*[15], Iwamoto T *et al*[23]. Hypomagnesaemia found to be significantly associated with pre eclampsia, low Mg^{2+} is known for increasing blood pressure by contracting smooth muscles. This was in accordance with Sayyed A *et al*[9], Handwerker SM *et al*[24]

CONCLUSION

The present study we can conclude that hypernatremia, hypokalemia, hypocalcaemia and hypomagnesaemia was found to be significant with pre eclampsia cases, this might have some role to play in progression of preeclampsia. Serum electrolyte profile might help saving mothers lives suffering from pre eclampsia by guiding us about severity of underline disease.

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