



Study of serum electrolytes in preeclampsia

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DR. DHOKIKAR GAJANAN D.¹

DR. BIRLA VARSHA H.²

DR. INGALE PRAMOD W.³

DR. BENDE SPOORTI P.⁴

DR. KADAM PRAGATI S.⁵

¹Assistant Professor

²MD Biochemistry

³Professor and HOD

^{4,5}Junior Resident

^{1,4,5} Department of Biochemistry, Government Medical College and Hospital, Aurangabad

^{2,3} Department of Biochemistry, LTM Medical College, Sion, Mumbai

Corresponding Author:



Dr. Gajanan D. Dhokikar
 Flat no.8, BRJ Plaza,
 Siddhivinayak nagar, Taroda,
 Nanded-431605
 (Maharashtra, India)

+917738898918

gajandhokikar@gmail.com

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Abstract:

Background - Preeclampsia is defined as the triad of hypertension, proteinuria and edema occurring after 20 weeks gestation in a previously normotensive woman. It is specific to human pregnancy and complicate 6 – 8 % of gestation after week 20. Preeclampsia is still one of the leading causes of maternal and fetal morbidity and mortality. Since the electrolytes sodium and potassium contribute significantly in the functioning of the vascular smooth muscles, the present study was designed to evaluate their role in the preeclampsia and compare it with that of normotensive pregnant controls. **Material & Methods:** In this case-control study serum electrolyte status was investigated in two groups: one with newly diagnosed cases of preeclampsia PE ($n = 50$) and the other of healthy primigravida as controls ($n = 50$) of same gestational age. Serum sodium and serum potassium levels were measured. Data was analyzed by Students Unpaired t test. **Results** demonstrated that difference for serum electrolytes, for sodium and potassium between cases (mean 138 ± 4.03 mEq/L, mean 4.0 ± 0.5 mEq/L) & controls (mean 137 ± 6.52 mEq/L, mean 3.9 ± 0.312 mEq/L) respectively, were not statistically significant (P value >0.05). **Conclusion-** we do not found significant difference in the Serum electrolyte status i.e. serum sodium and serum potassium levels in preeclampsia patients and normotensive controls.

Key words: Serum electrolytes, serum sodium, serum potassium, Preeclampsia.

Introduction:

Pregnancy is a physiological state associated with many alterations in metabolic, biochemical, physiological, haematological and immunological processes. If there are no complications, all these changes are reversible following a few days to a few months after delivery.^{1,2}

Hypertensive disorders of pregnancy and their complications rank as one of the major cause of

maternal mortality and morbidity in the world after obstetric haemorrhage, pre-existing medical disorders, sepsis and abortions.^{1,3} In addition, as it is strongly associated with foetal growth retardation and prematurity, it also contributes largely to perinatal mortality and morbidity.^{1,4}

Hypertension during pregnancy is defined as diastolic blood pressure more than 90 mmHg on 2 occasions more than 4 hrs apart or a single reading

of diastolic blood pressure more than 110mmHg.^{5,6} Hypertensive disorders during pregnancy occur in women with pre-existing primary or secondary chronic hypertension, and in others who develop new-onset hypertension in the second half of pregnancy. If this hypertension is associated with proteinuria and oedema it is known as preeclampsia. Family history of essential hypertension is a risk factor in development of preeclampsia and there may also be relationship between preeclampsia and metabolic syndrome.^{5,7,8} The worldwide prevalence of preeclampsia is 9% and in India it is 8-10%. Preeclampsia is mainly a disease of primigravida. The incidence is 14.1% in primigravida versus 5.7% in multigravida.^{5,9}

In preeclampsia there is marked increase in response to vasopressin, norepinephrine and to angiotensin. It is the increased responsiveness of the arterial systems to pressure substances which probably causes the generalized vasoconstriction and hypertension in preeclampsia.⁵ Since the electrolytes sodium and potassium contribute significantly in the functioning of the vascular smooth muscles, the present study was designed to evaluate their role in the preeclampsia. Numerous studies are available in literature describing complex dependence of electrolyte concentrations in respect of normotensive and preeclamptic women. Results of various studies are contradictory and confusing. So the present study was done.

Material and methods:

The study was conducted at the Department of Biochemistry, in a tertiary care centre hospital, after being approved by the Institutional Ethics committee. An informed consent was signed by all the participating women. Serum electrolytes were investigated in two groups of pregnant women: one with preeclampsia PE ($n = 50$) and the other of healthy pregnant women ($n = 50$).

The second and third trimester primigravida patients attending the obstetrics OPDs for routine follow up

and patients from obstetrics ward were enrolled for the study. Subjects were grouped into two groups.

Inclusion Criteria: The Study group included primigravida patients > 20weeks gestation with proteinuria with BP \geq 140/90mmHg and the Control group included primigravida women > 20weeks gestation normotensive and nonproteinuric. The common inclusion criteria for both groups were: singleton pregnancy, normal foetal morphology and the absence of concomitant disease and gestation between >20 and < 36 gestational weeks.

Exclusion Criteria: (For both the groups) Multiple Pregnancy, Previous History Of Abortion, Hypertension, Diabetes Mellitus, Cardiac illness, Gestational trophoblastic diseases, High grade fever or Any Concomitant illness.

The fasting blood samples were collected in plain evacuated tubes. Samples were transferred to the laboratory where serum was separated and tests were performed.

Results of Preeclampsia (PE) group were compared with the results of control group of healthy pregnant women group, matched for age and gestation.

Serum electrolytes were measured by ion selective electrodes (ISE) on Olympus AU400 Fully automated chemistry analyzer.

Statistical analysis:

For each parameter studied, mean and standard deviation was calculated to estimate the significance. The difference between the groups was measured by Students Unpaired 't' test. P Value less than 0.05 considered as statistically significant. The calculations were performed using the statistical program SPSS for Windows Version 13, with a p value of < 0.05 considered significant.

Results:

The descriptive information of the study and control groups is as follows-

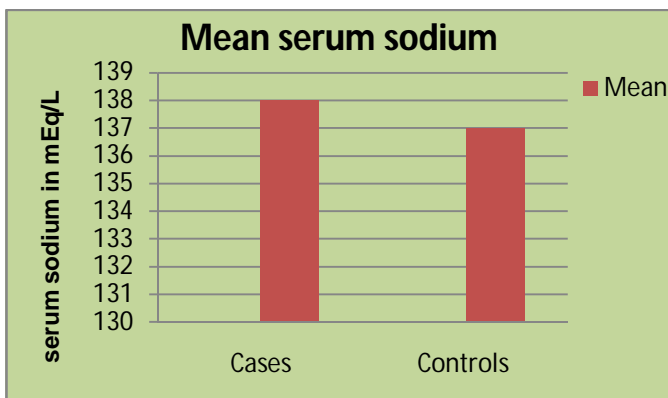
Majority of subjects belonged to age group between 22-26 years. The period of gestation of all subjects was between 26-36 weeks. All the subjects in both the groups were primigravida patients. Our results

demonstrated that difference between demographic characteristics between cases and controls was not statistically significant.

Table 1: Descriptive Information of Subjects

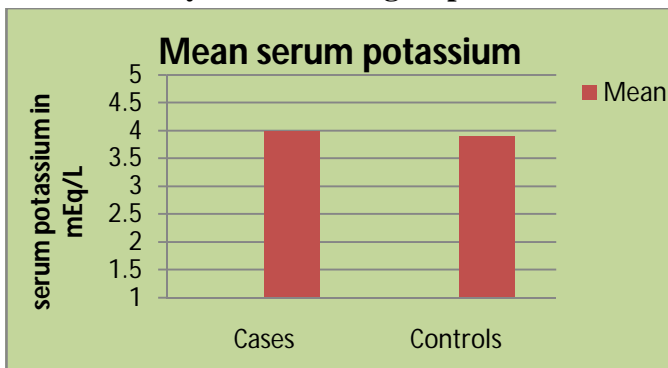
		Cases (n= 50)	Controls (n= 50)
Age(years)	Mean±SD	25.4 ± 3.84	24.6 ± 3.62
Gestational age in weeks	Mean±SD	33.1 ± 2.9	32 ± 2.6

Figure 1: Comparison of Serum Sodium between Study and Control group



The serum Sodium levels were within reference range for both the groups. There was not much difference between mean values of both the groups. (Cases mean 138 ± 4.03 mEq/L & controls mean 137 ± 6.52 mEq/L) (P value =0.35)The difference was statistically non-significant.

Figure 2: Comparison of Serum Potassium between Study and Control group



The serum Potassium levels were within reference range for both the groups. There was not much difference between mean values of both the groups. (Cases mean 4.0±0.5 mEq/L & controls mean 3.9±0.312 mEq/L) (P value=0.23)The difference was statistically non-significant.

Discussion:

Preeclampsia has been labeled as a dreaded disease affecting women and their pregnancy right from ancient times.^{1,10,11} The numerous complications associated with it have triggered a phobia in pregnant women and aroused the interest of Obstetricians everywhere.¹⁰ Preeclampsia is a pregnancy specific condition that increases maternal and infant morbidity and mortality.^{12,13} It is proposed to be a two stage disease, stage I is characterized by reduction in perfusion and stage II is a maternal syndrome. A predominant pathophysiological factor is critically reduced perfusion of all the organs, may be due to vasoconstriction, microthrombi formation and reduced circulating plasma volume.^{12,14} Preeclampsia is a multifactorial process and involves multiorgan dysfunction with no individual factor strictly essential or sufficient for causing it^{5,10} Thus estimation of electrolytes in preeclampsia provides a very useful index for the study of physiological and pathological changes during pregnancy.^{10,15} Primary hypertension results from the interplay of internal derangements (primarily in the kidney) and the external environment.^{16,17} Numerous studies show an adverse effect of serum sodium on arterial pressure.^{16,18,19,20,21}

In our study we found Sodium levels within reference range for both the groups. There was not much difference between mean values of both the groups. The difference was statistically non-significant.

Our results were in accordance with Singh H J et al²², Khan MY et al²³, Obembe O et al²⁴ and Beras S et al²⁵ which showed no significant change in serum sodium in preeclampsia.

Our results were not in accordance with the studies conducted by Indumati K et al¹⁵, Anjum K Sayyed et al¹⁰, T Sunitha et al⁵ and Magna Manjareeka et al.²⁶ Of these Indumati et al¹⁵, Searcy et al²⁷ and Pitkin RM et al²⁸ found decrease in serum sodium levels whereas Anjum K Sayyed et al¹⁰, T Sunitha et al⁵ and Magna Manjareeka et al²⁶ found increase in serum sodium levels in preeclampsia. So we do not found any significant change in serum sodium levels in preeclampsia.

In our study we found serum potassium levels within reference range for both the groups. There was not much difference between mean values of both the groups. The difference was not statistically significant. Our results were in accordance with the studies conducted by Singh H J et al²², Khan MY et al²³, Obembe O et al²⁴ and Beras S et al²⁵ which showed no significant change in serum potassium in preeclampsia.

Our results were not in accordance with the studies conducted by Indumati K et al¹⁵, Anjum K Sayyed et al¹⁰ and Magna Manjareeka et al.²⁶ Indumati et al, Anjum K Sayyed et al and Magna Manjareeka et al found decrease in serum potassium levels in preeclampsia. So we do not found any significant change in serum potassium levels in preeclampsia.

Conclusion:

We do not found significant difference in the Serum electrolyte status i.e. serum sodium and serum potassium levels in preeclampsia patients and normotensive controls. The serum electrolytes were within reference range in preeclampsia cases.

Conflict of interest: Authors declare no conflicts of interest.

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