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Original Research Article

A COMPARATIVE STUDY OF SERUM SODIUM, POTASSIUM & LIPID PROFILE IN PREECLAMPSIA AND NORMOTENSIVE PREGNANT WOMEN ATTENDING A TERTIARY CARE HOSPITAL OF TRIPURA

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Abstract

Background: Preeclampsia was a progressive, multisystemic and multifactorial pregnancy specific disorder, it was one of the major challenges for the obstetrician to combat this complication. **Materials and Methods:** In this hospital based observational Cross-sectional study, we have included 70 preeclamptic patients as cases and 70 normal pregnant women in the control group. Current study was aimed to estimate and compare the levels of serum sodium, potassium and lipid profile(Cholesterol, Triglyceride & HDL) among women with preeclampsia and normotensive pregnant women attending Dept. Of Obstetrics & Gynaecology at AGMC. These tests were done by ISE based Easylyte electrolyte auto analyser & XL-640 Fully Automated Autoanalyzer. Pearson's correlation coefficient and independent sample 't' test were used for statistical analysis. **Result:** Serum potassium, cholesterol & triglyceride were significantly higher in preeclamptic patients compared to normotensive pregnant women and all shows positive correlation with systolic blood pressure & diastolic blood pressure whereas sodium & HDL were significantly lower in preeclamptic patients and shows negative correlation. **Conclusion:** The measurement of serum sodium, potassium and lipid profile may be helpful for pregnant women during screening in Antenatal check up to prevent risk of preeclampsia.

INTRODUCTION

Preeclampsia is a pregnancy specific hypertensive disorder and if left untreated exerts serious medical complications of pregnancy culminating in maternal as well as perinatal morbidity and mortality worldwide. A progressive multisystem disorder of unknown etiology characterized by the development of new onset of hypertension to the extent of 140/90 mm Hg or more with proteinuria ≥ 300 mg per 24 hours or urinary protein to creatinine ratio ≥ 0.3 or dipstick 1+ persistent after 20 weeks of gestation in a previously normotensive and nonproteinuric pregnant woman.[1] Though the etiology of preeclampsia is still unclear, many theories suggest that abnormal placental implantation and abnormal trophoblastic invasion may be the possible causes of it. In India, the incidence of preeclampsia is reported to be 8-10% among pregnant women. According to a study, the prevalence of hypertensive disorders of pregnancy was 7-8% with preeclampsia in the study population in India.[2] Though the molecular basis of preeclampsia is unresolved in literature, it has been postulated that fluctuations in maternal serum ions may be the precipitating cause of elevated blood pressure.[3] In preeclampsia there is alteration in cell membrane sodium transport leading to extravascular accumulation of sodium with a reduced plasma sodium level. Potassium ion is the most prevalent cation in the human body. The small extracellular potassium pool is controlled by exterior intake, internal redistribution and excretion. In normal persons approximately 90% of dietary potassium is absorbed and excreted via kidneys.[4] Abnormal lipid profile may have a role in promotion of oxidative stress and vascular dysfunction seen in preeclampsia. Predominantly the atherogenic small low density lipoproteins (LDL) and vascular cell adhesion molecules (VCAM) are increased in association with hyperlipidemia in preeclampsia.[5]

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MATERIALS AND METHODS

A hospital based observational Cross sectional study which was conducted in the Department of Biochemistry, in collaboration with the Department of Obstetrics & Gynaecology, AGMC & GBP Hospital from July 2021 to June 2023 among the pregnant women attending the Department of Obstetrics & Gynaecology after 20 weeks of gestation. Sample size was calculated by openepi software & 70 (Seventy) in the study group and 70 (Seventy) in the control group were taken as sample. Measurement of Analytes-Estimation of serum sodium & potassium were done by ISE based Easylyte electrolyte auto analyser and lipid profile were done by XL-640 Fully automated Autoanalyzer. Serum cholesterol was measured by CHOD-PAP Method, triglyceride measured by GPO Method and HDL measured by Immunoinhibition enzymatic Method.

Statistics- Data entry and analysis was performed using SPSS 27 in windows PC & student t- test for testing the significance of difference between two means.Correlation analysis was done by Karl Pearson's correlation coefficient.p-value less than 0.05 were considered statistically significant.
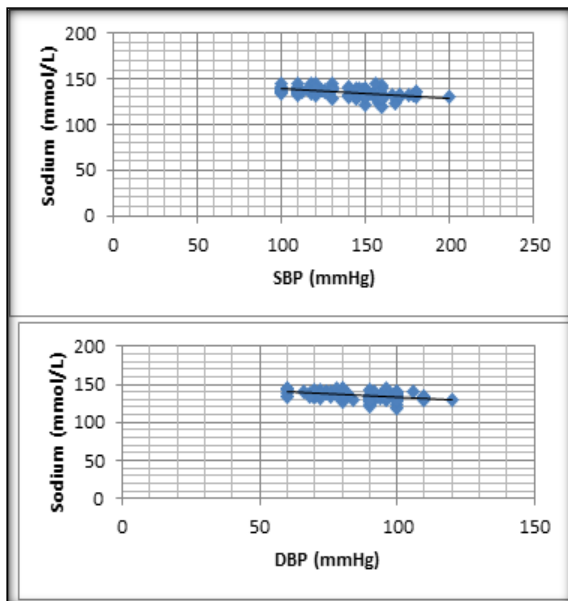
RESULTS

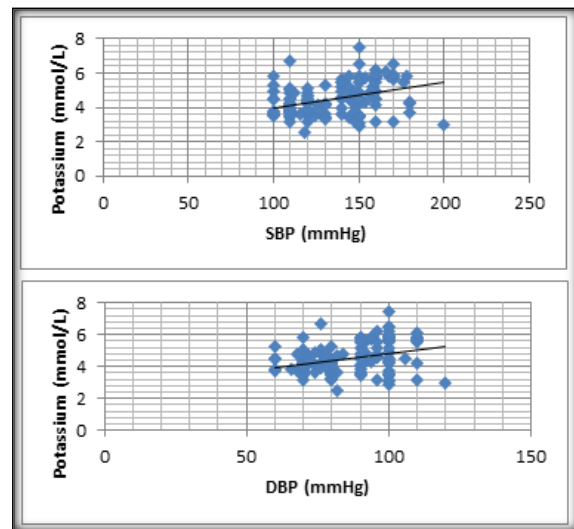**Figure 1: Correlation between Sodium (mmol/L) and Systolic blood pressure and Diastolic blood pressure**

Figure 2: Correlation between Potassium (mmol/L) and systolic blood pressure & Diastolic blood pressure
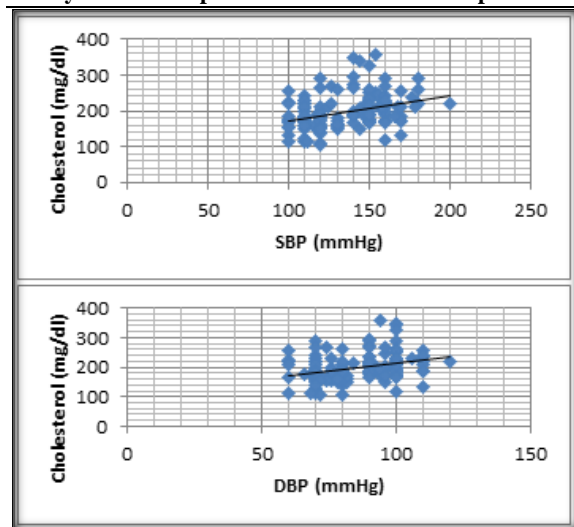

Figure 3: Correlation between Cholesterol (mg/dl) and Systolic blood pressure & Diastolic blood pressure
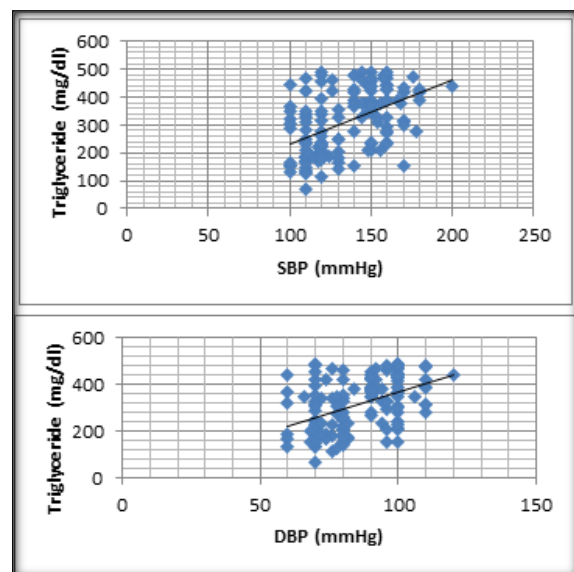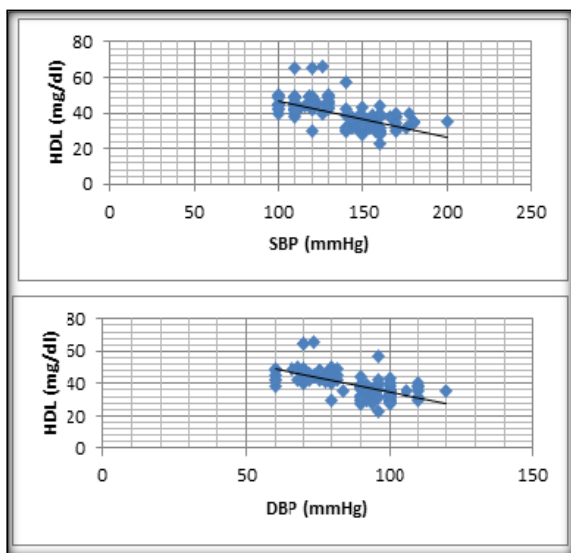

Figure 4: Correlation between Triglyceride(mg/dl) and Systolic blood pressure & Diastolic blood pressure

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Figure 5: Correlation between HDL (mg/dl) and Systolic blood pressure & Diastolic blood pressure

Table 1: Comparison of variables between both the study groups.

Variables	Preeclampsia (Mean ± SD)	Normotensive (Mean ± SD)	P-Value	Significance
Age (Years)	29.74±2.44	22.91±3.34	<0.0001	Highly Significant
POG (Weeks)	34.01±3.04	32.35±2.93	0.0013	Highly Significant
SBP (mmHg)	155.85±12.06	114.57±9.09	<0.0001	Highly Significant
DBP (mmHg)	97.88±6.86	73.54±6.22	<0.0001	Highly Significant

Table 2: Comparison of biochemical parameters between both the study groups

Parameter	Preeclampsia (Mean± SD)	Normotensive (Mean± SD)	p- value	Significance
Sodium (mmol/L)	132.90 ± 5.05	137.67 ± 3.52	<0.0001	Highly Significant
Potassium (mmol/L)	4.88 ± 1.01	4.12 ± 0.66	<0.0001	Highly Significant
Cholesterol (mg/dl)	216.42 ± 47.87	179.45 ± 39.15	<0.0001	Highly Significant
Triglyceride (mg/dl)	372.70±86.74	256.18±104.59	<0.0001	Highly Significant
HDL (mg/dl)	34.40±4.85	45.24±5.42	<0.0001	Highly Significant

Table 3: Correlation of SBP (mmHg) & DBP (mmHg) in all parameters

Variables	SBP (mmHg)	DBP (mmHg)	P -value
Sodium	-0.476	-0.458	<0.0001
Potassium	0.356	0.339	<0.0001
Cholesterol	0.342	0.311	<0.0001
Triglyceride	0.476	0.449	<0.0001
HDL	-0.631	-0.650	<0.0001

DISCUSSION

Maternal age distribution for both the groups was shown in [Table 1] and it shows that mean age of preeclampsia patients is 29.74±2.44 and mean age of normotensive patients is 22.91±3.34 and the p value is <0.001 which was highly significant. Similar findings was observed by Owiredu WK et al,[6] indicating the advanced maternal age posed a substantial risk factor for the development of preeclampsia. Regarding another anthropometric indicator gestational age between cases and control groups were compared in table 1 and it shows [mean ± SD] gestational age of the cases was 34.01 ± 3.04 weeks and of the controls 32.35 ± 2.93 weeks reflecting a statistical difference with a p-value of 0.0013.Our study showed that, the mean SBP (mmHg) was more [155.85±12.06] in cases compared to controls [114.57±9.09] it is statistically significant (p<0.0001) and the mean DBP (mmHg)

was higher [97.88±6.86] in preeclamptic compared to normotensive pregnant women [73.54±6.22] which was statistically significant (p<0.0001) as shown in [Table 1].A similar study conducted by Owusu Darkwa E et al,[7] found that preeclampsia remains a poorly understood complication of pregnancy affecting 5–14% pregnancies worldwide. This was a casecontrol study consisting of 30 preeclamptics and 30 normotensive pregnant women recruited consecutively at their first third trimester pre-natal visit at Korle-Bu Teaching Hospital.
[Table 2] shows that mean Cholesterol (mg/dl) was higher (216.42±47.87) in cases compared to controls [179.45±39.15] & it is statistically significant, the mean Triglyceride (mg/dl) was more (372.70±86.74) in cases compared to controls (256.18±104.59) which was statistically significant. Distribution of mean HDL (mg/dl) among Group was statistically significant. A study conducted by Yadav S et al,[8] found that preeclampsia was

associated with substantial risks for the fetus and the mother. Women with preeclampsia have a significant difference in lipid parameters compared to normal pregnancy. Altered lipid profile also has a potential role in the genesis of endothelial dysfunction and expression of preeclampsia.

[Table 3 and Figure 1-5] shows that all parameters show positive correlation with systolic blood pressure & diastolic blood pressure except sodium and HDL.

CONCLUSION

Preeclampsia was a progressive, multisystemic and multifactorial pregnancy specific disorder. High serum potassium & low serum sodium levels play a significant role in development of preeclampsia. High serum values of triglycerides, total cholesterol and low levels of high-density lipoprotein are all significantly related to risk developing preeclampsia. Other factors not highlighted in this study may also play essential roles in the disease progression. The association of serum lipid profile with gestational proteinuric hypertension was highly suggested to reflect a new diagnostic tool. Altered lipid profile also has a potential role in the genesis of endothelial dysfunction and expression of preeclampsia. Early detection of these lipid parameters may help pregnant patients by preventing maternal and fetal complications in

preeclampsia and was going to aid in better management of preeclampsia.

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