



Plasma fibrinogen in preeclampsia pregnancy

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Abstract

The aims of this study are the evaluation of serum Fibrinogen in preeclampsia and healthy controls; and the relation of Fibrinogen with hypertension. 90 subjects were incorporated in this study, 30 were healthy control with mean age 35.6 years. 60 Preeclampsia case with mean age 32-65 years preeclampsia, wherever all women were more 20 weeks of pregnancy. The blood was separated by centrifuge for evaluation coagulation profile levels and lipid profile. The findings were showed serum Fibrinogen was significantly decreased in preeclampsia than normal ($p < 0.01$). A significant rise in diastolic blood pressure in preeclampsia group ($p < 0.005$), Systolic blood pressure was significantly varied among preeclampsia group ($p < 0.001$). Concerning the lipid profile, only TC was significantly increased in preeclampsia patients than control $p < 0.0001$ while no significant variations in lipid profile were observed between the two pregnant groups. The Fibrinogen is a good indicator for the detection of preeclampsia in pregnant women. New tests are needed for determining the concentration of Fibrinogen in the pregnancy stages.

Keywords: Preeclampsia, Pregnant Women, Fibrinogen.

Introduction

Preeclampsia is a progressive disorder associated with high blood pressure higher than (140/90) mm Hg or more, proteinuria, as well as edema and increases after the sixth month of pregnancy (Jain et al., 2010). Preeclampsia is a common medical complication during pregnancy periods. Preeclampsia incidence during pregnancy was range 2-8 % (Walker et al., 2000; Sibai et al., 2005; Wagner et al., 2004) The third cause of pregnancy-related deaths is preeclampsia, followed by bleeding and obstruction of pregnancy-related causes of death, PE leads to increased risk of acute renal failure, blood clotting, placental plaques and cardiac complications (MacKay et al., 2005). The onset of coagulopathy in pregnancy is often inked with PE (Poon et al., 2019). The HELLP (Hemolysis, Elevated Liver enzymes and Low Platelets) syndrome is a serious complication of PE with coagulopathy characterized by hemolysis, increased enzymes of liver, and decreased platelet count. HELLP syndrome occurs in 0.5 to 0.9% of all pregnancies and in 10–20% of cases with severe PE (Weinstein et al., 1982).

Materials and methods

A total Patients was 90 at age range 18-40 years, they were seen from September 2022 till Feb. 2023 at the primary healthcare center for pregnant women, subjects were divided into two groups according to normal pregnancy: PE group and normal pregnancy. PE group was divided in to subgroups 22 pregnant women with severe PE and 38 with moderate PE. 30 healthy. The questionnaire was filled for all study groups; the patients have not diseased at the time of the study. Venous blood samples were aspirated following 12-hour fasting into two tube; first EDTA tube centrifuged to obtain plasma for the measurement of coagulation profile included fibrinogen shorter activated partial thromboplastin time (aPTT) and prothrombin time (PT). Second tube was plain tubes centrifuged to obtain serum for the measurement of biochemical tests including total serum cholesterol, HDL-cholesterol, LDL- cholesterol, triglyceride and VLDL. PE patients and controls were characterized in terms of age, SPB, DBP, family history of PE, body mass index (BMI), and

duration of disease. The BMI was calculated by dividing weight (kilogram) by the squared height (meter) (National Institute of Health, 1998).

Result and discussion

Characterization of PE in groups under study

The results of TC showed there was a highly significant difference (p<0.001) between PE (254±1.237) and normal pregnancy subjects 200.293±5.296 Table 1. At the first three months, the cholesterol level was associated with the pre-

preeclampsia, however the cholesterol is increased five-fold. The cholesterol level increased 3-60 fold in the risk of pre-eclampsia 8.

SPB and DPB were increased significantly in PE 140/10 compared with normal pregnancy subjects 11/8 at (p<0.001). Our results agreement with (Enquobahrie et al., 2004), they found Pb concentration was positively associated with diastolic and systolic blood pressure (Kasperczyk et al., 2009). The increasing of blood pressure showed in hypertensive women and that similar to our results.

Table 1. Clinical characteristics of patients with PE in the two group-categories considered, data are means +SD

Characteristics	Normal pregnancy	PE	P
Age years	29.8+4.8	32.6+5.8	
Duration	1+1.4	NS
SBP (mmHg)	114.4+5	148.5+16.8	0.003
DBP (mmHg)	74.4+5	97.9+20	NS
BMI (Kg/m)	28.2+4.6	30.7+6.2	NS
Total cholesterol (mg/dl)	200.4 + 30.7	233.5 + 59.8	NS
HDL Cholesterol (mg/dl)	49.6 + 17.7	48.4 + 21.1	NS
LDL Cholesterol (mg/dl)	132 + 2.2	133.6 + 41.3	NS
VLDL (mg/dl)	23.4 + 15.5	33.1 + 18.1	0.023
TG (mg/dl)	112.4 + 77.3	153.4 + 89.7	0.006
Pp*≤0.05,P**≤0.01,a:comparison between HP & sPE,b:comparison bet.HP &mPE,c:comp.bet.m&Spe			

Table 2. Comparison between healthy and preeclamptic women in coagulation profile

Variable	Healthy pregnant N=30	Mild N=38	SeverPE n=22	LSD	P-value
PT(sec)	13.7±1.3	15.6±1.32	15.1±1.37	37.538	0.463
Partial (PTT (sec)	25.09±1.35	25.40±2.40	28.3±0.31	36.24	0.27
Fibrinogen (mg/dl)	447.70±99.74	375.24±4.2 *a	355.25±2.1 *b	42.54	0.002
*Significant 0.05 (P<0.05), **Highly significant, 0.01 (P<0.01) , NS is not significant					

Coagulation profile in plasma of studied groups

Coagulation profile levels in PE and healthy pregnant (HP) women (Mean± SE) shown in Table 2.

Prothrombin time (sec), and Partial PTT (sec) were non-significantly decreased in the normal pregnant cases as compared to those in PE groups (p>0.05) as shown Fig. 1 and Fig. 2.

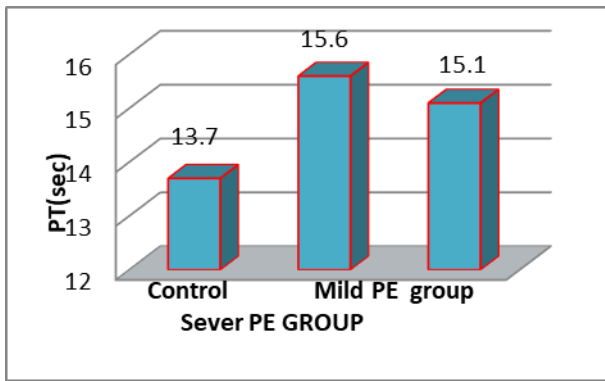


Fig. 1 Comparison between healthy and preeclamptic women in prothrombin time

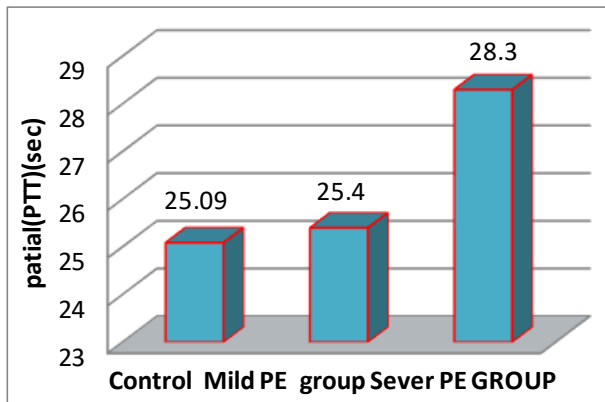


Fig. 2 Comparison between healthy and preeclamptic women in partial prothrombin time

Fibrinogen values were found to be significantly lower in both PE groups when compared to those of the healthy pregnant group ($p < 0.05$), while fibrinogen values were not found to be statistically different between mild and severe PE women shown in Fig. 3.

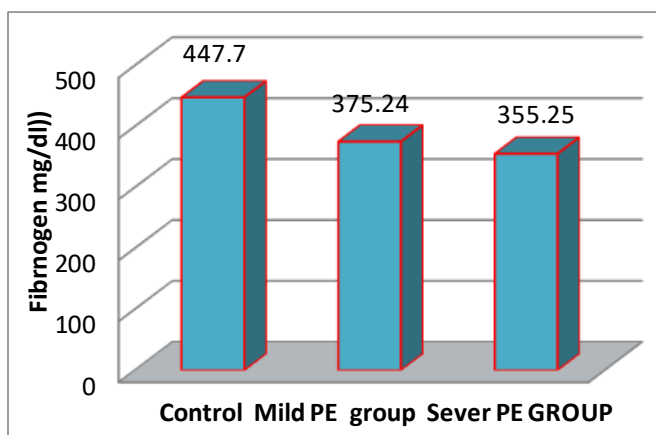


Fig. 3 Comparison between healthy and preeclamptic women in fibrinogen

In our current investigation, we observed a significant decrease in fibrinogen levels among preeclamptic pregnant women compared to healthy pregnant women during the gestational period of 26-33 weeks shown in Fig 3. These findings align with the results reported by Schjetlein et al. (1997).

However, as we analyzed the data for pregnancy weeks 34-40, we did not find any statistically significant difference in fibrinogen levels between the preeclamptic and control groups. To understand these changing fibrinogen levels, we considered two factors.

Firstly, preeclampsia is known to induce systemic inflammation, leading to an increase in fibrinogen levels as it is an acute phase reactant (Schjetlein et al., 1997).

Secondly, in healthy pregnant women, fibrinogen levels are naturally increased due to inflammation. However, in preeclampsia, an exaggerated compensatory coagulation and fibrinolysis response occurs, which can lead to consumption coagulopathy. As a result, fibrinogen levels are normalized or returned to normal values (Üstün et al., 2005).

It is important to note that in our study, all the healthy and preeclamptic pregnant women were in the second trimester. Therefore, the decreased fibrinogen levels in preeclamptic women and increased levels in the control group may be attributed to consumption coagulopathy. In this context, we believe that fibrinogen levels, especially in severe preeclamptic patients, could hold diagnostic significance. Further research in this area may provide valuable insights into its clinical implications.

Plasma fibrinogen level by selected variables with their significance in the studied groups

The mean values for plasma fibrinogen level by selected epidemiological variables in the studied groups with their significance are shown in Table 3. The Table shows that the mean plasma fibrinogen level was higher in PE patients in the age group equal 40 years, in rural residents, in patients with negative history for practising regular physical activity, and in the positive family history of hypertension. However, there were no statistically significant differences between mean plasma fibrinogen level of the subgroups in the studied variables for the studied cases. On the other hand, the table shows that in healthy controls the mean plasma fibrinogen level was lower in subjects aged less than 40 years, in rural residents, in those with negative history for practicing regular physical activity, and had no family history of hypertension. Significant difference was found between mean value for plasma fibrinogen level of the urban and rural residents only.

Table 3. (Mean ± SD) values for baseline plasma fibrinogen level (mg/dl) by selected variables with their significance in the studied groups

Variables		Healthy controls		Cases with PE	
		plasma fibrinogen level Mean±SD (mg/dl)	P Value	plasma fibrinogen level Mean±SD (mg/dl)	P Value
Age (in years)	< 40	45.6 ± 12.5	0.53 ^[NS]	69.7 ± 10.2	0.47 ^{[NS]*}
	30-40	41.0 ± 12.2		67.3 ± 11	
	20-	43.0 ± 12.9		67.5 ± 13.1	
Residence	Rural	48.6 ± 13.2	0.007	68.7 ± 12.3	0.45 ^[NS]
	Urban	40.9 ± 11.5		67.1 ± 12.2	
Physical activity	Negative	43.7 ± 10.9	0.85 ^[NS]	68.4 ± 12.5	0.38 ^[NS]
	Positive	43.2 ± 14.8		66.2 ± 11.3	
Family history of hypertension	Negative	41.8 ± 12.8	0.44 ^[NS]	69.5 ± 13.1	0.05 ^[NS]
	Positive	43.2 ± 10.8		65.3 ± 10.5	

Note: P-value was assessed by independent sample t-test with the exception of those marked by a star (*) in which ANOVA trend test was applied

The relative risk for the effect of independent (explanatory) variables on plasma fibrinogen

For further identification of the putative risk factor (s) that increases the incidence of pc, we recruited the factors of age, duration and other parameters in the Multiple linear regression analysis (multivariate analysis). We can tell from the results that the model was statistically significant p=0.01 and was able to explain 40% of the observed variation in the response (dependent) variable (plasma fibrinogen concentration). After controlling (adjusting) for the role of other independent

(explanatory) variables included in the model, two of them had a statistically significant association with plasma fibrinogen concentration; SBP and serum T- cholesterol (0.057mg/dl and 0.176mg/dl) respectively P=0.005,0.001 respectively Table 4. Women who developed preeclampsia did have increased mean arterial pressure, early measurement of total cholesterol, triglycerides, and non-HDL-C during the second trimester could aid in identifying pregnant women at increased risk of developing preeclampsia (Poon et al., 2008).

Table 4. The multiple linear regression analysis test for the effect of selected independent variables on Fibrinogen level (R2=0.40, P= 0.01)

Parameters	Partial regression coefficient (β)	P
Duration of DM in years	-0.007	NS
Age	-0.011	NS
Body Mass Index (BMI) Kg/m2	0.316	NS
Waist to hip ratio	-2.591	NS
SPB	0.057	0.005
Fasting serum total cholesterol conc. (mg/dl)	-0.176	0.001
Fasting serum triglycerides conc. (mg/dl)	0	NS
serum creatinine	1.73	NS

Conclusions

Plasma fibrinogen is very useful for making screening tool for determining preeclampsia in pregnant women for early detection. Other studies are required for detection protein concentration in the pregnancy period and it included sensitivity and specificity.

Conflict of Interest

The author hereby declares no conflict of interest.

Consent for publication

The author declares that the work has consent for publication.

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