Many researchers have studied various types of parameters related to etiopathogenesis, pathophysiology and progression of preeclampsia focusing on coagulation factors, biochemical and hematological parameters. The aim of this study was to evaluate the changes in coagulation factors, biochemical and hematological parameters in healthy normotensive non-pregnant women, healthy normotensive pregnant women and preeclamptic pregnant women and their comparison to each other. Thus the challenge of any screening test for preeclampsia is to differentiate between those who are and will remain normotensive versus those who appear normal but will develop preeclampsia.

The present study was done for early prediction of preeclampsia. Preeclampsia is a dreaded complication of pregnancy and early prediction of this disease would help in reducing maternal and fetal morbidity and mortality. In India about 8-10% of all pregnancies are affected by preeclampsia. It is a potentially dangerous condition in pregnant women that leads to maternal complications such as eclampsia, DIC, HELLP, placental abruption, failure of liver, kidney etc. This may also cause premature labor, premature birth, growth retardation, convulsions and cerebral palsy in the new born, and sometimes death of mother and fetus.

Normal pregnancy is associated with extensive changes in all aspects of haemostasis, resulting in a shift towards hypercoagulability, which in turn provides maintenance of placental functions and limits blood loss during labor. These all changes are associated with increased coagulation factors and enhanced platelet aggregation, which easily leads to thrombosis. Natural anticoagulants are stimulated by the result of thrombosis during pregnancy. AT III, one of the important natural anticoagulant demonstrates an anticoagulant effect, binding to thrombin. AT III is consumed during normal pregnancy for reducing thrombosis. Thus AT III is reduced as compared to non-pregnant women but with no significant difference. Therefore the body is protected from harmful effects of
coagulation cascade. Normal pregnancy is an inflammatory syndrome which is confirmed by hyperfibrinogenemia. Further elevated hs-CRP, ESR and WBC were found in healthy normotensive pregnant women in our study confirming that pregnancy was an inflammatory syndrome. The reduced fibrinolytic activity has been reported in healthy normotensive pregnant women in this study. This is further confirmed with no significant difference in plasma FDP between non-pregnant and pregnant women.

Statistical analysis of the data indicates that the activity of many clotting factors was significantly elevated in preeclamptic pregnant women over healthy normotensive non-pregnant and healthy normotensive pregnant controls. Preeclampsia is the consequence of a placental dysfunction causing the liberation of numerous substances into the maternal circulation resulting in a maternal systemic hypertension, glomerulonephritis and increased vascular permeability. It is clear that vascular endothelial dysfunction, which may lead to hypertension by imbalance between vasoactive and vasodilator agents, is an important component of this disorder. The induction of endothelial dysfunction is multifactorial. This disorder is found to be associated with generalized fibrin deposition in various organs like liver, placenta and kidney. Thus multiorgan dysfunction leading to deranged organ function tests. This is associated with increased consumption of AT III for further prevention of blood loss thus decreased AT III level was found in preeclamptic pregnant women when compared to healthy normotensive non-pregnant and healthy normotensive pregnant women in our study. Preeclampsia is also an inflammatory syndrome which is more exaggerated as compared to normal pregnancy associated with hyperfibrinogenemia. Also the elevated levels of fibrinogen indicate subsequent endothelial activation and endothelial cell dysfunction in preeclampsia.

Similarly markers of inflammation and tissue damage, hs-CRP and ESR, were found to be elevated in preeclamptic pregnant women as compared to healthy normotensive non-pregnant and healthy normotensive pregnant women. Our study summarized that elevated level of hs-CRP was associated with activation of endothelium and haemostatic system which were the components of systemic inflammatory response. Elevated level of WBC
in preeclamptic pregnant women in our study was found to be associated with inflammation. Although in preeclampsia, increased fibrinolytic activity with raised plasma FDP level has been found in our study. Hence it is summarized that PIH is associated with intravascular coagulation. In preeclamptic pregnant women reduced platelet count was observed as compared to healthy normotensive non-pregnant and healthy normotensive pregnant women suggesting that increased platelet consumption is associated with the disorder. Elevated level of RBC in preeclamptic pregnant women as compared to healthy normotensive non-pregnant and healthy normotensive pregnant women in our study indicates that preeclampsia is associated with reduced placental invasion. Elevated levels of hemoglobin and hematocrit in preeclamptic pregnant women as compared to healthy normotensive non-pregnant and healthy normotensive pregnant women indicate that preeclampsia is associated with hemoconcentration indicating that plasma volume is lowered in preeclamptic pregnancy as compared to healthy pregnancy.

The serum calcium and magnesium in healthy normotensive pregnant women was found to be lowered as compared to healthy normotensive non-pregnant women in our study which summarized the fact that both the intracellular ions were consumed by fetus during pregnancy for supporting fetal bone formation and also increased GFR rate in pregnancy dilutes the cation. Further decreased levels of serum calcium and magnesium in preeclamptic patients as compared to healthy normotensive non-pregnant and pregnant women were found in our study. Thus hypocalcaemia and hypomagnesaemia were associated with hypertension. It was thus concluded that regulation of intracellular calcium and magnesium plays a key role in hypertension.

The endothelial vascular damage is the main cause in the occurrence of preeclampsia associated with increased serum LDH and GGT levels. LDH is therefore considered to be one of the most important biochemical markers that reflect the severity of the occurrence of preeclampsia. Our findings confirmed that liver function tests (ALT/AST/ALP/bilirubin total/total protein/albumin) and renal function tests
(urea/BUN/creatinine/uric acid/UACR) when used as laboratory test panel have significant prognostic value in the prediction of preeclampsia.

Similarly hematological parameters also have significant prognostic value in the prediction of preeclampsia. Normal pregnancy is associated with increased plasma volume which is found to be reduced in preeclampsia. Thus normal pregnancy is hypovolaemia and preeclampsia is a hypervolemia condition with certain hemodynamic changes. One of the hemodynamic changes found in preeclamptic pregnant women is hemoconcentration. This is associated with increased hemoglobin and hematocrit which are reduced in normal pregnant women.

A range of pathological and biochemical changes are seen in the body as a result of which it can have a varied presentation. Failure of the clinicians to appreciate or recognize this is one of the important reasons for the increased maternal morbidity and mortality. **Regular BP checks to prevent future complications, identification of high risk patients, and prompt initiation of therapy and anticipation of complications are some of the measures that should be taken to reduce the mortality rates.**

Therefore, even though preeclampsia manifests itself late in pregnancy, the disease process likely begins very early on in gestation and the entire process may not be immediately reversed by delivery. Unfortunately the swing to conservative management came at a cost for the baby and stillbirths. The risk of fetal compromise remains significant with expectant management, **although advances in fetal surveillance have reduced the risk of fetal death. If delivery is indicated, medical advances have made induction of labor and caesarean section a less risky option for the woman.**