TO STUDY THE EFFECTS OF MATERNAL HYPERTENSION ON THE NEONATAL UMBILICAL CORD HEMOGRAM

THESIS

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(OBSTETRICS & GYNAECOLOGY)

JULY, 2020 **DR. CHAITHRA B V**

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(DECLARATION BY THE CANDIDATE)

DECLARATION

I hereby declare that the thesis titled "**To study the Effects of maternal hypertension on the neonatal umbilical cord hemogram** embodies the original work carried out by the undersigned in All India Institute of Medical Sciences, Jodhpur.

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This is to certify that the thesis titled **"To study the Effects of maternal hypertension on the neonatal umbilical cord hemogram** is the bonafide work of **Dr. Chaithra B V** carried out under our guidance and supervision, in the Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Jodhpur.

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Dedicated to

My Father, Venkateshappa

And

My Mother, Sarojamma

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LIST OF ABBREVIATIONS

Short Form	**Full Form**
PIH	PREGNANCY INDUCED HYPERTENSION
RDW	RED CELL DISTRIBUTION WIDTH
HCT	HEMATOCRIT
PDW	PLATELET DISTRIBUTION WIDTH
TLC	TOTAL LEUCOCYTE COUNT
MCH	MEAN CORPUSCULAR HEMOGLOBIN
MCHC	MEAN CORPUSCULAR HEMOGLOBIN CONCENTRATION
TTNB	TRANSIENT TACHYPNOEA OF NEWBORN
SBP	SYSTOLIC BLOOD PRESSURE
DBP	DIASTOLIC BLOOD PRESSURE
K5	KOROTKOFF SOUND 5
ACOG	AMERICAN COLLEGE OF OBSTETRICS & GYNAECOLOGY

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SUMMARY OF THE PROJECT

Background : The elevation of blood pressure associated with pregnancy is a health problem known as pregnancy induced hypertension (PIH).

In this study, we compared hematological profile of mothers of hypertensive disorders of pregnancy and umbilical cord blood samples to that measured in normotensive pregnants. In addition, possible correlations of hematological parameters between hypertensive mothers and umbilical cord blood was also examined.

Objective :

Primary objective:

- To compare the hematological parameters (hemoglobin , hematocrit, platelets , MCH, MCHC , RDW, PDW , platelests, TLC, neutrophils) of hypertensive mothers and their umbilical cord blood to normotensive pregnant women
- Secondary objective:
- To find out incidence of polycythemia, neonatal jaundice and need for phototherapy in babies of hypertensive and normotensive pregnant women
- To find and compare hematological parameters in gestational hypertension, pre-ecclampsia and ecclampsia

Methods:

This was a prospective cohort study conducted at department of Obstetrics & Gynecology and Neonatology at AIIMS Jodhpur for a period of 2 years. Pregnant women coming to Labour room with hyertension was included. Hypertension in pregnant women was diagnosed according to departmental protocol/ ACOG criteria [which includes- systolic BP of >140 mm Hg and diastolic BP of >90 mm Hg on at-least two readings taken 4 hours apart after 20 weeks of gestation As a control group healthy normotensive pregnant women was included.

Results : Our study shows that 48.3% were primigravida & 51.67 % were multigravida in hypertensive group , and 43.3 % were primigravida & 56.67 % were ,multigravida in normotensive group, shows that 56.67 % were preterm deliveries &

43.33% were term deliveries in hypertensive group , and in normotensive group 25% were preterm deliveries & shows that out of 60 hypertensive patients 32.5 % were gestational hypertension, 0.83% were partial HELLP, 10.83 % were pre-eclampsia with severe features, 5.83% were pre-eclampsia without severe features , Mean total leucocyte count level (12217.5±3482.73) was significantly higher in hypertensive group than that of normotensive group (10861.83±3406.02) (p<0.033), Mean hemoglobin level (16.11±3.29) was significantly higher in umbilical cord blood of hypertensive group than that of normotensive group (14.44±2.59) (p0.002) Mean platelet count (2.32±0.91) was significantly lower in umbilical cord blood of hypertensive group than that of normotensive group (2.69±0.58) (p 0.009) , Mean PDW level (14.07±3.39) was significantly higher in umbilical cord blood of hypertensive group than that of normotensive group (12.7±1.48) (p 0.004), Mean neutrophil count (6588.63±3025.6) was significantly lower in umbilical cord blood of hypertensive group than that of normotensive group (9181.67±1732.25) (p <0.0001), mean RDW levels (32.92±1.31, 32.98±1.87, 32.03±1.54, 34±0.00,) in spectrum of hypertensive disorders of pregnancy (gestational hypertension, PE without severe features , PE with severe feature , partial HELLP) (p value =0.314) is not correlating with severity of hypertension in pregnancy, rate of prematurity 26.67 % in newborns of hypertensive group than that of normotensive group (11.67%) , need of phototherapy in newborns of hypertensive group (35%), than that of normotensive group (18%) (rate is higher in normotensive group also as might be due to dehydration in baby by inefficient feeding practices), the rate of NICU admissions in newborns of hypertensive group (25%)higher than that of normotensive group (1.67%) (p=0.0002), due to higher prematurity rates in hypertensive group.

Conclusion : the mean total leucocyte count higher in mothers of hypertensive group, mean hemoglobin & mean PDW higher in umbilical cord blood of hypertensive group, mean platelets & mean neutrophils lower in umbilical cord blood of hypertensive group.

The rates of prematurity & NICU admissions are higher in newborns of hypertensive group, there is no correlation of RDW , hemoglobin , platelets with severity of hypertension in pregnancy.

INTRODUCTION

The elevation of blood pressure associated with pregnancy is a health problem known as pregnancy induced hypertension (PIH) and affects about one tenth of pregnant women. The prevalence of PIH in northern India conducted in 18 districts and 24 centers is estimated to be 19% to 26% in age groups of 19-23 years and 23-30 years. (1)This problem can develop into a more severe condition called pre-eclampsia that might put the mothers and their pregnancies at risk. Preeclampsia is characterized by hypertension during pregnancy and high protein content in the urine. (1–3) Gestational hypertension and severe preeclampsia can be associated with pronounced hemolysis, disturbance in the levels of hepatic enzymes and changes in blood profile and the subsequently lower gestational age and fetal body weight . (1) Severe preeclampsia might also be associated with disturbance in oxidative balance. (2)cardiovascular problems; genetic defects, metabolic and nutritional abnormalities and others Few studies have examined the impact of preeclampsia on blood biomarkers on mothers and their newborns, which may augment the existing morbidity they suffered. For example, maternal and cord blood levels of homocysteine, lipids and heme oxygenase 1 were higher in preeclampsia as compared to healthy pregnant women. A study by Moraes et al. (4)showed higher levels of immature platelet fraction in preeclampsia. Some studies indicate that measuring hematological markers such as blood cell counts and subtype, might provide prognostic and diagnostic clues of the diseases relevant in both maternal and neonates. In this study, we compared hematological profile in preeclampsia mothers and umbilical cord blood to that measured in normal pregnant ones. In addition, possible correlations of hematological parameters between preeclamptic mothers and cord blood was also examined. The results tested to assess status in preeclampsia women and to predict outcomes in their newborns.

GESTATIONAL HYPERTENSION: according to ACOG

Defined as a systolic blood pressure of 140 mm Hg or more or a diastolic blood pressure of 90 mm Hg or more, or both, on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure. (5)

Gestational hypertension is considered severe when the systolic level reaches 160 mm Hg or the diastolic level reaches 110 mm Hg, or both. On this occasion, the diagnosis

may need to be confirmed within a shorter interval (minutes) than 4 hrs. To facilitate timely antihypertensive therapy. (5)

Gestational hypertension occurs when hypertension without proteinuria or severe features develops after 20 weeks of gestation and blood pressure levels return to normal in the postpartum period.

Up to 50% of women with gestational hypertension will eventually develop proteinuria or other end organ dysfunction consistent with the diagnosis of preeclampsia, and this progression is more likely when hypertension is diagnosed before 32 weeks of gestation. (6)

Women with gestational hypertension who present with severe range blood pressures should be managed with same approach as for women with severe preeclampsia.

Gestational hypertension and preeclampsia may also be undistinguishable in terms of long term cardiovascular risks, including chronic hypertension. (6)

PRE ECLAMPSIA WITHOUT SEVERE FEATURES defined as: as per ACOG

1) Systolic blood pressure of 140 mm Hg or more or diastolic blood pressure of 90 mm Hg or more on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure. Systolic blood pressure of 160mm Hg or more or diastolic blood pressure of 110 mm Hg or more (severe hypertension can be confirmed within a short intervals (minutes) to facilitate timely anti hypertensive therapy)

And

2) Proteinuria of 300 mg or more per 24 hour urine collection or Protein/creatinine ratio of 0.3 mg/dL or more or Dipstick reading of 2+ (used only if other quantitative methods not available) .Or

3) in the absence of proteinuria: new-onset hypertension with the new onset of any of the following: Thrombocytopenia, Platelet count less than 100,000 x 109/L , Renal insufficiency: Serum creatinine concentrations greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease , Impaired liver function: Elevated blood concentrations of liver transaminases to twice normal

concentration , Pulmonary edema, New-onset headache unresponsive to medication and not accounted for by alternative diagnoses or visual symptoms.

PRE ECLAMPSIA WITH SEVERE FEATURES defined as:

1) Systolic blood pressure of 160 mm Hg or more or diastolic blood pressure of 110 mm Hg or more on two occasions at least 4 hours apart (unless antihypertensive therapy is initiated before this time)

2) Thrombocytopenia (platelet count less than 100,000 x 109/L,

3) Impaired liver function that is not accounted for by alternative diagnoses and as indicated by abnormally elevated blood concentrations of liver enzymes (to more than twice the upper limit normal concentrations), or by severe persistent right upper quadrant or epigastric pain unresponsive to medications

4) Renal insufficiency (serum creatinine concentration more than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease)

5) Pulmonary edema

6) New-onset headache unresponsive to medication and not accounted for by alternative diagnoses

7) Visual disturbances

ECLAMPSIA defined as:

Convulsive manifestation of the hypertensive disorders of pregnancy and is among the more severe manifestations of the disease. Eclampsia is defined by new-onset tonic-colonic, focal or multifocal seizures in the absence of other causative conditions such as epilepsy, cerebral arterial ischemia and infarction, intracranial haemorrhage, or drug use.

JNC 7 CLASSIFICATION OF HYPERTENSION IN PREGNANCY:

Chronic hypertension :

- BP >140 mmHg systolic or 90 mmHg diastolic prior to pregnancy orbefore 20 weeks gestation
- Persists >12 weeks postpartum

Pre eclampsia:

- BP >140 mmHg systolic or 90 mmHg diastolic with proteinuria (>300 mg/24 hrs) after 20 weeks gestation
- Can progress to eclampsia (seizures)
- More common in nulliparous women, multiple gestation, women with hypertension for >4 years, family history of preeclampsia, hypertension in previous pregnancy, renal disease

Chronic hypertension with superimposed preeclampsia :

- New onset proteinuria after 20 weeks in a woman with hypertension
- In a woman with hypertension and proteinuria prior to 20 weeks gestation
- Sudden two- to threefold increase in proteinuria
- Sudden increase in BP
- Thrombocytopenia
- Elevated AST or ALT

Gestational hypertension:

- Hypertension without proteinuria occurring after 20 weeks gestation
- Temporary diagnosis
- May represent preproteinuric phase of preeclampsia or recurrence of chronic hypertension abated in midpregnancy
- May evolve to preeclampsia

- If severe, may result in higher rates of premature delivery and growth retardation than mild preeclampsia

Transient hypertension:

- Retrospective diagnosis
- BP normal by 12 weeks postpartum
- May recur in subsequent pregnancies
- Predictive of future primary hypertension

International society of hypertension guidelines:

- **Preexisting hypertension:** Starts before pregnancy or <20 weeks of gestation, and lasts>6weeks postpartum with proteinuria.
- **Gestational hypertension:** Starts >20 weeks of gestation, and lasts <6 weeks postpartum.
- **Preexisting hypertension plus superimposed gestational hypertension** with proteinuria.
- **Preeclampsia:** Hypertension with proteinuria (>300 mg/24 h or ACR >30 mg/mmol [265 mg/g]). Predisposing factors are preexisting hypertension, hypertensive disease during previous pregnancy, diabetes, renal disease, first- or multiple pregnancy, autoimmune disease (SLE). Risks are fetal growth restriction, preterm birth.
- **Eclampsia:** Hypertension in pregnancy with seizures, severe headaches, visual disturbance, abdominal pain, nausea and vomiting, low urinary output: Immediate treatment and delivery required.
- **HELLP (hemolysis, elevated liver enzymes, low platelets) syndrome:** Immediate treatment and delivery required.

PATHOPHYSIOLOGY:

Several mechanisms of disease have been proposed in preeclampsia including the following: chronic uteroplacental ischemia, immune maladaptation, very low-density lipoprotein toxicity, genetic imprinting, increased trophoblast apoptosis or necrosis, and an exaggerated maternal inflammatory response to deported trophoblasts. (1–3) ,More recent observations suggest a possible role for imbalances of angiogenic factors in the pathogenesis of preeclampsia. It is possible that a combination of some of these purported mechanisms may be responsible, for triggering the clinical spectrum of preeclampsia. For example, there is clinical and experimental evidence suggesting that uteroplacental ischemia leads to increased circulating concentrations of antiangiogenic factors and angiogenic imbalances. (7,8)

HEMATOLOGIC CHANGES:

Various hematologic changes also may occur in women with preeclampsia, especially in preeclampsia with severe features. Thrombocytopenia and hemolysis may occur and may reach severe levels as part of HELLP syndrome. (1,5,6) Thrombocytopenia results from increased platelet activation, aggregation, and consumption and is a marker of disease severity. A platelet count less than 150,000 x 109/L is found in approximately 20% of patients with preeclampsia, varying from 7% in cases without severe manifestations to 50% in cases with severe manifestations. (4,9)However, reduced platelet counts are not found in all cases of preeclampsia or eclampsia. Interpretation of hematocrit levels in preeclampsia should take into consideration that hemolysis and hemoconcentration may occur. In some cases, the hematocrit may not appear decreased despite hemolysis because of baseline hemoconcentration. (10)Lactate dehydrogenase is present in erythrocytes in high concentration. High serum concentrations of LDH (more than 600 IU/L) may be a sign of hemolysis. (11)

PLATELETS: Blood platelets play critical roles in hemostasis, providing rapid protection against bleeding and catalyzing slower formation of stable blood clots via the coagulation cascade. They are also involved in protection from infection by phagocytosis of pathogens and by secreting chemokines that attract leukocytes. (2,4,9) Platelet function is commonly assessed by platelet count, bleeding time, and platelet aggregation or activation. However, defining and measuring in vivo platelet function remains a challenge. The assay of platelets can be considered as one of the prognostic

tool in management of hypertensive disorders of pregnancy . (2,4,12)The alterations in coagulation and fibrinolysis play a role in the pathogenesis of preeclampsia. The markers of platelet activation include platelet count (PC), platelet distribution width (PDW), mean platelet volume (MPV) and plateletcrit (PCT). These indices are cost-effective and easily available as they are derived from routine blood investigations.

Platelet indices may be used as an early markers for the diagnosis of thromboembolic diseases. These parameters can be used for prediction of Pregnancy Induced Hypertension (PIH) before the derangement in prothrombin time (PT), activated partial thrombin time (ApTT) and thrombin time (TT) values are observed(9). Thrombocytopenia is the most common hematological abnormality observed in preeclampsia and it may be due to consumption of platelets during abnormal activation of the system.

D-dimer, soluble vascular endothelial growth factor receptor and platelet distribution width may be used as markers for early diagnosis, as well as for the purpose of prognostication of the disease. (9,10,12)

Alterations in coagulation, fibrinolysis and platelet and vascular endothelial function are believed to play an important role in the pathogenesis of preeclampsia. The fall in the platelet count is most frequent abnormality and is probably due to consumption during low-grade intravascular coagulation.

Mean platelet volume and platelet distribution width are significantly higher in patients with preeclampsia compared to those with normal pregnancy, has a role as prognostic markers in assessing the severity of preeclampsia and giving an early prediction of progressive hypertension and severity of the disease. (10)

HEMOGLOBIN: Hemoglobin (Hb) measurement is a routine standard test for evaluating physical status among pregnant women in their first visit to primary health care clinics.

Throughout normal pregnancy, blood volume expands by an average of 50% compared with the non-pregnant state.(13) This rapid expansion of blood volume starts in the first trimester of pregnancy. Moreover, plasma volume increases more than the increase in red blood cell (RBC) mass, which produces a net decline in

hemoglobin concentration during the first half of pregnancy. This is known as the physiologic anemia of pregnancy. (8,13)

Hb concentration reaches the nadir in the second trimester of pregnancy because a concurrent increase does not match the increase in plasma volume in RBC mass increase. Based on the World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention (CDC) guidelines, anemia in pregnancy has different cutoffs based on the trimester (first trimester: <11.0 g/dl; second trimester: <10.5 g/dl; and third trimester: <11 g/dl . Physicians and health care providers give more attention to maternal anemia than high blood levels. (1,13) Elevated Hb levels in the first trimester indicate possible pregnancy complications and should not be mistaken for good iron status. Hb levels during early pregnancy play a role in predicting the risk of PE . (8) Both high and low maternal hemoglobin concentrations in early pregnancy have been associated with elevated blood pressure levels during pregnancy, impaired placental function, and a higher risk of gestational hypertensive disorders. The underlying pathophysiological mechanisms for these associations are unclear, but it has been hypothesized that a dysregulated iron status may play a role. (1,6,11)

A dysregulated iron status can cause oxidative stress. Iron overload leads to more production of reactive oxygen species (ROS), whereas iron deficiency can cause leakage of ROS through mitochondrial damage. Oxidative stress leads to endothelial damage and impaired vasoreactivity, which may negatively affect placental development and gestational hemodynamic adaptations, predisposing women to the development of gestational hypertensive disorders. (8)

Already in nonpregnant populations, increased serum ferritin concentrations, which reflect high iron stores, have been associated with the risk of hypertension, increased arterial stiffness, and a higher risk of cardiovascular disease. In pregnant populations, far less is known about the influence of maternal iron status in early pregnancy on gestational hemodynamic adaptations and the risk of gestational hypertensive disorders. (13)

EFFECTS ON HEMOGLOBIN AND HEMATOCRIT:

The relationship between maternal hemoglobin and hematocrit levels and pregnancy outcome has been generally studied. Maternal anemia has been considered as a risk factor for an undesirable pregnancy outcome. According to the study of Stove et al. conducted on Bulgarian pregnant women, increase of hematocrit, hemoglobin and red cell mass in early pregnancy can be considered a risk factor for preeclampsia, intrauterine growth restriction and fetal death in the later stages of pregnancy. (8)

Measuring hemoglobin and hematocrit is common during pregnancy. Normal level of hemoglobin is 12 to 16 grams per deciliter for women of childbearing age. (8) Its minimum normal value is 11 grams per deciliter in the first and third trimester of the pregnancy and 10.5 grams per deciliter in the second trimester. (2,7,13) Its amount gets lower than normal due to anemia and higher than normal because of erythrocytosis. Both hemoglobin and hematocrit are measured through fresh whole blood and are dependent on plasma volume. Thus, factors such as dehydration as well as over hydration can affect the test results.

In fact, hematocrit is a more precise parameter than hemoglobin to determine the ratio of erythrocyte volume to the total blood volume. Viscosity of blood is changeable, which is associated with geometry of blood vessels and blood flow level, blood plasma concentration, volume concentration of blood cells and hematocrit. Therefore, change in the mentioned parameters can be a warning of a high-risk pregnancy. (14)

EFFECT ON LEUCOCYTES:

Many studies showed that neonates of hypertensive women, especially those who have preeclampsia, are more liable to have hematological permutation. Although the etiology and pathogenesis of preeclampsia is not fully known, a proinflammatory immune state prevails and can disrupt fetal hematopoiesis. Some of the effects on newborns include neonatal thrombocytopenia, neutropenia, a reduction in T regulatory cells, and an increased cytotoxic natural killer cell profile. (15) There are no established international guidelines for routine screening of babies delivered to women with preeclampsia.

Early neonatal hematological screening might help to decrease morbidity and improve growth, development, and survival of the baby. (1,15,16)

Early neonatal hematological screening might help to decrease morbidity and improve growth, development, and survival of the baby. (3,4)

AIM AND OBJECTIVES

To find out the differences of hematological parameters of maternal and umbilical cord blood of hypertensive diseases of mothers with those of normotensive mothers

PRIMARY OBJECTIVE:

To compare the hematological parameters (hemoglobin , hematocrit, platelets , MCH, MCHC , RDW, PDW , platelests, TLC, neutrophils) of hypertensive mothers and umbilical cord blood to normotensive pregnant women

SECONDARY OBJECTIVE:

1. To find out incidence of polycythemia, neonatal jaundice and need for phototherapy in hypertensive and normotensive pregnant women
2. To find and compare changes in hematological parameters in gestational hypertension, pre-ecclampsia and ecclampsia

REVIEW OF LITERATURE

Many studies have been done look into the hematological changes with hypertensive disease of pregnancy, however the severity of the disease as assessed by grading has not been well assessed. Also it is unclear which hematological parameter is most affected.

Okoye H C et al in 2016 did a study from Malawi on 100 hypertensive pregnant women cases and 100 normotensive pregnant women admitted for delivery which served as controls. They found that hypertension in pregnancy is associated with increase in incidences of polycythaemia, neutropenia, and thrombocytopenia were found to be 8%, 15%, and 38% among neonates of hypertensive mothers and 0%, 2%, and 8% among neonates of normotensive mothers, respectively. These incidences were significantly different between the groups.

Yilmaz ZV et al in 2016, published that red cell distribution width is a simple parameter and changes with severity of preecclampsia .

Abdullahi H et al in 2014 reported on a study done in Sudan that Red cell distribution width is not correlated with pre-ecclampsia in Sudanese pregnant women

Viana-Rojas JA et al in 2017 did a study on 64 patients and demonstrated that Hemoglobin and platelet count measures were similar between study groups. Preeclamptic patients had levels of RDW (14.7 ± 1.4 vs. 13.4 ± 0.7, p = 0.0001) and MPV (11.8 ± 2.4 vs. 11.0 ± 1.4, p = 0.03) more elevated than control group. Moreover, severe preeclamptic subgroup had more elevated levels of RDW (15.0 ± 1.6 vs. 14.0 ± 0.6, p = 0.001) and MPV (12.7 ± 2.8 vs. 10.8 ± 1.8, p = 0.01) in comparison with mild preeclamptic patients. They concluded that RDW and MPV are accessible and inexpensive measures associated with the severity of preeclampsia

Elgari MM et al in2018did a study in Saudi Arabia , on 80 preecclamptic pregnant women reported significant change in multiple hematological parameter like PCV, Hb, MCH, MCHC and platelet count.

Though these studies are done on various hematological parameters like Hb, PCV, MCH, MCHC, RDW, Platelet width distribution, Platelet count, homocysteine, but

there is lack of consensus as which parameter is most effected by hypertension in pregnancy and its increasing severity.

R Rahim et al 2010: did a study on platelet count in 100 cases of pregnancy induced hypertension, The aim of the study was to see the platelet count in pregnancy induced hypertension (PIH). It was a prospective study. The study was done on 100 cases of PIH patients in Gynae & Obstetrics department of Mymensingh Medical College Hospital (MMCH) during the period of January to July 2006. Among the 100 cases 60 were eclamptic, 34 were pre eclamptic (PE) and 06 were gestational hypertensive (GH) patients. All the necessary informations and data were collected by interviewing the patients or their attendants on a pre-designed data collection sheet.

Blood pattern had been accrued from the patients and required investigations were executed. Most of the eclampsia cases were from below average socioeconomic status of family, and other two businesses were from average socioeconomic reputation of circle of relatives. Among eclamptic patients 76.60% have been primigravida. In eclamptic institution 93.33% did no longer get any antenatal care however eighty three.33% GH cases had everyday antenatal care. Among the eclamptic institution imply maternal age become 23.12 years and 47.00% had low platelet matter (<1,50,000/cmm). Among eclampsia organization 60.00% had low platelet count number (<1,50,000/cmm). In this study 12% cases developed postpartum haemorrhage (PPH) and among them 66.67% had low platelet count (<1,50,000/cmm). Although there may be hazard of development of disseminated intravascular coagulation (DIC) and Liver Failure in sufferers with low platelet rely, but in this study there is no such incidence.In thisstudy mortality become 3% and all have been in eclamptic organization. Those sufferers had low platelet rely 74.28% &had low start weight (LBW) toddlers. Platelet count is a completely essential research for antenatal mother having PIH, as it's miles at once associated with maternal and perinatal final results.

Tejeswini KK et al 2016, did a study on Platelet count as a prognostic indicator in pregnancy induced hypertension. Study became accomplished to assess the software of platelet be counted as a prognostic indicator in pregnancy precipitated hypertension to understand and manage early the headaches springing up and to have a better being pregnant final results.

This study includes 76 instances of pregnancy brought about high blood pressure over a period of 18 months. Platelet estimation become executed for all cases and sufferers with documented platelet depend of much less than 1,50,000/cumm was documented as thrombocytopenia. Of the 76 cases of pregnancy induced hypertension, 32 (42.1%)were recognized with thrombocytopenia, and an accelerated prevalence of maternal and fetal morbidity & mortality become discovered.This took a look at and the results show that the assay of platelets can be taken into consideration as one of the prognostic tool in management of hypertensive problems of pregnancy

Thalor N et al 2019: performed a study on correlation between platelet indices and preeclampsia. Preeclampsia is one of the foremost health troubles causing maternal morbidity and mortality, complicating 3–8% of pregnancies.It has been recommended that the changes within the coagulation and fibrinolysis play a function inside the pathogenesis of preeclampsia. The markers of platelet activation encompass platelet count number, platelet distribution width, imply platelet quantity and plateletcrit. The MPV and PDW confirmed a great distinction between the 2 organizations and increasing values with growing BP. However, the PC and PCT in this study did not display a vast correlation with preeclampsia. Thus, the platelet indices, specially the MPV and PDW, which are cost-efficient and without problems available, can be reliable in the prediction and early prognosis of preeclampsia, as well as a marker for the severity of preeclampsia.

Dadhich et al 2012: did a study on predictive value of platelet indices in development of preeclampsia. To examine the affiliation between changes in platelet indices (platelet matter, suggest platelet quantity, platelet distribution width and development of preeclampsia.Patients with preeclampsia are much more likely to have good sized lower in platelet remember, boom in PDW and MPV. These modifications can be located at an earlier gestational age than large rise in BP can be observed and aredirectly proportional to progressive rise in hypertension. Thus, estimation of platelet indices can be considered as an early, easy and cost-powerful procedure within the assessment of severity of preeclampsia.

Bawore SG et 2021: conducted a study on a pattern of platelet indices as a potential marker for prediction of pre-eclampsia among pregnant women attending a Tertiary Hospital, Ethiopia: A case-control study. A total of 180 pregnant women were

included in the study. Platelet count and platelet crit levels tend to lower as pre-eclampsia will become greater severe. In assessment, the mean platelet quantity and platelet distribution widths were appreciably multiplied with the severity of preeclampsia (P<0.001). Platelet distribution width (rho = zero.731, p<zero.001) and suggest platelet volume (rho = 0.674, p<zero.001) had statistically substantial tremendous relationships with mean arterial pressure. The pleasant metric for predicting preeclampsia turned into platelet distribution width (AUC = zero.986; ninety fivep.CCI; zero.970, 1). Platelet indices, along with platelet count number, mean platelet volume, platelet distribution width, and Platelet crit, were recognized as promising candidate markers for predicting preeclampsia in pregnant ladies. In the future, a serial examination of these indicators at some stage in various trimesters of pregnancy have to be carried out.

Abumohsen H et al 2021:studied the Association between High Hemoglobin Levels and Pregnancy Complications, Hypertension Among Palestinian Women. hypertensive disorders of pregnancy (HDP) are the principal causes of maternal morbidity and mortality. The maternal morbidity and mortality burden for Palestinian women is rather high, suggesting a substandard quality of care. Therefore, an early analysis of GDM and gestational hypertension (GH) can enhance prenatal care for pregnant women and enhance being pregnant effects. Previous research verified that increased Hb degrees inside the first trimester indicate feasible being pregnancy complications.

However, ethnic variations may want to play a role in figuring out the magnitude of the association. They hypothesized that high Hb stages (≥12.5 g/dl) inside the first trimester (6-13 gestational weeks) are related to elevated SBP and DBP amongst pregnant Palestinian women visiting prenatal clinics in Palestine, The final wide variety of eligible information was 2565. Pregnant women with excessive Hb degrees within the first trimester were at better threat of high systolic blood strain; OR=3.048, 95p.CCI, [1.252-7.421]) at 24 wks. Their findings advice that Hb level at registration might be utilized in predicting the chance of HP among Palestinian ladies who never had a previous history of these situations. The outcomes of this take a look at ought to have vital clinical implications for early screening, which can improve preventive and healing health offerings to sell the health of pregnant ladies and youngsters.

Taeubert et al 2022 : did a study on Maternal Iron Status in Early Pregnancy and Blood Pressure Throughout Pregnancy, Placental Hemodynamics, and the Risk of Gestational Hypertensive Disorders. In nonpregnant populations, higher serum ferritin, which reflects excessive iron stores, is related to an increased threat of hypertension. They hypothesized that a dysregulated maternal iron fame in early pregnancy may result in impaired gestational hemodynamic variations, main to an extended hazard of gestational hypertensive problems. Higher maternal early pregnancy serum ferritin concentrations had been associated with better systolic and diastolic blood pressure in the course of being pregnant within the simple fashions (P values < 0.05).

No constant institutions had been present of maternal iron status in early pregnancy with gestational hemodynamic adaptations or the dangers of gestational hypertensive issues. Further studies are needed to have a look at the capacity role of iron metabolism in the improvement of gestational hypertensive problems inside higher-hazard populations.

Khoigani et al 2012: Did a observe on The relationship of hemoglobin and hematocrit inside the first and second half of being pregnant with being pregnant outcome. Considering the connection of low and high ranges of hemoglobin and hematocrit with a few pregnancy complications, This have a look at additionally aimed to investigate the changes in hemoglobin and hematocrit values all through the second and first half of of pregnancy and its relation with being pregnant final results.

Low tiers of hemoglobin in the course of the primary half of pregnancy turned into related to preeclampsia (p = 0.024). Moreover, low levels of hemoglobin at some stage in the second half of pregnancy changed into associated with the danger of preterm untimely rupture of membranes (p = zero.01). In addition, mothers with lower blood dilution, as a physiological manner at some point of being pregnant, had been extra prone to preeclampsia (p = zero.04).

Hemoglobin degrees in the first and second half of being pregnant are expecting preeclampsia and untimely preterm rupture of membranes. Increased hematocrit stages inside the second half of pregnancy or lack of reduction of hematocrit stages within the second half as compared to the first half can estimate preeclampsia.

Enawgaw et al 2017: performed a study on hematological parameters of hypertensive and normotensive individuals, from a total of 252 study subjects, about 67.5% were females. The mean age of study subjects was 50.3 ± 11 yearsfor hypertensive individuals and 49.8 ± 11.6 years for normotensive individuals with range of 18–65 years. In this study, the median value of WBC, RBC, Hgb, HCT, MCV and the mean value of MCHC, RDW, MPV andPDW were significantly higher in hypertensive group compare additionally, WBC, RBC, Hgb, HCT and PLT showed statistically good sized positive correlations with blood pressure indices. Platelet rely and MCH did not show statistically considerable difference among the two groups. Additionally,WBC, RBC, Hgb, HCT and PLT showed statistically significant positive correlations with blood pressure indices. Plateletcount and MCH did not show statistically significant difference between the two groups.

Hypertension has effect on hematological parameters. In this study the mean and median values of haematological parameters in hypertensive people were appreciably one of a kind compared to reputedly healthy normotensive individuals. Hence, hematological parameters may be used to reveal the analysis of the disorder and manage hypertensive associated complications, and it is essential to evaluate hematological parameters for hypertensive people which may additionally assist to prevent complications related hematological disorders.

Sileshi B et al 2021: Studied hematological parameters of hypertensive and normotensive individuals, 102 hypertensive and 102 healthy controls were enrolled on this observe. The median price of white blood cell (WBC), hemoglobin (Hgb), hematocrit (HCT), red cell distribution width (RDW) and mean platelet volume (MPV) were drastically higher in hypertensive group compared to seemingly healthy control group. Additionally, RBC (red blood cell)count, HCT and RDW showed statistically significant positive correlations with systolic and
diastolic blood pressure. WBC count and RDW were significantly and positively correlated with body mass index (BMI). Platelet (PLT) count had a significant but negative correlation (r -0.219, P = 0.027) with duration of hypertension illness while MPV showed positive andsignificant correlation (r = 0.255, P = 0.010).The median values of WBC, Hgb, HCT, RDW and MPV were significantly higher in hypertensive patient compared to apparently healthy individuals. Assessment of hematological

parameters for hypertensive individuals which may also assist to prevent complications related to hematological aberrations.

Ranjith babu et al 2015 : They determined that the suggest values of Hemoglobin, Erythrocyte remember, Hematocrit, MCH and MCHC were elevated in primary hypertension at the same time as, they suggest ranges of MCV were observed to be lower within the hypertensive institution when in comparison to normotensive subjects.

Hypertension has impact on hematocrit, hemoglobin, RBC matter, WBC be counted and Platelet depend which can be used for early detection of hypertensive inclined individuals.

MATERIALS ANDMETHODS

METHODOLOGY:

Study Setting: Study was conducted in the Department of Obstetrics and Gynecology and Department of Neonatology, AIIMS Jodhpur.

Ethical Consideration:

Prior to the commencement of data collection, the study protocol was reviewed and approved by Institutional Ethics Committee (AIIMS/IEC/2021/3476).

Study design: Prospective cohort study

Study population: Pregnant women, after 20 weeks of pregnancy diagnosed with hypertension, according to ACOG criteria.

Study Period: This study was conducted from April 2020 to october 2022.

INCLUSION CRITERIA:

- Pregnant women, after 20 weeks of pregnancy diagnosed with hypertension Singleton pregnancy as cases
- Willing to participate in study

EXCLUSION CRITERIA:

- Multiple pregnancy
- Pregnant women with chronic medical conditions e.g.- heart disease, renal disease, liver disease, pulmonary disease, chronic anemia etc.
- Pregnancy with known major congenital malformations,
- Rh isoimmunised pregnancy
- Intrauterine fetal demise
- h/o smoking
- Women not ready to participate in study

Group A - Hypertensive disease of pregnancy

Group B - Normotensive (Control Group)

Group A - Hypertensive disease of pregnancy

This group included Pregnant women, after 20 weeks of pregnancy diagnosed with hypertension

Singleton pregnancy , hypertensive disease of pregnancy described according to ACOG guidelines .

According to ACOG , a systolic blood pressure of 140 mm Hg or more or a diastolic blood pressure of 90 mm Hg or more, or both, on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure

Figure :1

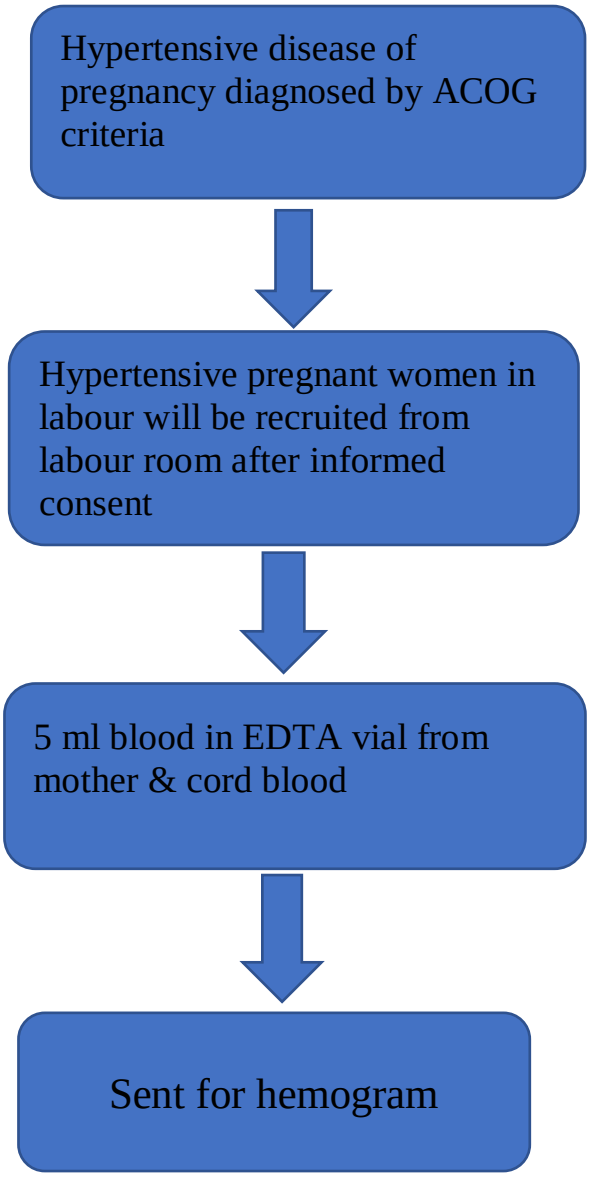

Figure 2: BP apparatus

Blood Pressure Measurement:

Patient seated with feet supported for 2–3 minutes before blood pressure is measured.

- Blood pressure taken on both arms at the first antenatal visit.
- The right arm used thereafter if there is no significant difference between the arms.
- While measuring blood pressure, SBP palpated at the brachial artery before inflating the cuff to 20 mmHg above the recorded level.
- The cuff then deflated slowly. DBP is recorded as Korotkoff phase V (K5) and if K5 is not present, can be recorded as Korotkoff phase IV (K4).
- A standard cuff used for arms with a circumference of ≤33 cm while the large cuff (15 × 33 cm bladder) used for arms with a circumference of >33 cm.
- blood pressure measured in the sitting position or left lateral recumbency (on the left arm) rather than the supine position

Group 2- Normotensive (Control Group)

After the umbilical cord was cut, around 5 ml of cord blood was obtained in EDTA vial and sent for the evaluation of the complete hemogram to hematology lab .it was Analysed by Mindray BC-6200 Automatic Hematology Analyzer.

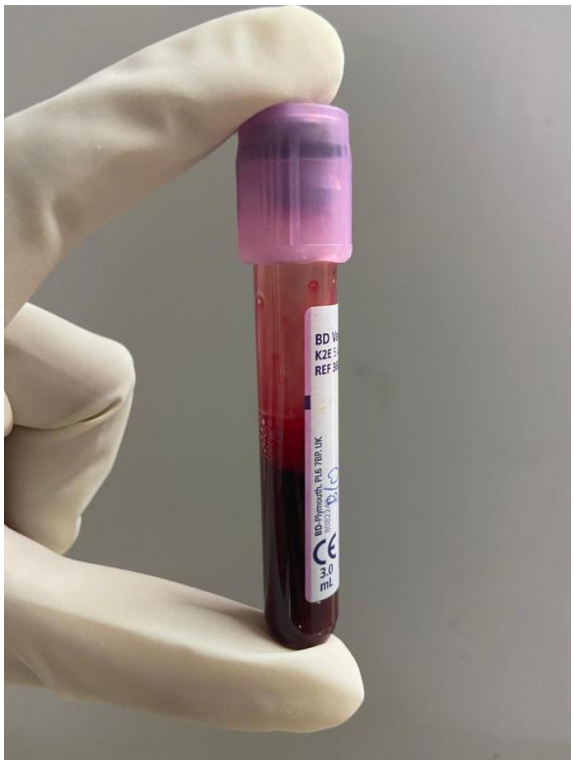

Figure 4: Around 5ml Blood Collected Automatic In EDTA Vial

Figure 5: Mindray BC-6200 Hematology Analyzer

SAMPLE SIZE CALCULATION

According to Henle C Okyne study(4) mean difference of haematocrit between the two groups is 5.6, taking the power of study as 90% (ß error) and confidence interval of 95%, sample size of 46 is required in each group, making total sample size of 92 women & taking loss of data as 10 %.

STATISTICAL ANALYSIS

Data was entered in Microsoft Excel Sheet. All the analysis was performed by using Statistical package for social sciences (SPSS) software 21. Student *t* test was used to analyze means between 2 groups and for categorical variables chi-square test was used, with significant level of P being 0.05 for testing the differences between two groups.

OBSERVATIONS AND RESULTS

During the study period from April 2021 to October2022, a total 120 patients were approached for enrollment 60 patients were hypertensive & 60 were normotensive patients, hematological parameters compared between these 2 groups & babies of both the groups .

TABLE 1: DEMOGRAPHIC DETAILS OF HYPERTENSIVE & NORMOTENSIVE GROUP

We compared the demographic variables in two groups in terms of qualification, occupation, parity, period of gestation.

TABLE 1: COMPARISION IN QUALIFICATION BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUP

Qualification	Hypertensive		Normotensive		Total	
	N	%	N	%	N	%
Illiterate	4	6.67	0	0.00	4	3.33
Primary	5	8.33	0	0.00	5	4.17
Middle school	11	18.33	10	16.67	21	17.50
Secondary school	8	13.33	24	40.00	32	26.67
Higher secondary	2	3.33	22	36.67	24	20.00
Graduate	20	33.33	4	6.67	24	20.00
Post graduate	10	16.67	0	0.00	10	8.33
Total	60	100.00	60	100.00	120	100.00

Table 1 shows that 6.67% were illiterate. 8.3%, 18.33%, 13.33%, 3.33% were from primary, middle school, secondary school, & higher secondary respectively, & 33.3% were graduates 16.67% were postgraduates in hypertensive group, where as 16.67%, 40%, 36.67% were from middle school, secondary school, & higher secondary respectively & 6.67 % were graduates in normotensive group

TABLE 2: COMPARISION OF LOCALITY BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUP

Locality	Hypertensive		Normotensive		Total	
	N	%	N	%	N	%
Rural	14	23.33	26	43.33	40	33.33
Urban	46	76.67	34	56.67	80	66.67
Total	60	100.00	60	100.00	120	100.00

Table 2 showsthat 23.3 % were from rural, & 76.7 % were from urban area in hypertensive group, where as 43.33 % were from rural, & 56.67 % were from urban area in normotensive group

TABLE 3: COMPARISION IN GRAVIDITY BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUP

Gravidity	Hypertensive		Normotensive		Total	
	N	%	N	%	N	%
Primi	29	48.33	26	43.33	55	45.83
Multi	31	51.67	34	56.67	65	54.17
Total	60	100.00	60	100.00	120	100.00

Table 3 shows that 48.3% were primigravida & 51.67 % were multigravida in hypertensive group, and 43.3 % were primigravida & 56.67 % were ,multigravida in normotensive group

TABLE 4: GESTATIONAL AGE COMPARISION BETWEEN HYPERTENSIVE & NORMOTENSIVE PATIENTS

Gestational age	Hypertensive		Normotensive		Total	
	N	%	N	%	N	%
<37	34	56.67	15	25.00	49	40.83
37-41	26	43.33	45	75.00	71	59.17
Total	60	100.00	60	100.00	120	100.00

Chi square 12.45, P value 0.0004 (S)

Table 4 & figure : 1, shows that 56.67 % were preterm deliveries & 43.33% were term deliveries in hypertensive group and in normotensive group 25% were preterm deliveries & 75 % were term deliveries.

On applying chi square test, both the groups were **statistically significant** with p value of **0.0004** which was < 0.05

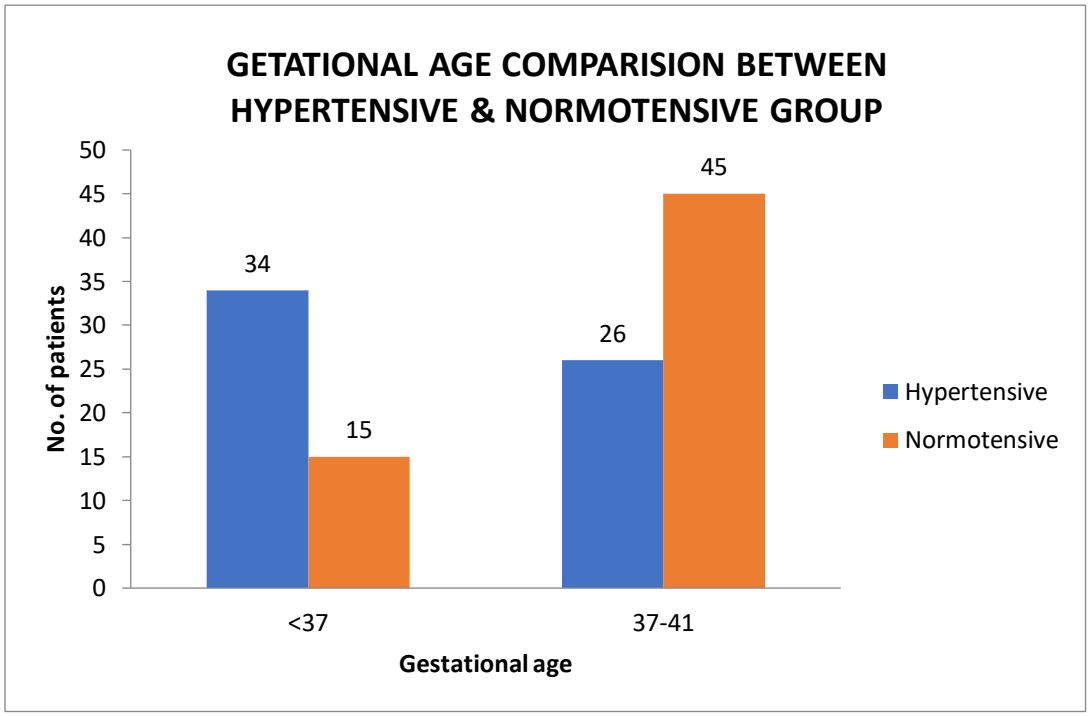

Figure : 1: GESTATIONAL AGE COMPARISION BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUPS

TABLE 5: SPECTRUM OFHYPERTENSIVE DISORDERS OF PREGNANCY

Hypertensive disease of pregnancy	No. of patients	Percentage
Gestational hypertension	39	32.50
Partial HELLP	1	0.83
Preeclampsia with severe features	13	10.83
Preeclampsia without severe features	7	5.83
Total	60	100.00

Table 5: shows that out of 60 hypertensive patients 32.5 % were gestational hypertension, 0.83% were partial HELLP, 10.83 % were pre eclampsia with severe features, 5.83% were pre eclampsia without severe features

TABLE 6: COMPARISION OF HEMATOLOGICAL PARAMETERS IN SPECTRUM OF HYPERTENSIVE DISORDERS OF PREGNANCY

Variables	Gestational htn (Mean±SD)	Partial HELLP (Mean±SD)	PE with SEVERE FEATURES(Mean±SD)	PE without SEVERE FEATURES (Mean±SD)	P value
HB	11.95±1.49	8.1±0.00	12.07±1.39	12.55±1.39	0.442
HEMATOCRIT	35.33±6.42	23.9±0.00	36.47±7.16	37.19±4.4	0.615
MCH	2.67±0.87	0.7±0.00	1.91±0.54	2.18±0.67	**0.027**
MCHC	28.09±3.1	30.4±0.00	28.41±2.66	27.84±2.63	0.915
RDW	32.92±1.31	34±0.00	32.03±1.54	32.98±1.87	0.314
TLC	46.59±10.34	71.1±0.00	50.29±11.01	49.15±14.57	0.631
POLYMORPHS	14.97±1.96	17.6±0.00	16.21±4.21	15.85±1.38	0.249
PLATELETS	12147.95±3215.43	14300±0.00	12241.43±3751.5	12253.08±4413.67	0.994
PDW	7793.08±2583.86	7760±0.00	7457.14±2237.44	7531.46±2104.86	0.911

Table 6 shows there is no statistical difference of hematological parameters like hemoglobin , hematocrit, MCHC, RDW, PDW, pletelets, TLC, neutrophils in mothers with gestational hypertension, pre eclampsia without severe features , pre eclampsia with severe features , & partial HELLP, except for MCH which showed statistically significant difference between above groups.

TABLE 7: COMPARISION OF NICU ADMISSION BETWEEN NEWBORN BABIES OF HYPERTENSIVE & NORMOTENSIVE PATIENTS

NICU admission for baby	Hypertensive		Normotensive		Total	
	N	%	N	%	N	%
Yes	15	25.00	1	1.67	16	13.33
No	45	75.00	59	98.33	104	86.67
Total	60	100.00	60	100.00	120	100.00

Chi square 14.13, P value 0.0002 (S)

NICU admissions in hypertensive group were 15 from total of 60 patients, & NICU admissions in normotensive group were 1 from total of 60 patients.

Both groups were compared by chi square test. P value was **0.0002**which was <0.05, thus both groups are**statistically significant** in terms of NICU admissions.

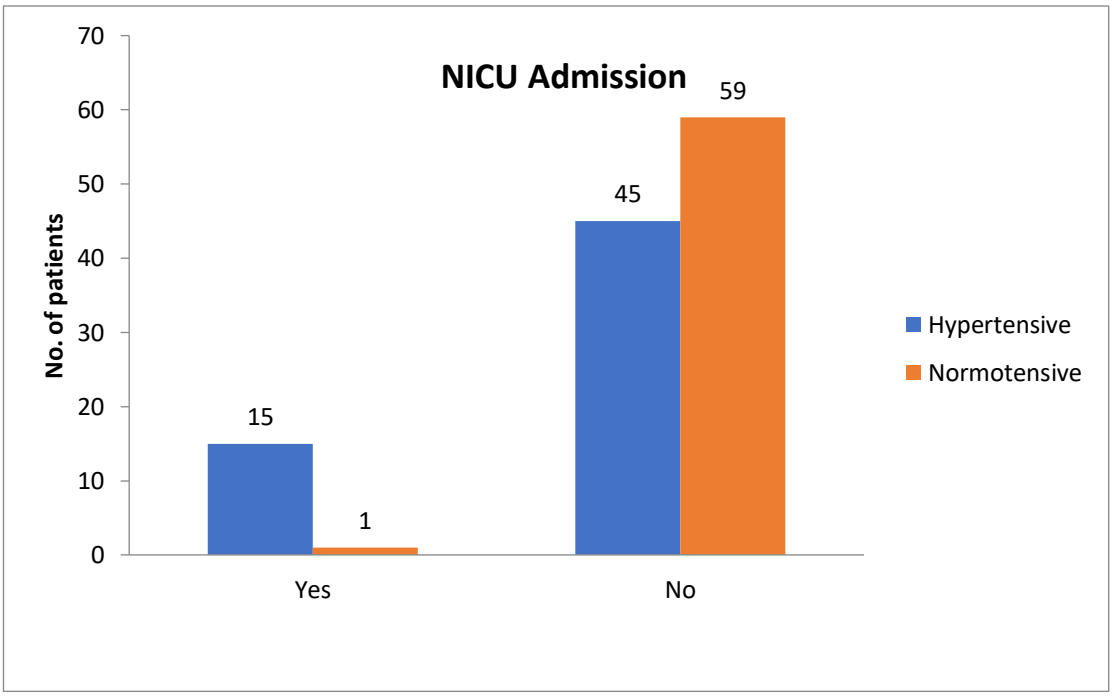

FIGURE 2: COMPARISION OF NICU ADMISSION BETWEEN NEWBORN BABIES OF HYPERTENSIVE & NORMOTENSIVE PATIENTS

TABLE 8: COMPARISION OF NEONATAL COMPLICATIONS BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUPS

Birth axphasia	Hypertensive		Normotensive		Total		P value
	N	%	N	%	N	%	
Birth asphyxia	2	3.33	1	1.67	3	2.50	1.000
Fever	0	0.00	2	3.33	2	1.67	0.495
Phototherapy	21	35.00	18	30.00	39	32.50	0.558
Polycythemia	16	26.67	7	11.67	23	19.17	**0.036**
Prematurity	6	10.00	6	10.00	12	10.00	1.000
TTNB	5	8.33	4	6.67	9	7.50	1.000
No complications	10	16.67	22	36.67	32	26.67	**0.013**
Total	60	100.00	60	100.00	120	100.00	-

Table 7 shows that out of 60 babies, 3.33%, 35%, 26.67%, 10%, 8.33%, had developed birth asphyxia, had need for phototherapy, developed polycythemia, prematurity, TTNB respectively.

TABLE 9: COMPARISON OF HAEMATOLOGICAL PARAMETERS BETWEEN HYPERTENSIVE & NORMOTENSIVE MOTHERS

Variables	Mother		t value	p value
	Hypertensive mother (Mean±SD)	Normotensive mother (Mean±SD)		
Haemoglobin	12.03±1.53	12.19±1.45	6.00	0.549
HCT	35.67±6.22	37.03±4.27	1.396	0.167
Platelets	2.44±0.86	2.54±0.8	0.367	0.525
MCH	28.11±2.9	28.92±2.57	1.617	0.108
MCHC	32.85±1.47	32.76±0.95	0.39	0.696
RDW	47.99±11.65	48.83±9.37	0.438	0.661
PDW	15.35±2.23	15.91±1.92	1.46	0.146
TLC	12217.5±3482.73	10861.83±3406.02	2.156	**0.033**
Polymophs	7696.65±2393.59	9258.81±11177.7	1.055	0.293

1) **HEMOGLOBIN**: Mean hemoglobin was 12.03 with standard deviation of 1.53 in hypertensive group, and Mean hemoglobin was 12.19gm% with standard deviation of 1.45 in normotensive group.

Hemoglobin in both groups was compared by Unpaired t test. P value was 0.549 which was > 0.05, thus both groups are comparable in terms of hemoglobin .

2) **HEMATOCRIT:** Mean hematocrit was 35.67 with standard deviation of 6.22 in hypertensive group, and Mean hematocrit was 37.03 with standard deviation of 0.8 in normotensive group.

Haematocrit in both groups was compared by Unpaired t test. P value was 0.167which was > 0.05, thus both groups are comparable in terms of hematocrit.

3) **PLATELETS :** Mean platelets was 2.44 lakhs with standard deviation of 0.86 in hypertensive group, and Mean platelets was 2.54 lakhs with standard deviation of 0.8 in normotensive group.

Platelets in both groups was compared by Unpaired t test. P value was 0.525 which was > 0.05, thus both groups are comparable in terms of platelets.

4) **MCH:** Mean MCH was 28.11 with standard deviation of 2.9 in hypertensive group, and Mean MCH was 28.9 with standard deviation of 2.57 in normotensive group.

MCH in both groups was compared by Unpaired t test. P value was 0.108 which was > 0.05, thus both groups are comparable in terms of MCH.

5) **MCHC:** Mean MCHC was 32.85 with standard deviation of 1.47 in hypertensive group, and Mean MCHC was 32.76 with standard deviation of 0.95 in normotensive group.

MCHC in both groups was compared by Unpaired t test. P value was 0.696 which was > 0.05, thus both groups are comparable in terms of MCHC

6)**RDW:** Mean RDW was 47.99 with standard deviation of 11.65 in hypertensive group, and Mean RDW was 48.83 with standard deviation of 9.37 in normotensive group.

RDW in both groups was compared by Unpaired t test. P value was 0.661 which was > 0.05, thus both groups are comparable in terms of RDW

7)**PDW:** Mean PDW was 15.35 with standard deviation of 2.23 in hypertensive group, and Mean PDW was 15.91 with standard deviation of 1.92 in normotensive group.

PDW in both groups was compared by Unpaired t test. P value was 0.146 which was > 0.05, thus both groups are comparable in terms of PDW

8)**TLC:** Mean TLC was 12217.5/cumm with standard deviation of 3482.59 in hypertensive group, and Mean TLC was 10861/cumm with standard deviation of 3406.02 in normotensive group.

TLC in both groups was compared by Unpaired t test. P value was **0.033**which was <0.05, thus both groups are **statistically significant**in terms of TLC

9)**POLYMORPHS:** Mean polymorphs was 7696.65 with standard deviation of 2393.59 in hypertensive group, and Mean polymorphs was 9258.81 with standard deviation of 11177.7 in normotensive group.

Polymorphs in both groups was compared by Unpaired t test. P value was 0.293 which was >0.05, thus both groups are comparable in terms of polymorphs.

TABLE 10: COMPARISION OF HAEMATOLOGICAL PARAMETERS BETWEEN CORD BLOOOD SAMPLES OF HYPERTENSIVE MOTHERS & NON HYPERTENSIVE MOTHERS

Variables	Newborn cord blood samples of		t value	p value
	Hypertensive mother (Mean±SD)	Normotensive mother (Mean±SD)		
HB	16.11±3.29	14.44±2.59	3.092	**0.002**
HEMATICRIT	46.33±12.58	46.27±6.3	0.039	0.975
MCH	34.36±3.52	34.04±2.16	0.593	0.553
MCHC	33.49±1.61	33.19±1.49	1.066	0.288
RDW	55.51±19.79	53.69±6.68	0.677	0.499
TLC	14344.83±23774.52	13260.17±1682.52	0.352	0.725
POLYMORPHS	6588.63±3025.6	9181.67±1732.25	5.761	**<0.0001**
PLATELETS	2.32±0.91	2.69±0.58	2.643	**0.009**
PDW	14.07±3.39	12.7±1.48	2.868	**0.004**

1)HEMOGLOBIN : Mean hemoglobin was 16.11 with standard deviation of 3.29 in hypertensive group, and Mean hemoglobin was 14.44gm% with standard deviation of 6.3 in normotensive group.

hemoglobin in both groups was compared by Unpaired t test. P value was **0.002** which was <0.05, thus both groups are**statistically significant** in terms of hemoglobin .

2)HEMATOCRIT : Mean hematocrit was 46.33 with standard deviation of 12.58 in hypertensive group, and Mean hematocrit was 46.27 with standard deviation of 6.3 in normotensive group.

Hematocrit in both groups was compared by Unpaired t test. P value was 0.975 which was > 0.05, thus both groups are comparable in terms of hematocrit.

3)PLATELETS : Mean platelets was 2.32 lakhs with standard deviation of 0.91 in hypertensive group, and Mean platelets was 2.69 lakhs with standard deviation of 0.58 in normotensive group.

Platelets in both groups was compared by Unpaired t test. P value was **0.009** which was <0.05, thus both groups are **statistically significant** in terms of platelets.

4)MCH: Mean MCH was 34.36 with standard deviation of 3.52 in hypertensive group, and Mean MCH was 34.04 with standard deviation of 2.16 in normotensive group.

MCH in both groups was compared by Unpaired t test. P value was 0.553 which was > 0.05, thus both groups are comparable in terms of MCH.

5)**MCHC:** Mean MCHC was 33.49 with standard deviation of 1.61 in hypertensive group, and Mean MCHC was 33.19 with standard deviation of 0.149 in normotensive group.

MCHC in both groups was compared by Unpaired t test. P value was 0.288 which was > 0.05, thus both groups are comparable in terms of MCHC

6)**RDW:** Mean RDW was 55.51 with standard deviation of 19.79 in hypertensive group, and Mean RDW was 53.69 with standard deviation of 6.68 in normotensive group.

RDW in both groups was compared by Unpaired t test. P value was 0.499 which was > 0.05, thus both groups are comparable in terms of RDW

7)**PDW:** Mean PDW was 14.07 with standard deviation of 3.39 in hypertensive group, and Mean PDW was 12.7 with standard deviation of 1.48 in normotensive group.

PDW in both groups was compared by Unpaired t test. P value was **0.004**which was <0.05, thus both groups are **statistically significant** in terms of PDW

8)**TLC:** Mean TLC was 14344.83/cumm with standard deviation of 23774 in hypertensive group, and Mean TLC was 13260.17/cumm with standard deviation of 1732.25 in normotensive group.

TLC in both groups was compared by Unpaired t test. P value was 0.352 which was >0.05, thus both groups are comparable in terms of TLC

9)**POLYMORPHS:** Mean polymorphs was 6588.63 with standard deviation of 3025.6 in hypertensive group, and Mean polymorphs was 9181.67 with standard deviation of 1732.25 in normotensive group.

Polymorphs in both groups was compared by Unpaired t test. P value was**<0.0001** which was <0.05, thus both groups are **statistically significant** in terms of polymorphs.

TABLE 11 : COMPARISION OF HEMATOLOGICAL PARAMETERS BETWEEN MOTHER & CORD BLOOD SAMPLES IN PATIENTS OF HYPERTENSIVE DISEASE IN PREGNANCY

Variables	N	Hypertensive Mother (Mean±SD)	Cord Blood sample of newborn of hypertensive mother(Mean±SD)
HB	120	12.11±1.48	15.28±3.07
Hematocrit	120	36.35±5.35	46.3±9.91
MCH	120	2.49±0.83	2.5±0.79
MCHC	120	28.52±2.76	34.2±2.91
RDW	120	32.8±1.23	33.34±1.55
TLC	120	48.41±10.53	54.6±14.73
Polymorphs	120	15.63±2.09	13.43±2.69
Platelets	120	11539.67±3496.97	13909.66±16820.78
PDW	120	8471.17±8079.94	7885.6±2790.51

1)HEMOGLOBIN : Mean hemoglobin was 12.11 with standard deviation of 1.48 in mothers group, and Mean hemoglobin was 15.28gm% with standard deviation of 3.07 in cord blood group.

2)HEMATOCRIT : Mean hematocrit was 36.35 with standard deviation of 5.35 in mothers group, and Mean hematocrit was 36.35 with standard deviation of 9.91 in cord blood group.

3)PLATELETS : Mean platelets was 2.49 lakhs with standard deviation of 0.83 in mothers group, and Mean platelets was 2.5 lakhs with standard deviation of 0.79 in cord blood group.

4)MCH: Mean MCH was 28.52 with standard deviation of 2.76 in mothers group, and Mean MCH was 34.2 with standard deviation of 2.91 in cord blood group.

5)MCHC: Mean MCHC was 32.8 with standard deviation of 1.23 in mothers group, and Mean MCHC was 33.34 with standard deviation of 1.55 in cord blood group.

6)**RDW:** Mean RDW was 48.41 with standard deviation of 1.23 in mothers group, and Mean RDW was 54.6 with standard deviation of 14.73 in cord blood group.

7)**PDW:** Mean PDW was 15.63 with standard deviation of 2.09 in mothers group, and Mean PDW was 13.43 with standard deviation of 2.69 in cord blood group.

8)**TLC:** Mean TLC was 11539.67/cumm with standard deviation of 3496 in mothers group, and Mean TLC was 13909/cumm with standard deviation of 16820.78 in cord blood group.

9)**POLYMORPHS :** Mean polymorphs was 8471.17 with standard deviation of 8079.94 in mothers group, and Mean polymorphs was 7885.6 with standard deviation of 2790.51 in cord blood group.

DISCUSSION

during the study period , a total of 120 patients were recruited out of which 60 were hypertensives & 60 were normotensive pregnant women , we compared hematological parameters hypertensive mothers & umbilical cord blood samples to that of normotensive pregnant women .

TABLE:12 Comparison Of hemoglobin of mothers between hypertensive and normotensive groups

	Hemoglobin of mother in hypetensive group	**Hemoglobin of mother in normotensive group**	**P value**
Yilmaz et al [4] (2016)	11.46± 1.3	11.09± 1.22	0.172
Elgari et al [7] (2018)	11.9± 1.3	12.6± 1.6	<0.01
Enagaw et al [17] (2017)	14.60	14.15	0.005
Sileshi et al [16] (2021)	14.5± 1.93	13.78± 2.13	0.027
Al-bahadily et al [33] 2017	11.62± 1.53	11.85± 1.23	0.244
Ahmed shariff et al [36] (2020)	8.13± 0.5	9.68± 0.64	0.05
Neelam jhajharia et al [35] (2019)	8.80± 2.53	9.728± 2.47	<0.05
Our study	12.03± 1.53	12.19± 1.45	0.549

In our study mean hemoglobin of mothers in hypertensive group was (12.03± 1.53) as compared to normotensive group (12.19± 1.45) and the difference was found to be statistically non- significant (P value 0.549). The study conducted by Yilmaz et al [4] reported that mean hemoglobin of mothers inhypertensive group was 11.46± 1.3 and in normotensive group was 11.09± 1.22 and the difference was statistically non significant (p value0.172). The study conducted by Al-bahadily et al [33] reported that mean hemoglobin of mothers inhypertensive group was 11.62± 1.53 and in normotensive group was 11.85± 1.23 and the difference was statistically non significant (p value0.244).

The study conducted by Elgari et al [7] showed mean hemoglobin of mothers in hypetensive group was 11.9± 1.3 and in normotensive group was 12.6± 1.6which was statistically significant (p value <0.01) . the study conducted by Enagaw et al [17]showed mean hemoglobin of mothers in hypetensive group was 14.60 and in normotensive group was 14.15 which was statistically significant (p value 0.005), the study conducted by Sileshi et al [16] showed mean hemoglobin of mothers in hypetensive group was 14.5± 1.93 and in normotensive group was 13.78± 2.13 which was statistically significant (p value 0.027), the study conducted by Ahmed shariff et al [36]showed mean hemoglobin of mothers in hypetensive group was 14.5± 1.93 and in normotensive group was 9.68± 0.64 which was statistically significant (p value 0.05), the study conducted by Neelam jhajharia et al [35]showed mean hemoglobin of mothers in hypetensive group was 8.80± 2.53 and in normotensive group was 9.728± 2.47 which was statistically significant (p value <0.05).

TABLE: 1 Comparison Of hematocrit of mothers between hypertensive and normotensive groups

	Hematocrit of mother in hypetensive group	**Hematocrit of mother in normotensive group**	**p value**
Yilmaz et al [4] (2016)	33.3±4.04	34.32± 3.01	0.970
Elgari et al [7] (2018)	35± 3.9	33± 4.9	<0.01
Enagaw et al [17] (2017)	42.7	41.3	<0.001
Sileshi et al [16] (2021)	42.45± 5.42	40.6± 4.33	0.001
Al-bahadily et al [33] (2017)	Not done	Not done	Not done
Ahmed shariff et al [36] (2020)	21.1±2.55	27.6± 2.05	<0.05
Neelam jhajharia et al [35] (2019)	32.68± 7.29	30.04± 23.8	<0.05
Our study	35.67± 6.22	37.03± 4.27	0.167

In our study mean hematocrit of mothers in hypertensive group was (35.67± 6.22) as compared to normotensive group (37.03± 4.27) and the difference was found to be statistically non- significant (P value 0.167). The study conducted by Yilmaz et al[4]reported that mean hematocrit of mothers inhypertensive group was 33.3±4.04and in normotensive group was 34.32± 3.01 and the difference was statistically non significant (p value0.970).

The study conducted by Elgari et al[7] showed mean hematocrit of mothers in hypetensive group was 35± 3.9 and in normotensive group was 33± 4.9 which was statistically significant (p value <0.01). The study conducted by Enagaw et al [17]showed mean hematocrit of mothers in hypetensive group was 42.7 and in normotensive group was 41.3 which was statistically significant (p value <0.001), the study conducted by Sileshi et al [16] showed mean hematocrit of mothers in hypetensive group was 42.45±5.42 and in normotensive group was 40.6± 4.33 which was statistically significant (p value 0.001), the study conducted by Ahmed shariff et al [36]showed mean hematocrit of mothers in hypertensive group was 21.1±2.55 and in normotensive group was 27.6±2.05 which was statistically significant (p value <0.05), the study conducted by Neelam jhajharia et al [35]showed mean hematocrit of mothers in hypertensive group was 32.68±7.29 and in normotensive group was 30.04± 23.8 which was statistically significant (p value <0.05).

TABLE: 12: Comparison Of platelets of mothers between hypertensive and normotensive groups

	platelets of mother in hypetensive group	**platelets of mother in normotensive group**	**p value**
Yilmaz et al [4] 2016	2.08±0.64	2.08±0.64	0.031
Elgari et al [7] 2018	2.23± 7.83	2.28± 0.707	0.687
Enagaw et al [17] 2017	2.7	2.55	0.262
Sileshi et al [16] 2021	2.5± 0.75	2.44± 0.82	0.714
Al-bahadily et al [33] 2017	2.4± 0.77	2.41± 0.72	0.880
Ahmed shariff et al [36] 2020	1.64±0.34	3.7± 0.46	<0.05
Neelam jhajharia et al[35] 019	1.31± 0.62	3.24± 2.3	<0.0001
Our study	2.44± 0.86	2.54± 0.8	0.525

In our study mean platelets of mothers in hypertensive group was (2.44± 0.86) as compared to normotensive group (2.54± 0.8) and the difference was found to be statistically non- significant (P value 0.525). The study conducted by Elgari et al [7] showed mean platelets of mothers in hypetensive group was 2.23± 7.83 and in normotensive group was2.28± 0.707 which was statistically non significant (p value 0.687), the study conducted by Enagaw et al[17]showed mean platelets of mothers in hypetensive group was 2.7 and in normotensive group was 2.55 which was statistically non significant (p value 0.262), the study conducted by Sileshi et al [16] showed mean platelets of mothers in hypetensive group was 2.5± 0.75 and in normotensive group was 2.44± 0.82 which was statistically non significant (p value 0.714), the study conducted byAl-bahadily et al[33]showed mean platelets of mothers in hypetensive group was 2.4± 0.77 and in normotensive group was 2.41± 0.72 which was statistically non significant (p value 0.88)

The study conducted by Yilmaz et al[4]reported that mean platelets of mothers inhypertensive group was 2.08±0.64 and in normotensive group was 2.08±0.64 and the difference was statistically significant (p value0.031), the study conducted by Ahmed shariff et al[36] showed mean platelets of mothers in hypertensive group was 1.64±0.34 and in normotensive group was 3.7± 0.46 which was statistically significant (p value <0.05), the study conducted by Neelam jhajharia et al[35]showed mean platelets of mothers in hypertensive group was 1.31± 0.62 and in normotensive group was 3.24± 2.3 which was statistically significant (p value <0.0001).

Comparison Of MCH of mothers between hypertensive and normotensive groups

	MCH of mother in hypetensive group	**MCH of mother in normotensive group**	**p value**
Elgari et al [7] 2018	29± 2.7	26± 3.3	<0.01
Enagaw et al [17] 2017	29.6± 1.75	29.6± 1.7	0.937
Sileshi et al [16] 2021	29.8± 2.7	30.4± 2.03	0.118
Al-bahadily et al[33] 2017	28.67± 3.17	29.18± 3.44	0.277
Our study	28.11± 2.9	28.92± 2.57	0.108

In our study mean MCH of mothers in hypertensive group was (28.11± 2.9) as compared to normotensive group (28.92± 2.57) and the difference was found to be statistically non-significant (P value 0.108) . the study conducted by Enagaw et al [17]showed mean MCH of mothers in hypetensive group was 29.6± 1.75 and in normotensive group was 29.6± 1.7 which wasstatistically non significant (p value 0.937), the study conducted by Sileshi et al[16]showed mean MCH of mothers in hypetensive group was 29.8± 2.7 and in normotensive group was 29.6± 1.7 which was statistically non significant (p value 0.118), the study conducted byAl-bahadily et al [33]showed mean platelets of mothers in hypetensive group was 28.67± 3.17 and in normotensive group was 29.18± 3.44 which was statistically non significant (p value0.277).

The study conducted by Elgari et al [7] showed mean MCH of mothers in hypetensive group was 29± 2.7and in normotensive group was 26± 3.3 which was statistically significant (p value <0.01),

TABLE: 13, Comparison of MCHC of mothers between hypertensive and normotensive groups

	MCHC of mother in hypetensive group	**MCHC of mother in normotensive group**	**p value**
Elgari et al [7] 2018	33± 1.3	32± 1.6	<0.01
Enagaw et al [17] 2017	34.27± 1.17	34.7± 1.13	0.003
Sileshi et al [16] 2021	34± 1.92	34.35± 3.95	0.192
Al-bahadily et al [33] 2017	32.97± 1.83	32.81± 1.27	0.48
Our study	32.85± 1.47	32.76± 0.95	0.696

In our study mean MCHC of mothers in hypertensive group was 32.85± 1.47 as compared to normotensive group 32.76± 0.95 and the difference was found to be statistically non-significant (P value 0.696), the study conducted by Sileshi et al[16] showed mean MCHC of mothers in hypetensive group was 34± 1.92 and in normotensive group was 34.35± 3.95 which was statistically non significant (p value 0.192), the study conducted byAl-bahadily et al [33]showed mean MCHC of mothers in

hypetensive group was 32.97± 1.83 and in normotensive group was 32.81± 1.27 which was statistically non significant (p value0.48).

The study conducted by Enagaw et al [17]showed mean MCHC of mothers in hypetensive group was 34.27± 1.17 and in normotensive group was 34.7± 1.13which was statistically significant (p value0.003), the study conducted by Elgari et al [7] showed mean MCHC of mothers in hypetensive group was 33± 1.3 and in normotensive group was 32± 1.6 which was statistically significant (p value <0.01),

TABLE 14: Comparison Of RDW of mothers between hypertensive and normotensive groups

	RDW of mother in hypetensive group	**RDW of mother in normotensive group**	**p value**
Elgari et al [7] 2018	14± 2	14± 2	<0.01
Yilmaz et al [4] 2016	15.23± 1.96	14.48± 1.7	0.021
Enagaw et al [17] 2017	43.19± 2.62	42.9± 4.42	<0.001
Sileshi et al [16] 2021	43.9± 5.3	42.03± 2.85	0.063
Our study	47.99± 11.65	48.83± 9.37	0.438

In our study mean RDW of mothers in hypertensive group was 47.99± 11.65 as compared to normotensive group 48.83± 9.37 and the difference was found to be statistically non-significant (P value 0.438), the study conducted by Sileshi et al [16] showed mean RDW of mothers in hypetensive group was 43.9± 5.3 and in normotensive group was 42.03± 2.85 which was statistically non significant (p value 0.063).

The study conducted by Enagaw et al [17]showed mean RDW of mothers in hypetensive group was 43.19± 2.62 and in normotensive group was 42.9± 4.42 which was statistically significant (p value<0.001), the study conducted by Elgari et al[7] showed mean RDW of mothers in hypetensive group was 14± 2 and in normotensive group was 14± 2 which was statistically significant (p value <0.01), the study conducted by Yilmaz et al [4]showed mean RDW of mothers in hypetensive group was 15.23± 1.96 and in normotensive group was 14.48± 1.7 which was statistically significant (p value 0.021).

TABLE 15: Comparison Of PDW of mothers between hypertensive and normotensive groups

	PDW of mother in hypetensive group	PDW of mother in normotensive group	p value
Enagaw et al [17] 2017	12.6± 1.8	12± 1.7	0.007
Our study	15.35± 2.23	15.91± 1.92	0.146

In our study mean PDW of mothers in hypertensive group was 15.35± 2.23as compared to normotensive group 15.91± 1.92 and the difference was found to be statistically non-significant (P value 0.146).

The study conducted by Enagaw et al[17]showed mean PDW of mothers in hypetensive group was 12.6± 1.8 and in normotensive group was 12± 1.7 which was statistically significant (p value 0.007),

TABLE: 16, Comparison of TLC of mothers between hypertensive and normotensive groups

	TLC of mother in hypetensive group	TLC of mother in normotensive group	p value
Yilmaz et al [4] 2016	9.942± 2.5	9.79± 2.25	0.661
Elgari et al[7] 2018	10.3± 4.4	10.1± 3.4	0.740
Enagaw et al [17] 2017	6.90	5.2	<0.001
Sileshi et al [16] 2021	6.52± 3.08	5.29± 2.27	0.0001
Al-bahadily et al [33] 2017	12.8± 4.2	12.69± 4.28	0.859
Ahmed shariff et al [36] 2020	15.9± 2.09	7.8± 1.7	<0.05
Neelam jhajharia et al [35] 2019	16.34± 1.99	11.52± 4.83	<0.05
Our study	12.21± 3.48	10.86± 3.4	0.033

In our study mean TLC of mothers in hypertensive group was 12.21± 3.48 as compared to normotensive group 10.86± 3.4 and the difference was found to be statisticallysignificant (P value 0.033), the study conducted by Enagaw et al [17]showed mean TLC of mothers in hypetensive group was 6.90 and in normotensive group

was 5.2 which was statistically significant (p value <0.001) . the study conducted by Sileshi et al [16] showed mean TLC of mothers in hypetensive group was 6.52± 3.08 and in normotensive group was 5.29± 2.27 which was statistically significant (p value 0.0.0001), the study conducted by Ahmed shariff et al[36]showed mean TLC of mothers in hypetensive group was 15.9± 2.09 and in normotensive group was 7.8± 1.7 which was statistically significant (p value <0.05), the study conducted by Neelam jhajharia et al [35]showed mean TLC of mothers in hypetensive group was 16.34± 1.99 and in normotensive group was 11.52± 4.83 which was statistically significant (p value <0.05).

The study conducted by Yilmaz et al[4]reported that mean TLC of mothers inhypertensive group was 9.942± 2.5 and in normotensive group was 10.1± 3.4 and the difference was statistically non significant (p value0.661), the study conducted by Elgari et al [7] showed mean TLC of mothers in hypetensive group was 10.3± 4.4 and in normotensive group was 12.6± 1.6which was statistically non significant (p value 0.740). The study conducted by Al-bahadily et al[33] reported that mean TLC of mothers inhypertensive group was 12.8± 4.2 and in normotensive group was 12.69± 4.28 and the difference was statistically non significant (p value0.859).

TABLE: 16, Comparison Of Neutrophils of mothers between hypertensive and normotensive groups

	Neutrophils of mother in hypetensive group	**Neutrophils of mother in normotensive group**	**p value**
Elgari et al [7] 2018	7.19± 1.11	7.74± 1.36	<0.001
Al-bahadily et al [33] 2017	9.76± 3.65	10.25± 4.07	0.371
Our study	7.69± 2.39	9.258± 1.11	0.293

In our study mean neutrophils of mothers in hypertensive group was 7.69± 2.39 as compared to normotensive group 9.258± 1.11 and the difference was found to be statistically non significant (P value 0.293).The study conducted by Al-bahadily et al[33]reported that mean neutrophils of mothers inhypertensive group was 9.76± 3.65 and in normotensive group was 10.25± 4.07 and the difference was statistically non significant (p value0.371).

The study conducted by Elgari et al[7] showed mean neutrophils of mothers in hypetensive group was 7.19± 1.11 and in normotensive group was 7.74± 1.36 which was statisticallysignificant (p value <0.001).

CORD BLOOD SAMPLES

TABLE 17, : Comparison Of hemoglobin of cord blood between hypertensive and Normotensive groups

	Hemoglobin of cord blood in hypetensive group	**Hemoglobin of cord blood in normotensive group**	**P value**
Okoye H C et al [3] 2016	16.6± 3.1	14.8± 2.3	<0.001
Elgari et al [7] 2018	14.3± 1.6	14.6 ± 1.7	0.252
Tiwari et al [31] 2021	15.88± 2.68	15.65± 5.04	0.776
Al -bahadily et al [33] 2017	17.27± 2.29	16.86± 1.33	0.132
Jaiom dagar et al [34] 2016	15.7	15.7	0.587
K Mouna et al [32] 2017	17.6± 1.17	14.6± 0.65	<0.001
Aliabad et al [30] 2022	15.1± 1.8	15.1± 1.8	0.07
Omoniyi et al [29] 2020	Not done	Not done	Not done
Our study	16.11± 3.29	14.44± 2.59	**0.002**

In our study mean hemoglobin of cord blood in hypertensive group was higher (16.11 ± 3.29) as compared to normotensive group (14.44 ± 2.59) and the difference was found to be statistically significant (P value 0.002). The study conducted by Okoye H C et al[3]reported that mean hemoglobin of cord blood inhypertensive group was 16.6±3.1 and in normotensive group was 14.8 ± 2.3 and the difference was statistically significant (p value<0.001). The study conducted by K Mouna et al[32] reported that mean hemoglobin of cord blood inhypertensive group was 17.6± 1.17and in normotensive group was 14.6± 0.65and the difference was statistically significant (p value<0.001).

The study conducted by Elgari et al[7]showed mean hemoglobin of cord blood in hypetensive group was 14.3 ± 1.6% and in normotensive group was 14.6 ± 1.7 which was statistically non-significant. The study conducted by Tiwari et al [31]showed mean hemoglobin of cord blood in hypetensive group was 15.88 ± 2.68 and in

normotensive group was 15.65 ± 5.04 which was statistically non-significant. The study conducted by Al -bahadily et al [33] showed mean hemoglobin of cord blood in hypetensive group was 17.27± 2.29 and in normotensive group was 16.86± 1.33 which was statistically non-significant. The study conducted by Jaiom dagar et al [34]showed mean hemoglobin of cord blood in hypetensive group was 15.7 and in normotensive group was 15.7 which was was statistically non-significant. The study conducted by Aliabad et al [30]showed mean hemoglobin of cord blood in hypetensive group was 15.1± 1.8and in normotensive group was 15.1± 1.8which was statistically non-significant

TABLE 18: Comparison Of hematocrit of cord blood between hypertensive and non hypertensive groups

	Hematocrit of cord blood in hypetensive group	**Hematocrit of cord blood in normotensive group**	**P value**
Okoye H C et al [3] 2016	51.1± 9.0	45.5± 7.5	<0.001
Elgari et al [7] 2018	44± 5.1	42 ± 5.6	<0.05
Tiwari et al [31] 2021	48.68± 6.98	48.63± 15.17	0.983
Al -bahadily et al [33] 2017	Not compared	Not compared	Not compared
Jaiom dagar et al[34] 2016	51.82	51.57	0.945
K Mouna et al 2017	53± 3.6	45.1± 1.7	<0.0001
Aliabad et al [30]2022	45.2± 4.6	44.5± 6.1	0.62
Omoniyi et al [29] 2020	48.4± 9.1	45.8± 7	0.013
Our study	46.33± 12.58	46.27± 6.3	0.975

In our study mean hematocrit of cord blood in hypertensive group was higher (46.33 ± 12.58) as compared to normotensive group (46.27 ± 6.3) and the difference was comparable (P value 0.975). The study conducted by Tiwari et al[31]showed mean hematocrit of cord blood in hypetensive group was 48.68 ± 6.98 and in normotensive group was 48.63± 15.17 which was lower than that observed in our study and was statistically non-significant(p value 0.983), The study conducted by Jaiom dagar et [34] alshowed mean hematocrit of cord blood in hypetensive group was 51.82 and in normotensive group was51.57which was lower than that observed in our study and was statistically non-significant(p value 0.983), The study conducted by Aliabad et al [30]showed mean hematocrit of cord blood in hypetensive group was 45.2± 4.6 and in normotensive group was44.5± 6.1which was lower than that observed in our study and was statistically non-significant.

The study conducted by Okoye H C et al[3]reported that mean hematocrit of cord blood inhypertensive group was 51.1 ± 9.0 and in normotensive group was 45.5 ± 7.5 and the difference was statistically significant (p value<0.001),). The study conducted by K Mouna et al [32] reported that mean hematocrit of cord blood inhypertensive group was 53± 3.6and in normotensive group was 45.1± 1.7and the difference was statistically significant (p value<0.001).The study conducted by Elgari et al [7] showed mean hematocrit of cord blood in hypetensive group was 44± 5.1and in normotensive group was 42 ± 5.6 and difference was statistically significant(p value<0.05) . The study conducted by Omoniyi et al [29]showed mean hematocrit of cord blood in hypetensive group was 48.4± 9.1and in normotensive group was 45.8± 7 and difference was statistically significant(p value0.013) .

TABLE : 19, Comparison Of MCH of cord blood between hypertensive and non hypertensive groups

	MCH of cord blood in hypetensive group	MCH of cord blood in normotensive group	P value
Okoye H C et al [3] 2016	Not compared	Not compared	Not compared
Elgari et al 7 2018	35± 2.9	32 ± 4.2	<0.01
Tiwari et al [31] 2021	32.73± 3.7	32.54± 4.95	0.823
Al -bahadily et al [33] 2017	35.64± 2.31	35.64± 2.31	0.480
Jaiom dagar et al [34] 2016	36.13	35.32	0.052
K Mouna et al [32] 2017	35± 1.25	35.2± 2.01	0.406
Aliabad et al [30] 2022	35.6± 2.0	33.6± 3.6	0.01
Omoniyi et al [29] 2020	35.5± 4.7	35.1± 3.4	0.527
Our study	34.36± 3.52	34.04± 2.16	0.553

In our study mean MCH of cord blood in hypertensive group was (34.36± 3.52) as compared to normotensive group (34.04 ± 2.16) and the difference was comparable (P value 0.553).The study conducted by Tiwari et al [31] showed mean MCH of cord blood in hypetensive group was 32.73 ± 3.7 and in normotensive group was 32.54± 4.95 which was statistically nonsignificant(p value 0.823), The study conducted by Al -bahadily et al [33]showed mean MCH of cord blood in hypetensive group was 35.64± 2.31and in normotensive group was35.64± 2.31which was statistically non-significant(p value 0.480), The study conducted by K Mouna et al [32]showed mean MCH of cord blood in hypetensive group was 35± 1.25and in normotensive group was35.2± 2.01which was statistically non-significant(p value 0.406), The study conducted by Omoniyi et al [29]showed mean MCH of cord blood in hypetensive group was 35.5± 4.7and in normotensive group was35.1± 3.4which was statistically non-significant(p value 0.527).

The study conducted by Elgari et al [7] showed mean MCH of cord blood in hypetensive group was 35 ± 2.9 and in normotensive group was 32 ± 4.2and difference was statistically significant(p value<0.01), The study conducted by Jaiom dagar et al [34]showed mean MCH of cord blood in hypetensive group was 36.13and in normotensive group was 35.32 and difference was statistically significant(p value0.052), The study conducted by Aliabad et al [30] showed mean MCH of cord blood in hypetensive group was 35.6± 2.0and in normotensive group was 33.6± 3.6and difference was statistically significant(p value0.01),

TABLE: 20, Comparison Of MCHC of cord blood between hypertensive and non hypertensive groups

	MCHC of cord blood in hypetensive group	**MCHC of cord blood in normotensive group**	**P value**
Okoye H C et al [3] 2016	**Not done**	**Not done**	Not done
Elgari et al [7] 2018	32± 4.2	32 ± 1.8	0.92
Tiwari et al [31] 2021	33.05± 1.41	33.39± 1.42	0.232
Al -bahadily et al [33] 2017	34.16± 1.49	33.71± 1.33	0.0290
Jaiom dagar et al [34] 2016	33.44	32.46	0.951
K Mouna et al [32] 2017	32.85± 0.83	33.37± 1.02	0.08
Aliabad et al [30] 2022	32.3± 0.8	32.1± 1.1	0.56
Omoniyi et al [29] 2020	32.1± 3.6	32.7± 2.5	0.118
Our study	33.49± 1.61	33.19± 1.49	0.288

In our study mean MCHC of cord blood in hypertensive group was (33.49± 1.61) as compared to normotensive group (33.19 ± 1.49) and the difference was comparable (P value 0.288), the study conducted by Elgari et al [7] showed mean MCHC of cord blood in hypetensive group was 32 ± 4.2 and in normotensive group was 32 ± 1.8and difference was comparable (p value 0.92) .The study conducted by Tiwari et al [31] showed mean MCHC of cord blood in hypetensive group was 33.49 ± 1.61 and in normotensive group was 33.19± 1.49 which was statistically non-significant(p

value 0.232), The study conducted by Jaiom dagar et al [34]showed mean MCHC of cord blood in hypetensive group was 33.44 and in normotensive group was32.46 which was statistically non-significant(p value 0.951), The study conducted by K Mouna et al [32]showed mean MCHC of cord blood in hypetensive group was 32.85± 0.83 and in normotensive group was33.37± 1.02which was statistically non-significant(p value 0.08), The study conducted by Aliabad et al [30]showed mean MCHC of cord blood in hypetensive group was 32.3± 0.8 and in normotensive group was32.1± 1.1which was statistically non-significant(p value 0.56), The study conducted by Omoniyi et al [29]showed mean MCHC of cord blood in hypetensive group was 32.1± 3.6and in normotensive group was32.7± 2.5which was statistically non-significant(p value 0.118).

The study conducted by Al -bahadily et al [33]showed mean MCHC of cord blood in hypetensive group was 34.16± 1.49and in normotensive group was33.71± 1.33which was statistically significant(p value 0.0290).

TABLE: 21, Comparison of RDW of cord blood between hypertensive and non hypertensive groups

	RDW of cord blood in hypetensive group	**RDW of cord blood in normotensive group**	**p value**
Elgari et al [7] 2018	19± 0.01	18 ± 1.8	<0.01
Aliabad et al [30] 2022	17.3± 1.2	12.1± 1.1	<0.0001
Our study	55.51± 19.79	53.69± 6.68	0.499

In our study mean RDW of cord blood in hypertensive group was (55.51± 19.79) as compared to normotensive group (53.69 ± 6.68) and the difference was comparable (P value 0.499).

The study conducted by Elgari et al[7] showed mean RDW of cord blood in hypetensive group was 19 ± 0.01 and in normotensive group was 18± 1.8and difference was statistically significant (p value<0.01). The study conducted by Aliabad et al [30] showed mean RDW of cord blood in hypetensive group was 17.3± 1.2 and in normotensive group was 12.1± 1.1 and difference was statistically significant (p value<0.0001) .

TABLE 22: Comparison Of TLC of cord blood between hypertensive and non hypertensive groups

	TLC of cord blood in hypetensive group	TLC of cord blood in normotensive group	P value
Okoye H C et al [3] 2016	11.1± 3.2	10.6± 4.3	0.443
Elgari et al [7] 2018	11.9± 1.9	12.3 ± 4.2	0.7
Tiwari et al [31] 2021	10.0± 17.7	11.7± 6.1	0.516
Al -bahadily et al [33] 2017	16.14± 5.13	20.58± 13.12	0.002
Jaiom dagar et [34] 2016	15.314	15.617	Not significant
K Mouna et al [32] 2017	8.98± 0.818	15.38± 0.992	<0.001
Aliabad et al [30] 2022	8.4± 3.2	11.3± 3.4	0.002
Omoniyi et al [29] 2020	10.9	11.4	0.198
Our study	14.34± 23.7	13.2± 16.8	0.725

In our study mean TLC of cord blood in hypertensive group was higher (14.34± 23.7) as compared to normotensive group (13.2± 16.8) and the difference was comparable (P value 0.725). The study conducted by Okoye H C et al [3] reported that mean TLC of cord blood inhypertensive group was 11.1± 3.2 and in normotensive group was 10.6± 4.3 and the difference was comparable (p value 0.443). The study conducted by Elgari et al [7] showed mean TLC of cord blood in hypetensive group was11.9± 1.9 and in normotensive group was 12.3 ± 4.2 which was comparable (p value 0.7), The study conducted by Tiwari et al [31] showed mean TLC of cord blood in hypetensive group was 10.0± 17.7 and in normotensive group was 11.7± 6.1 which was statistically non-significant(p value 0.516), The study conducted by Jaiom dagar et al [34]

showed mean TLC of cord blood in hypetensive group was 15.314 and in normotensive group was 15.617 which was statistically non-significant, The study conducted by Omoniyi et al [29] showed mean TLC of cord blood in hypetensive group was 10.9 and in normotensive group was 11.4 which was statistically non-significant(p value 0.198),

The study conducted by Al -bahadily et al [33]showed mean TLC of cord blood in hypetensive group was 16.14± 5.13 and in normotensive group was 20.58± 13.12 which was statistically significant(p value 0.002),The study conducted by K Mouna et al [32]showed mean TLC of cord blood in hypetensive group was 8.98± 0.818 and in normotensive group was 15.38± 0.992 which was statisticallysignificant(p value <0.001),The study conducted by Aliabad et al [30] showed mean TLC of cord blood in hypetensive group was 8.4± 3.2 and in normotensive group was 11.3± 3.4 which was statisticallysignificant(p value 0.002).

TABLE: 23: Comparison Of NEUTROPHILS of cord blood between hypertensive and non hypertensive groups

	NEUTROPHILS of cord blood in hypetensive group	**NEUTROPHILS of cord blood in normotensive group**	**P value**
Okoye H C et al [3] 2016	4.5± 3.1	5.4± 2.7	0.033
Elgari et al [7] 2018	44.9± 15.3	53.2± 12.5	<0.001
Tiwari et al [31] 2021	60.95± 18.5	67.02± 12.29	0.056
Al -bahadily et al [33] 2017	8.49± 3.76	8.7± 3.92	0.709
Jaiom dagar et al [34] 2016	5.06	8.261	<0.001
K Mouna et al [32] 2017	45.9± 2.12	52.2± 1.72	<0.001
Aliabad et al [30] 2022	3.9± 2.4	5.7± 2.9	0.01
Omoniyi et al [29] 2020	4.763	5.451	0.023
Our study	6.588± 3.02	9.18± 1.73	<0.0001

In our study mean neutrophils of cord blood in hypertensive group was (6.588± 3.02) ascompared to normotensive group (9.18± 1.73) and the difference was statistically significant (P value <0.0001). The study conducted by Okoye H C et al [3]showed mean neutrophils of cord blood in hypetensive group was 4.5± 3.1 and in normotensive group was 5.4± 2.7 which was statistically significant (p value 0.033), The study conducted by Elgari et al [7]showed mean neutrophils of cord blood in hypetensive group was 44.9± 15.3 and in normotensive group was 53.2± 12.5 which was statisticallysignificant(p value <0.001), The study conducted by Tiwari et al [31]showed mean neutrophils of cord blood in hypetensive group was 60.95± 18.5 and

in normotensive group was 67.02± 12.29 which was statisticallysignificant(p value 0.056), The study conducted by Jaiom dagar et al [34]showed mean neutrophils of cord blood in hypetensive group was 5.06 and in normotensive group was 8.261 which was statisticallysignificant(p value <0.001), The study conducted by K Mouna et al [32]showed mean neutrophils of cord blood in hypetensive group was 45.9± 2.12 and in normotensive group was 52.2± 1.72 which was statisticallysignificant(p value <0.001), The study conducted by Aliabad et al [30]showed mean neutrophils of cord blood in hypetensive group was 3.9± 2.4 and in normotensive group was 5.7± 2.9 which was statisticallysignificant(p value 0.01), The study conducted by Omoniyi et al [29]showed mean neutrophils of cord blood in hypetensive group was 4.763 and in normotensive group was 5.451 which was statisticallysignificant(p value 0.023)

The study conducted by Al -bahadily et al [33] reported that mean neutrophils of cord blood inhypertensive group was 8.49± 3.76 and in normotensive group was 8.7± 3.92 and the difference was comparable (p value 0.709).

TABLE 24: Comparison Of PLATELETS of cord blood between hypertensive and non hypertensive groups

	platelets of cord blood in hypetensive group	**Platelets of cord blood in normotensive group**	**P value**
Okoye H C et al [3] 2016	1.57± 1.18	2.53± 0.88	<0.001
Elgari et al [7] 2018	1.75± 1.18	2.53± 1.19	<0.001
Tiwari et al [31] 2021	1.01± 0.8	2.28± 1.03	<0.001
Al -bahadily et al [33] 2017	2.46± 0.81	2.81± 0.92	0.007
Jaiom dagar et al [34] 2016	1.42	2.09	<0.001
K Mouna et al [32] 2017	0.942± 0.1	2.02± 0.31	<0.001
Aliabad et al [30] 2022	1.57± 0.7	2.62± 0.62	<0.0001
Omoniyi et al [29] 2020	1.73	2.08	0.047
Our study	2.32± 0.91	2.69± 0.58	**0.009**

In our study mean platelet of cord blood in hypertensive group was (2.32± 0.91) as compared to normotensive group (2.69± 0.58) and the difference was found to be statistically significant (P value **0.009**). The study conducted by Okoye H C et al[3] reported that mean platelet of cord blood inhypertensive group was 1.57 ± 1.18 and in

normotensive group was 2.53± 0.88 and the difference was statistically significant (p value<0.001). the study conducted by Elgari et al[7] showed mean platelet of cord blood in hypetensive group was 1.75± 1.18 and in normotensive group was 2.53 ± 1.19 which was statistically significant (p value <0.001), the study conducted by Tiwari et al[31] showed mean platelet of cord blood in hypetensive group was 1.01± 0.8 and in normotensive group was 2.28± 1.03 which was statistically significant (p value <0.001), the study conducted by Al -bahadily et al[33]showed mean platelet of cord blood in hypetensive group was 2.46± 0.81and in normotensive group was 2.81± 0.92 which was statistically significant (p value 0.007), the study conducted by Jaiom dagar et al [34]showed mean platelet of cord blood in hypetensive group was 1.42 and in normotensive group was 2.09 which was statistically significant (p value <0.001), the study conducted by K Mouna et al [32]showed mean platelet of cord blood in hypetensive group was 0.942± 0.1 and in normotensive group was 2.02± 0.31 which was statistically significant (p value <0.001), the study conducted by Omoniyi et al [29]showed mean platelet of cord blood in hypetensive group was 1.73 and in normotensive group was 2.08 which was statistically significant (p value 0.047)

TABLE 25: Comparison Of PDW of cord blood between hypertensive and non hypertensive groups

	PDW of cord blood in hypetensive group	**PDW of cord blood in normotensive group**	**p value**
Aliabad et al [30] 2022	16.0± 3.5	11.7± 0.8	<0.0001
Our study	14.07± 3.39	12.7± 1.48	**0.004**

In our study mean platelet of cord blood in hypertensive group was (14.07± 3.39) as compared to normotensive group (12.7± 1.48) and the difference was found to be statistically significant (P value **0.004**). The study conducted by Aliabad et al[30]reported that mean platelet of cord blood inhypertensive group was 16.0± 3.5 and in normotensive group was 11.7± 0.8 and the difference was statistically significant (p value<0.0001).

COMPARISION OF HEMATOLOGICAL PARAMETERS IN SPECTRUM OF HYPERTENSIVE DISORDERS OF PREGNANCY

Our study showed that there is no significant difference in hematological profile like hemoglobin, hematocrit, platelets, total leucocyte count, RDW, MCHC, with severity of hypertensive disorders of pregnancy.

COMPARISION OF NEONATAL COMPLICATIONS BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUPS

Need for phototherapy is higher in newborns of hypertensive group as that of normotensive group , due to higher rates of prematurity in hypertensive group, rate of polycythemia is significantly higher in hypertensive group than that of normotensive group

COMPARISION OF NICU ADMISSIONS BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUPS

NICU admissions in hypertensive group was (25%) significantly higher in newborns of hypertensive group than that of normotensive group , explained by higher rates of prematurity in hypertensive group.

GESTATIONAL AGE COMPARISION BETWEEN HYPERTENSIVE & NORMOTENSIVE GROUP

Preterm deliveries were significantly higher in hypertensive group than that of normotensive group , due to need for earlier intervention for raised BP records

STRENGTHS:

1) It's is prospective cohort study
2) Less bias due to prospective evaluation of exposure.

3) We compared most of the hematological parameters in spectrum of hypertensive disorders of pregnancy, while very few studies have compared all the parameters.
4) Less chances of missing cases and dara.

LIMITATION: Some limitations of the study should be acknowledged

1) study conducted during COVID breakdown , thus making less sample,
2) study duration was short
3) This study reflecting percentage of hypertensive disorders of pregnancy in our hospital & not all cities in our country.
4) Some possible confounding factors like- iron intake , viral infections, possible immunological disease have the potention to effect the results , which were not considered.

CONCLUSION

1) Study was conducted in the Department of Obstetrics and Gynecology and Department of Neonatology, AIIMS Jodhpur from April 2021 to October 2022
2) This was a Prospective cohort study, comparing effect of hypertensive disorders of pregnancy on hematological profile between hypertensive & normotensive pregnant womens , also hematological profile of umbilical cord blood of hypertensive & normotensive pregnant women.
3) 120 patients were recruited to particicpate in study, out of which 60 were hypertensive & 60 were normotensive pregnant women.
4) The mean total leucocyte count was significantly higher in mothers of hypertensive group than that of normotensive group. which suggests an imbalance in immune cells & inflammatory response in patients with hypertensive disorders of pregnancy .
5) Hemoglobin , hematocrit , MCH, MCHC, RDW, platelets, PDW, showed no statistical difference between hypertensive & normotensive groups. therefore cohort study with longer duration of study period required for further evaluation
6) The mean hemoglobin & mean PDW were significantly higher in umbilical cord blood of hypertensive group than that of normotensive group .
7) The mean platelet count & mean neutrophil count were significantly lower in umbilical cord blood of hypertensive group than that of normotensive group, thus neutropenia & thrombocytopenia during the early neonatal period should be closely monitored so as to facilitate early detection of sepsis & bleeding tendencies in order to improve morbidity & mortality among newborns
8) Hematocrit, MCH, MCHC, RDW, TLC showed no statistical difference between umbilical cord blood of hypertensive group than that of normotensive group .
9) The rates of prematurity & NICU admissions were significantly higher in newborns mothers of hypertensive group than that of normotensive group .
10) Polycythemia, TTNB, birth asphyxia showed no statistical difference between hypertensive & normotensive group .

11) Hemoglobin, platelet count, RDW, hematocrit, TLC showed no statistical difference in spectrum of hypertensive disorders of pregnancy , thus there is no correlation with severity of disease from this parameters

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APPENDIX 1

CASE RECORD SHEET:- (CONTROL / INTERVENTION GROUP)

- Name : Registration Id:
- Age: Qualification/education: mobile no.
- Occupation: Residence:
- Date of admission: date of discharge:
- Chief complaints
- HOPP
- Menstrual History:

  Menstrual cycle-

  LMP-

  POG-

  EDD-

- Obstetric History:
- Past History:
- Family History:
- Personal History:

On Examination:

- General condition
- Pulse rate /min Blood pressure(mmHg)
- Respiratory rate/min Temperature
- Pallor / Icterus/Cyanosis/Clubbing/Lymphadenopathy/Edema
- Weight(Kg): [prepregnancy if known] Height(cm):

- Body Mass Index(Kg/m^2)
- Central Nervous System:
- Respiratory System:
- Cardio-Vascular System:
- Per-Abdomen

Final Diagnosis:

INVESTIGATIONS:

	DATE Mother	Newborn
Blood Group		
CBC- Hb- **HEMATOCRIT** **PCV** **MCH** **MCHC** **RDW** TLC- **P L E M** Plt- **PDW**		
Urinary proteins		
OGTT		
HIV/HBsAg/VDRL		
RFT		
LFT		
Blood group		
TSH		
USG		
Others		

- Labour-

Onset- Spontaneous/ Induced

Indication of induction-

Duration of stages of labour- $1^{st}/2^{nd}/3^{rd}$- hrs/ mins/ mins

Mode of delivery:

Type of placental delivery-

Any complications:

Baby:

Date time weight sex APGAR

Any complications:

Head circumference- NICU admission- YES/NO

Breast feeding started at:

Any complications /problem

Jaundice/ phototherapy/ exchange transfusion

Polycythemia/ fever/ lethargy/inability to feed/

OTHERS:

Day 1 Day 2 Day 3 Day 4 day 5

APPENDIX 2
ALL INDIA INSTITUTE OF MEDICAL SCIENCES, JODHPUR, RAJASTHAN
INFORMED CONSENT FORM

Title of Thesis/Dissertation: "**To study the Effects of maternal hypertension on the neonatal umbilical cord hemogram."**

Name of PG Student : Dr. Chaithra B V Tel. No. : 7975738127

Patient/Volunteer Identification No. : _____

I, _____W/o or D/o _____

R/o _____

give my full, free, voluntary consent to be a part of the study "**To study the Effects of maternal hypertension on the neonatal umbilical cord hemogram: A Prospective Cohort Study"** the procedure and nature of which has been explained to me in my own language to my full satisfaction. I confirm that I have had the opportunity to ask questions. I fully understand that any of the above mentioned observation can be given to me, still I want to be a part of study.

I understand that my participation is voluntary and am aware of my right to opt out of the study at any time without giving any reason.

I understand that the information collected about me and any of my medical records may be looked at by responsible individual from AIIMS, Jodhpur or from regulatory authorities. I give permission for these individuals to have access to my records.

Date: _____ _____

Place: _____ Signature/Left thumb impression

This to certify that the above consent has been obtained in my presence.

Date: _____ _____

Place: _____ Signature of PG Student

Witness 1 2. Witness

_____ _____

Signature Signature

Name: _____ Name: _____

Address: _____ Address: _____

ऑलइंडियाइंस्टिट्यूटऑफमैडिकलसाईंसिस, जोधपुर, राजस्थान

सूचितसहमतिप्रपत्र

थीसिस / निबंधकाशीर्षक: '**कॉर्डब्लेडहेमोग्रैमपरमैट्रनलहाइपर्टेंसनकाप्रभाव-भावीकाउहोटअध्ययन**'

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रोगी / स्वयंसेवकपहचानसंख्या: _____

मैं, _____ पुत्री/पत्नी _____

निवासी_____

अध्ययन"कॉर्डब्लेडहेमोग्रैमपरमैट्रनलहाइपर्टेंसनकाप्रभाव-भावीकाउहोटअध्ययन" मेंभागलेनेकेलिएमेरीपूर्ण, स्वतंत्र, स्वैच्छिकसहमतिदेतीहूं, जिसकीप्रक्रियाऔरप्रकृतिमुझेमेरीभाषामेंसमझाईगईहै।मैंपुष्टिकरतीहूंकिमुझेप्रश्नपूछनेकाअवसर मिलाहै।मैंसमझतीहूंकिमेरीभागीदारीस्वैच्छिकहैऔरमुझेकिसीभीसमयअध्ययनसेबाहरनिकलने काअधिकारहै|।मैंसमझतीहूंकिमेरेऔरमेरेमेडिकलरिकॉर्डकेबारेमेंएकत्रितकीगईजानकारीकोऑ लइंडियाइंस्टिट्यूटऑफमैडिकलसाईंसिसकेजिम्मेदारव्यक्तिद्वारादेखाजासकताहै |मैंइनलोगोंकोमेरेरिकॉर्डदेखनेकीअनुमतिदेतीहूं|

तारीख : _____

जगह: _____ हस्ताक्षर / बाएंअंगूठेकाछाप

यहप्रमाणितकरनेकेलिएकिमेरीउपस्थितिमेंउपरोक्तसहमतिप्राप्तकीगईहै

तारीख : _____ _____

जगह: _____ पीजीछात्राकेहस्ताक्षर

1. गवाह 2.गवाह

_____ _____

हस्ताक्षर हस्ताक्षर

नाम_____नाम:_____

पता_____पता : _____

APPENDIX -3

PATIENT INFORMATION SHEET (PIS)

You are invited to take part in this study entitled "The Effect of Maternal Hypertension on the Neonatal Umbilical Cord Blood Haemogram- A Prospective Cohort Study".

It is informed that it is entirely voluntary and you may refuse to take part or discontinue at any time without losing your right to adequate gynecological care.

This research is aimed at comparing the hematological parameters like hemoglobin, TLC, platelet count, hematocrit, RDW in maternal and umbilical cord blood of hypertensive and normotensive mothers; incidence of polycythemia, neonatal jaundice and need for phototherapy in baby.

Even if you refuse to participate in this study the investigations and the appropriate treatment will be carried out as a regular protocol.

The expected duration of your participation in this study is till discharge postoperatively.

There is no specific complication due to the study.

All the records will be kept confidential.

You have the right to ask for any further information that you require.

In case of any doubt regarding the study you are welcome to contact the undersigned personally or telephonically.

Dr. Chaithra B V
Contact No. 7975738127

रोगीसूचनापत्र

आपकोइसअध्ययनमेंभागलेनेकेलिएआमंत्रितकियागयाहै**"कॉर्डब्लेडहेमोग्रैमपरमैट्रनलहाइपर्टेंसनकाप्रभाव-भावीकाउहोटअध्ययन"**

यहसूचितकियाजाताहैकियहपूरीतरहसेस्वैच्छिकहैऔरआपपर्याप्तस्त्रीरोगसंबंधीदेखभालकेअपने अधिकारकोखोएबिनाकिसीभीसमयहिस्सालेसकतेहैंयाबाहरनिकलसकतेहैं।

इसअनुसंधानकाउद्देश्यसामान्यऔरउच्चरक्तचापरोगियोंअथवागर्भनालब्लेडमेंहीमोग्लोबिन, टीएलसी, प्लेटलेटकाउंट, हेमटोक्रिट, औरआरडीडब्ल्यूजैसेहेमटोलॉजिकलमापदंडोंकीतुलनाकरना;पॉलीसिथेमिया, नवजातपीलियाऔरबच्चेमेंफोटोथेरेपीकीआवश्यकतादेखनाहै।

यदिआपइसअध्ययनमेंभागलेनेसेमनाकरतेहैंतबभीजांचऔरउचितउपचारएकनियमितप्रोटोकॉल केरूपमेंकियाजाएगा।

इसअध्ययनमेंआपकीभागीदारीकीअपेक्षितअवधितीनसेचारदिनयाअस्पतालसेडिस्चार्जतककेसम यतकहोगी।

अध्ययनकेकारणकोईविशेषजटिलतानहींहै।

सभीअभिलेखोंकोगोपनीयरखाजाएगा।

आपकोकिसीभीअधिकजानकारीकेविषयमेंपूछनेकापूराअधिकारहै।

किसीभीअध्ययनकेबारेमेंसंदेहकेमामलेमेंआपअधोहस्ताक्षरीसेव्यक्तिगतयाटेलीफोनसेसंपर्ककर नेकेलिएस्वतंत्रहैं।

डॉ.चैत्राबीवी

फ़ोननंबर: 7975738127

ETHICAL CLEARANCE CERTIFICATE

अखिल भारतीय आयुर्विज्ञान संस्थान, जोधपुर
All India Institute of Medical Sciences, Jodhpur
संस्थागत नैतिकता समिति
Institutional Ethics Committee

No. AIIMS/IEC/2021/3476 Date: 12/03/2021

ETHICAL CLEARANCE CERTIFICATE

Certificate Reference Number: **AIIMS/IEC/2021/3311**

Project title: **"To study the effects of maternal hypertension on the neonatal umbilical cord blood hemogram"**

Nature of Project:	**Research Project Submitted for Expedited Review**
Submitted as:	**M.D. Dissertation**
Student Name:	**Dr. Chaithra BV**
Guide:	**Dr. Pratibha Singh**
Co-Guide:	**Dr. Garima Yadav, Dr. Neeraj Gupta, Dr. Manu Goyal & Dr. Priyanka Kathuria**

Institutional Ethics Committee after thorough consideration accorded its approval on above project.

The investigator may therefore commence the research from the date of this certificate, using the reference number indicated above.

Please note that the AIIMS IEC must be informed immediately of:

- Any material change in the conditions or undertakings mentioned in the document.
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research.

The Principal Investigator must report to the AIIMS IEC in the prescribed format, where applicable, bi-annually, and at the end of the project, in respect of ethical compliance.

AIIMS IEC retains the right to withdraw or amend this if:

- Any unethical principle or practices are revealed or suspected
- Relevant information has been withheld or misrepresented

AIIMS IEC shall have an access to any information or data at any time during the course or after completion of the project.

Please Note that this approval will be rectified whenever it is possible to hold a meeting in person of the Institutional Ethics Committee. It is possible that the PI may be asked to give more clarifications or the Institutional Ethics Committee may withhold the project. The Institutional Ethics Committee is adopting this procedure due to COVID-19 (Corona Virus) situation.

If the Institutional Ethics Committee does not get back to you, this means your project has been cleared by the IEC.

On behalf of Ethics Committee, I wish you success in your research.

Dr. Prasad Sharma
Member Secretary
Member secretary
Institutional Ethics Committee
AIIMS,Jodhpur

Basni Phase-2, Jodhpur, Rajasthan-342005; **Website:** www.aiimsjodhpur.edu.in; **Phone:** 0291-2740741 Extn. 3109
E-mail : ethicscommittee@aiimsjodhpur.edu.in; ethicscommitteeaiimsjdh@gmail.com

MASTER CHART

S No	Age	Name	Reg. No	Qualification	Residence	GRAVIDA / PARITY	POG	MOTHER HB (dl)	MOTHER HCT (%)	MOTHER Platelets lacs/cumm)	MOTHER MCH (pg)	MOTHER MCHC (g/dl)	MOTHER RDW (fl)	MOTHER PDW (fl)	MOTHER TLC (/cumm)	MOTHER POLYMORPHS (/cumm)	CORD BLOOD HB (g/dl)	CORD BLOOD HEMATICRIT (%)	CORD BLOOD PLATELETS	CORD BLOOD MCH	CORD BLOOD MCHC	CORD BLOOD RDW	CORD BLOOD PDW	CORD BLOOD TLC	CORD BLOOD POLYMORPHS	HYPERTENSIVE DISEASE OF PREGNANCY	NICU ADMISSION FOR BABY	NEWBORN COMPLICATIONS
1	23	Parul soni	2022/03/006712	Post graduate	Urban	G2P1001	37+5 weeks	12.4	38.1	2.68	26.4	32.6	46.1	16.2	12800	10220	16.7	46.7	3.09	37.6	35.8	58.2	16.5	192400	15200	Gestational hypertension	NO	Phototherapy
2	26	Kavita sancheti	2022/05/003925	Post graduate	Urban	Primi Gravida	38+5 weeks	10.2	31.2	2.54	30.3	32.7	62.7	16.5	8,520	6,590	20.7	59.3	2.24	36.1	34.9	61.1	13	13,120	7,400	Gestational hypertension	NO	Jaundice
3	29	Nidhi sankhla	2022/01/029369	Graduate	Urban	Primi Gravida	37+1 weeks	10.7	32.4	1.78	27.1	33	46	13.3	10,480	6,530	13.6	41.5	3.57	41.3	32.9	76.6	15.7	8,620	5,550	Gestational hypertension	NO	Weight loss
4	22	Komal	2021/12/013756	Secondary school	Semi urban	Primi Gravida	38+1 weeks	13.9	40.6	2.09	31.1	34.3	46.6	16.6	9,340	7,730	19.8	62.4	4.52	29.5	31.7	58.2	11.2	19,640	5,740	Gestational hypertension	NO	Jaundice
5	20	Anita	2022/06/022769	Secondary school	Semi urban	G2P0010	39+2 weeks	12.6	37.7	1.8	30.8	33.5	44.4	16.2	9,930	6,920	14.2	30.1	3.06	32	35	41	17.1	15,320	11,730	Gestational hypertension	NO	No complications
6	29	Nirmla bheel	2022/06/019789	Graduate	Urban	G2P1101	32 weeks	12.7	38.2	1.85	26.9	33.2	52	16	7,240	4,820	22.3	63.4	0.44	40.1	35.2	88.5	32	3,800	5130	Preeclampsia with severe features	YES	Phototherapy
7	25	Sarah khan	2022/02/005967	Middle school	Urban	Primi Gravida	38+6 weeks	11.8	34.8	2.39	29.1	33.8	54.9	16	10,460	6,360	19.8	58.5	2.08	37.1	33.8	60.7	11.3	7,470	6,360	Gestational hypertension	NO	Jaundice
8	40	Durga devi	2022/03/011522	Illiterate	Rural	G8P6104	37+2 weeks	10.2	10.3	1.22	27.6	33	52.1	16.3	8,860	7,960	17.9	55.7	2.8	29.6	32.1	63.9	13.4	8,100	5,810	Gestational hypertension	YES	Birth asphyxia
9	35	Kanchan	2019/05/019652	Secondary school	Semi urban	G2P1001	38+1 weeks	10.1	30.2	2.63	27.6	33.5	39.4	16.2	9,030	7210	20.5	60.1	3.81	34.1	34.1	62.3	9.6	8,140	5,340	Gestational hypertension	NO	Jaundice
10	28	Khushboo	2022/06/004816	Post graduate	Semi urban	G2P1001	38 weeks	9.3	28.5	2.62	27.3	32.5	58.7	16.7	15,480	9,120	10.5	20.4	2.03	32	33	56	18.4	16,120	13,320	Gestational hypertension	NO	Birth asphyxia
11	27	Suveksha mathur	2022/06/001798	Post graduate	Semi urban	Primi Gravida	37+1 weeks	11.6	35.6	2.51	27.1	32.5	52.9	16.1	10,560	6,900	13.2	17.2	3.04	28	34	51	17	15,300	11,120	Gestational hypertension	NO	Jaundice
12	21	Kiran	2021/09/011983	Graduate	Rural	Primi Gravida	34+4 weeks	11.1	34.2	2.68	24.4	32.5	68.1	15.4	16,330	7,990	16.6	51.6	2.56	37.6	32.2	74.8	10	7,110	3,810	Preeclampsia with severe features	YES	No complications
13	30	Pooja	2022/04/015488	Post graduate	Urban	Primi Gravida	37+6 weeks	10.9	34.4	1.64	25.7	31.7	43.9	16	14,290	9110	18.2	55.7	1.61	35	32.7	64.4	12.2	10870	5320	Preeclampsia without severe features	NO	Jaundice
14	26	Vimla	2022/08/001024	Graduate	Urban	G2P0010	38+6 weeks	11.9	35.4	1.38	28.3	33.6	40.6	12.6	10640	8120	18	53.9	3.62	33.6	33.4	58.5	12.1	9020	6040	Gestational hypertension	NO	Birth asphyxia
15	24	Anchi	2022/03/002824	Primary	Rural	G3P1011	36+1 weeks	10.9	34.5	2.38	26.5	31.6	49.1	12.6	13,870	8,870	18.7	56	2.63	36.4	33.4	62.9	11.1	9330	2370	Gestational hypertension	YES	Birth asphyxia
16	37	Shalini bhatia	2022/06/000636	Secondary school	Semi urban	G5P1031	37+5 weeks	11.2	35.6	4.13	27.1	31.5	43.8	10.5	14,690	7,210	14.6	28.5	2.03	32	34	46	15	15,720	11,160	Gestational hypertension	NO	Jaundice
17	31	Preeti	2019/07/007505	Post graduate	Urban	G2P1001	37+3 weeks	12.6	40.8	2.36	31.6	30.9	55.3	22.1	11,480	7,910	15.6	51	0.47	35.1	30.6	78.4		9,040	4,250	Preeclampsia with severe features	NO	No complications
18	26	Milan soni	2022/03/005044	Graduate	Urban	Primi Gravida	37 weeks	11.2	26	3.04	27	33	36	15	8,900	6,700	20.6	60.7	1.9	38.6	33.9	71.7	10.1	4,500	3,740	Gestational hypertension	NO	Birth asphyxia
19	24	Seeta	2022/01/028663	Higher secondary	Rural	Primi Gravida	35+3 weeks	13.1	38.8	1.89	31.3	33.8	40.7	13.4	17,290	8560	22.2	62.5	3.97	37.2	35.5	62.4	9.5	16,120	5,850	Preeclampsia with severe features	YES	Birth asphyxia
20	26	Gudiya	2021/08/006023	Illiterate	Rural	G5P2022	33+5 weeks	10.2	22	1.02	28	33	36	10	14,000	11,260	20.1	24	1.06	34	34.6	26	15	12,240	10,260	Preeclampsia with severe features	YES	Birth asphyxia
21	23	Soundhrya dhoot	2022/03/007528	Post graduate	Urban	Primi Gravida	38 weeks	11.4	36.3	1.71	29	31.4	45.8	14.1	11,400	7000	14.2	29	3.02	29	32	14	15	12,460	9,380	Gestational hypertension	NO	Phototherapy
22	22	Kareena jain	2021/12/012745	Graduate	Urban	Primi Gravida	39+6 weeks	11.4	24	2.04	29.1	34	13.5	11.6	15,200	11,280	14.5	29.4	2.06	32	33.4	13.5	13.4	16,200	9,820	Gestational hypertension	NO	Jaundice
23	26	Madhu malviya	2022/08/012279	Graduate	Semi urban	Primi Gravida	31 weeks	10.8	36.7	2.06	26.7	29.4	56.5	15.5	10,110	6730	12.7	42.8	1.66	37.2	29.7	76.9	13.1	9,350	3320	Preeclampsia with severe features	YES	No complications
24	24	Parsi	2021/12/012530	Middle school	Rural	G2P0010	36 weeks	14	41.6	3.19	28.4	33.6	41.2	16.2	15,980	7,300	18.4	60.1	1.95	34.3	30.6	75.6	13.1	13,020	3,790	Gestational hypertension	NO	Birth asphyxia
25	27	Pooja	2022/06/003083	Graduate	Semi urban	G2P0010	37 weeks	13.7	44.2	2.45	26.1	31	45	14.9	12,810	6,690	14.1	34	2.06	27.8	32.4	13.6	15	14,120	11,260	Gestational hypertension	NO	Jaundice
26	31	Sanju bharti	2022/01/034094	Graduate	Urban	G3P0020	35+2 weeks	14	44.6	1.5	30	31.4	43.4	21.1	9,240	4,930	20.1	61.9	1.27	39.6	32.5	89	12.5	15,980	2,420	Preeclampsia with severe features	NO	Phototherapy
27	34	Chandrika khatri	2017/11/015477	Graduate	Urban	Primi Gravida	39+3 weeks	13.1	39.3	2.74	31.3	33.2	46.9	15.8	9,830	7,200	13.6	26	2.06	32	33	11.3	13.5	15,700	9,280	Gestational hypertension	NO	Weight loss
28	24	Jyoti	2021/12/019305	Graduate	Urban	Primi Gravida	39 weeks	12.7	38.9	2.2	29.5	32.6	43	16	12,530	7920	16	49.6	3.74	35.6	32.3	63.2	9.6	12,690	4,510	Gestational hypertension	NO	Jaundice
29	25	Siddi	2022/08/008932	Graduate	Urban	G2P0010	37+1 weeks	11.4	35.6	2.71	29.4	32	58.9	13.7	9,270	7000	19.3	59.3	1.64	36.2	32.5	71.4	12	16,650	5990	Gestational hypertension	NO	No complications
30	30	Sapna choudary	2022/04/013310	Post graduate	Semi urban	G2P0010	38+2 weeks	13.7	40.5	2.51	29.1	33.8	41	11.9	12,390	6550	18	56.1	3.54	35.5	32.1	66.5	9.1	12,230	3,930	Gestational hypertension	NO	No complications
31	38	Lalita	2022/08/012278	Graduate	Semi urban	G3P2002	34+1 weeks	14.9	46.7	1.73	28.3	31.9	47.2	14.3	21,190	9130	15.8	48.1	2.2	35.5	32.8	65.5	10.3	6210	3810	Preeclampsia without severe features	YES	Birth asphyxia
32	27	Sangita gehlot	2022/06/015564	Post graduate	Semi urban	Primi Gravida	38+6 weeks	12.6	41.4	2.1	26	30.4	43.1	18	12470	7220	18.5	54	2.02	36.7	34.3	64.4	11.8	24460	7330	Gestational hypertension	NO	Phototherapy
33	24	Babita	2019/02/008664	Middle school	Rural	G3P1101	36+3 weeks	11.7	36.7	2.15	26.8	31.9	43.7	12.3	8770	6920	22.2	65.6	1.76	35.4	33.8	72.5	14.3	8600	5840	Preeclampsia without severe features	NO	No complications
34	24	Bhagwati	2022/03/017123	Secondary school	Semi urban	Primi Gravida	38+1 weeks	13	37.8	2.1	31.2	34.7	40.7	15.8	10750	6620	16	56.2	3.01	28	33	13.6	13	14640	9780	Gestational hypertension	NO	Phototherapy
35	26	Gopi kumari	2020/08/003192	Middle school	Rural	G2P1001	38+2 weeks	13.5	40.8	4.02	27.9	33.1	44.4	10.7	12480	7130	13.9	42.4	2.1	37.4	32.9	71.6	17.1	11960	6480	Gestational hypertension	NO	Jaundice
36	24	Natasha	2021/03/013698	Middle school	Semi urban	Primi Gravida	37+1 weeks	10.7	30.9	2.78	30.4	34.5	46.3	16	15300	7880	12.5	35.5	2.5	34.8	35.1	57.7	16.3	11600	6270	Gestational hypertension	NO	Jaundice
37	28	Jyoti nahta	2021/07/004904	Primary	Semi urban	G2P0010	37+4 weeks	12.1	33.5	1.72	28	34	41.7	16.7	10830	8650	15.6	44	2.51	35.3	35.4	56.1	16.2	15270	5810	Preeclampsia without severe features	YES	Ttnb
38	24	Minakshi	2021/03/006539	Illiterate	Semi urban	Primi Gravida	34+1 weeks	11.8	31.7	1.67	20.8	28.7	49.7	15	14240	9780	19.8	56.9	2.04	37.3	34.8	78.8	13	13240	7950	Preeclampsia without severe features	NO	Polycythemia
39	26	Kanchan	2021/06/013199	Middle school	Semi urban	Primi Gravida	37+6 weeks	11.4	37.7	2.87	25.1	30.2	44.3	12.3	15030	7990	7.4	25.4	0.9	26.8	29.1	61.1		4680	2300	Gestational hypertension	NO	Phototherapy
40	26	Bablu kanwar	2018/09/013675	Primary	Rural	G2P1001	39+2 weeks	13.2	41.2	1.65	27.6	32	40	17.8	18470	9090	12.1	35.8	3.85	28.1	33.9	45.8	16.4	13140	6390	Preeclampsia without severe features	NO	No complications
41	31	Lalita	2022/07/012560	Post graduate	Semi urban	G2P1001	36+5 weeks	12.7	38.1	2.17	28.2	33.2	46	16.8	10530	7040	13.8	41.7	2.93	33.6	33	58	16.2	10140	4010	Preeclampsia without severe features	NO	Phototherapy
42	22	Anshi kanwar	2022/11/000012	Illiterate	Urban	Primi Gravida	36+2 weeks	13.2	41.3	3.5	24.1	31.9	85.3	15.7	8890	6880	17.5	53.8	2.95	34.3	32.5	78.3	16.4	11400	5160	Gestational hypertension	NO	Birth asphyxia
43	26	Nirma devi	2022/06/023006	Primary	Semi urban	G3P2002	37+1 weeks	13.2	38.1	2.24	33.9	34.6	44	16.3	10600	6510	13.9	41.7	1	38.9	33.4	68.6	14.8	5220	36.6	Gestational hypertension	NO	No complications
44	22	Ritu gehlot	2022/03/002312	Graduate	Semi urban	Primi Gravida	39 weeks	11.2	37.4	5.64	20.7	29.9	37.6	10.5	11300	5510	9.6	27.7	0.49	33.2	34.7	52.4	16.6	6540	7270	Gestational hypertension	NO	Jaundice
45	25	Suman rankawat	2022/09/005883	Graduate	Urban	Primi Gravida	39+5 weeks	13.6	39.8	2.53	30.8	35.2	43	16.5	14350	7650	14.4	42.1	2.51	38.1	34.1	59.5	16.2	11120	5630	Gestational hypertension	NO	Jaundice
46	26	Shweta paliwal	2013/12/001070	Graduate	Urban	Primi Gravida	39+5 weeks	12.6	38.2	3.38	26.8	32.9	46.6	16.3	11250	6820	17.1	51.6	2.18	37	33.2	65.9	16.5	10460	5610	Gestational hypertension	NO	No complications
47	26	Roshanee	2022/08/002821	Middle school	Semi urban	G2P1001	38+4 weeks	12.6	36.1	2.5	32.6	34.8	40.6	15.7	9780	6910	16.5	46.8	3.05	37.5	35.4	58.3	16.3	10940	5880	Gestational hypertension	YES	Birth asphyxia
48	30	Gitika	2022/04/011194	Secondary school	Semi urban	G2P0010	38	13.5	38.5	2.69	30.4	35.1	42.7	16.2	12460	7750	18.3	55.3	1.79	34.8	33	71	16.5	13500	4700	Preeclampsia without severe features	NO	Phototherapy
49	32	Rekha sharma	2022/08/012670	Middle school	Rural	Primi Gravida	38+3 weeks	14.3	39.5	2.3	31.1	36.3	41.8	16.6	14700	9150	13.9	37.6	1.93	38.2	36.9	58	17.2	3600	6180	Preeclampsia without severe features	NO	Jaundice
50	24	Sukhi devi	2022/04/008116	Secondary school	Rural	G5P1122	39+1 weeks	13.3	39.8	4.36	28.3	33.4	50	15.7	11600	5880	14.5	34.2	3.02	33	33	15	13	14500	11230	Gestational hypertension	NO	Jaundice

MASTER CHART

S No	Age	Name	Reg No	Qualification	Residence	GRAVIDA / PARITY	POG	MOTHER HB (dl)	MOTHER HCT (%)	MOTHER Platelets lacs/cumm	MOTHER MCH (pg)	MOTHER MCHC (g/dl)	MOTHER RDW (fl)	MOTHER PDW (fl)	MOTHER TLC (/cumm)	MOTHER POLYMORPHS (/cumm)	CORD BLOOD HB (g/dl)	CORD BLOOD HEMATICRIT (%)	CORD BLOOD PLATELETS	CORD BLOOD MCH	CORD BLOOD MCHC	CORD BLOOD RDW	CORD BLOOD PDW	CORD BLOOD TLC	CORD BLOOD POLYMORPHS	HYPERTENSIVE DISEASE OF PREGNANCY	NICU ADMISSION FOR BABY	NEW BORN COMPLICATIONS
51	23	Manisha	2020/12/008867	Graduate	Urban	Primi Gravida	35+1 weeks	11 8	35	2 9	30 1	33 8	43 7	16 1	5890	6590	13 4	36		29	32	16				Preeclampsia without severe features	NO	Phototherapy
52	26	Privanka	2022/08/014497	Graduate	Urban	G2P1001	37	10	31 4	1 45	22 5	31 9	41 8	16 1	16610	8680	22 1	70 7	2 6	35 1	31 2	62 1	11 1	7500	4800	Gestational hypertension	NO	Jaundice
53	29	Vaijeyanti	2022/08/008744	Higher secondary	Semi urban	G4P1112	36+2 weeks	13 7	40 1	1 25	29 8	34 2	44 2	16 2	9500	6370	14 2	46	2 97	28	32	34	13	13400	9870	Preeclampsia without severe features	YES	Birth asphyxia
54	30	Monika	2022/08/013104	Graduate	Semi urban	Primi Gravida	40+2 weeks	12 7	37	2 6	32 3	34 2	46 5	16 1	12170	6690	15	45	1 24	33	35	38	14	13400	8760	Gestational hypertension	NO	Jaundice
55	33	Anju kanwar	2022/08/000528	Middle school	Semi urban	G4P1021	37+3 weeks	9 9	30	2 84	28 3	33	59 7	16 7	6260	1799	12	44	3 12	32	36	28	14	12560	4590	Preeclampsia without severe features	YES	Phototherapy
56	32	Raju devi	2022/10/000512	Graduate	Urban	G2P1001	34 weeks	8 1	23 9	0 7	30 4	34	71 1	17 6	14300	7760	15	46	2 3	32	36	45	13	14000	7340	Partial hellp	YES	Birth asphyxia
57	26	Rekha	2022/07/012315	Middle school	Rural	Primi Gravida	39 weeks	12 2	36 1	2 7	29 1	33 7	51	15 9	10500	7840	14 8	43 6	1 9	35 7	33 9	56 7	15 3	6400	5860	Gestational hypertension	NO	Jaundice
58	32	Rashi	2022/10/000451	Middle school	Semi urban	Primi Gravida	32 weeks	12 6	38 1	3 6	26 8	33	94 7	15 4	12160	6530	16	46	1 24	33	36	48	14	13400	8900	Preeclampsia without severe features	YES	Birth asphyxia
59	24	Manshu devi	2022/05/000307	Primary	Rural	Primi Gravida	40+6 weeks	13 7	40 3	2 86	30 3	34 1	42 2	16 1	11540	8340	12	56	1 6	33	36	52	13	13490	9870	Gestational hypertension	NO	Jaundice
60	31	Meena	2022/01/032036	Secondary school	Rural	G3P0020	26+2	7 1	22 3	3 88	18 4	31 7	61 1	15 3	26180	22000	14 3	42 5	1 14	40 5	33 8	61 3	16 9	3890	720	Gestational hypertension	YES	Prematurity
61	24	Gudiya	2021/11/016726	Higher secondary	Rural	G2P0010	40+6	14 3	43 7	3 39	28 3	32 7	46 6	13 1	12070	7200	14	50 4	3 65	33 4	32 1	64 3	11 8	15600	8990	Normotensive female	NO	Weight loss
62	26	Meenal arora	2022/06/005733	Higher secondary	Urban	G2P1001	40+1	15 3	44 1	2 23	29 5	32 5	46 2	13 2	10530	7220	15 6	48 9	2 64	32 8	30 2	63 7	11 8	12730	8930	Normotensive female	NO	No complications
63	26	Meenal arora	2022/06/005733	Higher secondary	Urban	G2P1001	40+1	11 1	33 4	2 54	26 7	33 5	42 5	16 2	12560	9560	14 5	48 3	2 58	34 4	33 4	48 4	16 2	14300	9530	Normotensive female	NO	Weight loss
64	44	Manisha soni	2022/07/002570	Secondary school	Urban	G4P3002	38+4	12 5	38 4	2 45	28 3	31 3	42 4	15 3	13580	8380	13 5	47 3	2 54	34 2	34 5	49 4	12 4	15300	7450	Normotensive female	NO	Phototherapy
65	19	Harshita	2022/07/019773	Middle school	Rural	Primi Gravida	40+3	10 9	29 5	2 64	29 4	30 4	48 4	14 2	13020	9320	16 4	49 3	2 5	34 8	32 8	52 4	12 5	10480	6380	Normotensive female	NO	No complications
66	27	Minakshi sharma	2022/04/003821	Higher secondary	Urban	G5P1121	38+6	12 5	36 4	2 63	28 6	32 4	43 6	13 3	12300	7430	18 3	49 3	3 65	36 1	34 2	59 4	14 5	13500	10400	Normotensive female	NO	Phototherapy
67	24	Mamta	2022/01/025230	Higher secondary	Urban	G2P1001	39+5	12 2	38 9	1 93	32 1	31 4	50 5	14 8	10720	90400	16 3	48 5	2 89	35 9	34 5	56 2	12 5	14300	10380	Normotensive female	NO	No complications
68	23	Sanju devi	2022/06/005846	Secondary school	Rural	Primi Gravida	39+3	11 1	33 3	2 44	26 7	33 2	45 5	16 2	12570	8820	13 5	45 2	3 23	34 2	32 5	46 3	13 5	13420	8940	Normotensive female	NO	Weight loss
69	27	Mamta gehlot	2021/12/004682	Higher secondary	Urban	G2P0101	39+0	12 9	38 3	2 3	32 3	33 7	45 5	12 7	9830	6830	8 4	29 5	1 45	28 4	30 4	63 2	10 4	13290	10280	Normotensive female	NO	Jaundice
70	19	Pooja kanwar	2022/07/015514	Middle school	Rural	G4P1021	38+4	11	33 9	1 32	26 4	32 4	50 4	16 5	9320	6420	10 4	41 4	2 45	30 2	31 4	69 3	10 4	9320	5490	Normotensive female	NO	Jaundice
71	22	Lila kanwar	2022/08/003518	Secondary school	Rural	Primi Gravida	39 6	11 3	36 2	2 19	26 4	32	45	22 3	11130	7560	13 4	46 3	3 45	34 2	32 4	42 4	14 2	13200	9630	Normotensive female	NO	No complications
72	29	Indra	2022/06/016423	Higher secondary	Urban	G4P0030	40+0	13 7	41 2	2 58	31 7	33 3	48 6	16 4	20350	18060	15 4	48 2	3 24	35 2	34 4	46 2	13 2	13470	10380	Normotensive female	NO	No complications
73	31	Deepika nehra	2022/03/002125	Higher secondary	Urban	G2P1001	38+1	12 2	37	2 72	31 2	33 5	50 5	15 5	6050	3820	13 4	48 2	2 67	34 2	31 5	46 2	13 2	10380	7360	Normotensive female	NO	No complications
74	25	Hardika chouhan	2022/04/011461	Higher secondary	Urban	Primi Gravida	38+3	12 3	36 3	2 64	32 4	32 5	48 3	13 2	13680	8640	10 3	38 2	2 63	29 4	30 1	69 4	15 2	13280	9830	Normotensive female	NO	Jaundice
75	24	Bhavana	2021/12/010724	Secondary school	Rural	G3P0111	40+0	12 3	37 9	1 65	30 8	32 5	47 1	21 4	16120	11730	13 5	46 3	2 45	35 2	34 1	45 6	13 2	14270	8450	Normotensive female	NO	Phototherapy
76	20	Sarla	2022/08/002694	Secondary school	Rural	Primi Gravida	37+4	12 4	37 8	1 56	30 3	32 3	47 1	14 3	12460	9840	14 6	45 6	2 64	33 4	34 2	49 5	13 4	13260	8560	Normotensive female	NO	No complications
77	23	Saroj	2022/07/019611	Secondary school	Urban	G8P7006	39+6	13 6	40 8	2 94	29 4	33 3	46 4	16 1	7640	4690	10 3	39 4	2 45	28 3	30 4	63	14 3	12300	8320	Normotensive female	NO	Jaundice
78	23	Mamta	2022/11/000718	Middle school	Rural	Primi Gravida	32	10 2	31 2	2 04	29 1	32 9	45 5	16 8	14620	12290	16 2	44 8	2 35	35 4	34 6	48	11 6	12800	6800	Normotensive female	NO	Fever
79	20	Disha	2022/04/002806	Middle school	Rural	Primi Gravida	37+1	11 1	36 5	3 81	30 2	32 6	52 8	15 2	7890	5240	12 5	45 2	2 64	35 6	34 2	48 3	12 5	13260	9830	Normotensive female	NO	Phototherapy
80	32	Chandani mehta	2018/02/010927	Secondary school	Urban	G2P1001	38+1	14 6	45 8	3 11	31	31 9	41 6	15 6	12130	9080	15 7	45 5	2 34	35 1	34 2	57	11	12400	6800	Normotensive female	NO	Phototherapy
81	24	Nandini vaishnavi	2019/01/030292	Secondary school	Urban	G2P1001	30+0	13 1	39 3	2 37	28 5	33 3	43 3	16 5	5070	1980	12 6	45 2	1 32	32 3	31 4	48 3	13 2	12480	7350	Normotensive female	NO	No complications
82	24	Shyam kanwar	2022/04/015258	Middle school	Rural	Primi Gravida	40	7 5	23 8	4 06	23 1	31 4	57 7	15 8	8260	5660	15 7	47 2	2 98	34 8	33 9	52	11 3	11600	8200	Normotensive female	NO	Phototherapy
83	33	Dimpal	2022/03/017823	Secondary school	Urban	G3P2002	38+1	14	41 7	3 5	31 3	33 6	45 9	13	15540	11280	21 4	54 2	2 54	35 5	34 6	52 4	13 2	12350	10340	Normotensive female	NO	No complications
84	25	Urmila	2022/06/017509	Higher secondary	Urban	G3P2002	37+2	13 9	40 9	2 52	29 7	34 1	41 9	16 3	12240	8490	15 8	46 1	2 38	35 5	34 8	47	11 5	12470	9100	Normotensive female	NO	No complications
85	23	Anju kanwar	2021/10/000763	Higher secondary	Urban	G3P1011	38+6	12 7	41 2	1 39	26 7	30 8	74 9	11 5	7750	5720	12 5	46 4	3 34	35 2	34 5	48 3	13 5	12450	7580	Normotensive female	NO	Phototherapy
86	20	Aartu jangid	2022/07/000944	Secondary school	Rural	Primi Gravida	40+2	12 6	36 4	2	30 8	34 6	41 7	16 3	11880	9290	16 4	47 9	2 41	36 1	33 8	59	11 4	13700	8120	Normotensive female	NO	Phototherapy
87	34	Vishakha gehlot	2022/06/018142	Secondary school	Urban	G2P1001	38+4	12 8	36 7	2 8	30 2	34 5	41 5	16 4	11860	9780	15 2	48 3	2 45	35 7	33 8	52	11 7	12200	7780	Normotensive female	NO	Jaundice
88	26	Ranku	2022/07/013518	Middle school	Rural	Primi Gravida	38+4	13 2	40 6	4 19	27 9	32 4	50 1	12 2	8410	4070	16 4	48 9	2 31	35 7	33 9	57 3	11 2	13800	9200	Normotensive female	NO	No complications
89	24	Kavita vishnoi	2022/05/008154	Middle school	Rural	Primi Gravida	39+1	9 6	30 2	2 44	26 3	31 8	43 5	16 5	9680	7410	16 3	47 9	2 49	35 3	34 9	52 7	11 7	11780	7350	Normotensive female	NO	Phototherapy
90	26	Harsha rathi	2022/05/012442	Secondary school	Urban	Primi Gravida	40+1	13 5	40 5	1 86	30	33 4	46 4	15 4	15160	12640	15 1	48 3	3 45	36 2	34 2	48 3	13 4	13420	10450	Normotensive female	NO	Weight loss
91	26	Anu	2018/02/009584	Graduate	Urban	G2P1001	40	13 8	43 6	2 22	29 8	31 6	50 8	16 4	12140	8340	12 8	46 6	2 69	35 3	34 5	47 9	11 8	12460	7860	Normotensive female	NO	Weight loss
92	21	Sushma devi	2022/10/003750	Secondary school	Rural	Primi Gravida	37+6	10 4	33 3	2 1	20 8	31 2	43	16 1	8440	6500	12 5	43 2	1 56	32 6	30 3	43 2	10 4	12570	8790	Normotensive female	NO	Low birth weight
93	29	Priyanka sharma	2022/06/011033	Graduate	Urban	Primi Gravida	36	11 2	33 6	3 02	29 3	33 5	42 2	15 7	8030	5570	16 3	48 3	2 34	33 6	35 1	57 3	11 5	12360	6800	Normotensive female	NO	Phototherapy
94	31	Rubina bano	2022/06/021100	Secondary school	Rural	G3P2002	37+6	12 2	39	3 09	24 2	31 2	44 5	21 2	8160	5130	16 4	48 3	3 53	36 6	32 8	53 4	14 2	15470	12490	Normotensive female	NO	No complications
95	32	Ankita kawad	2018/03/007626	Higher secondary	Urban	G3P1011	40+3	13 4	43 4	2 54	32 4	31 3	43 2	13 4	14380	9560	12 5	46 3	2 65	35 3	34 2	49 5	12 6	12560	8380	Normotensive female	NO	No complications
96	34	Anubha jemawat	2018/04/009770	Higher secondary	Urban	G2P1001	39+6	13 7	39	1 55	29 6	34 9	43 8	17	17340	14250	16 3	49 4	2 65	36 4	34 2	54 2	13 5	14380	10450	Normotensive female	NO	Phototherapy
97	26	Dimple rathore	2022/05/001683	Higher secondary	Urban	Primi Gravida	37+2	12 8	39 4	1 98	33	32 5	48 7	19 2	9240	7040	16 4	48 2	3 54	35 6	33 2	49 4	13 6	14570	9860	Normotensive female	NO	No complications
98	25	Ansu solanki	2022/03/009724	Higher secondary	Urban	G2P1001	39+5	13 3	39 5	1 98	31 5	33 6	44 8	16 4	9630	5970	14 3	13 5	3 21	32 5	34 2	54 2	14 2	13760	10350	Normotensive female	NO	No complications
99	23	Babli	2022/11/002328	Higher secondary	Urban	G3P1011	37+6	13 8	41 2	2 41	28 9	33 6	45 7	16 3	10920	8720	18 3	53 2	3 41	36 2	32 5	63 5	14 1	15380	11750	Normotensive female	NO	No complications
100	29	Ertu sukhla	2022/05/015298	Graduate	Urban	G2P1001	38+4	10 4	32 1	0 81	27 2	32 5	45 9	16 1	6860	4390	12 6	46 9	3 12	34 2	32 6	48 3	10 3	13280	9860	Normotensive female	NO	No complications

MASTER CHART

S. No.	Age	Name	Reg No	Qualification	Residence	GRAVIDA / PARITY	POG	MOTHER HB (dl)	MOTHER HCT (%)	MOTHER Platelets lacs/cumm	MOTHER MCH (pg)	MOTHER MCHC (g/dl)	MOTHER RDW (fl)	MOTHER PDW (fl)	MOTHER TLC (/cumm)	MOTHER POLYMORPHS (/cumm)	CORD BLOOD HB (g/dl)	CORD BLOOD HEMATICRIT (%)	CORD BLOOD PLATELETS	CORD BLOOD
101	19	Suman	2022/09/008193	Secondary school	Rural	Primi Gravida	37+4	11.3	33.7	1.88	30	33.4	45.7	16.3	7850	4860	14.3	46.8	2.65	3
102	29	Santosh	2022/05/002738	Higher secondary	Urban	G3P2002	37+4	11.2	33.1	2.54	28.1	33.4	45.6	16	17840	14440	18.4	48.2	2.54	3
103	26	Lata kandpal	2022/07/017449	Secondary school	Rural	Primi Gravida	39+0	10	30.7	4.12	31.1	32.7	45.1	16	17850	15150	13.4	45.1	1.54	3
104	32	Uma malani	2022/03/017777	Higher secondary	Urban	G2P1001	36+5	12	36	1.93	30.3	33.5	46.6	15.9	8920	6560	11.3	41.9	2.65	3
105	20	Koshaliya	2022/04/003231	Higher secondary	Urban	Primi Gravida	40+2	11.2	34	2.83	29.3	32.9	53.3	16.2	11400	8510	11.3	42.4	2.43	3
106	38	Amita	2022/03/010694	Secondary school	Rural	G2P1001	40+4	11.2	34	2.83	29.4	32.9	53.3	16.3	13250	9570	15.6	47.5	3.25	3
107	28	Pragya bhandari	2017/10/000733	Higher secondary	Urban	Primi Gravida	40+1	10.7	32.7	5.39	20.3	32.6	34.7	17.9	10790	8160	12.5	46.7	3.13	3
108	31	Nenu kanwar	2022/07/004796	Secondary school	Rural	Primi Gravida	34+6	14.2	42.2	3.35	31.1	33.8	40.5	15.8	8900	5310	8.9	34.2	1.32	2
109	38	Rajshree solanki	2022/07/013141	Higher secondary	Urban	G2P1001	39+0	14.3	43.1	2	28.4	33.2	44.3	16.3	7340	4450	11.4	43.6	3.25	3
110	26	Ekata meena	2017/08/008969	Secondary school	Rural	Primi Gravida	39+4	10.4	32.9	2.35	29.5	31.6	52.5	15.4	6960	5150	16.3	48.2	2.78	3
111	21	Sundar devi	2020/12/007650	Secondary school	Rural	G2P1001	39+4	12.6	37.1	1.83	32	34	48.7	16.9	11240	8470	14.6	46.7	1.96	3
112	24	Pooja kumari	2022/09/001860	Secondary school	Rural	Primi Gravida	40+4	10.8	32.8	2.73	26.9	32.9	56.5	16.1	5890	4510	12.4	46.7	1.56	3
113	24	Pooja kumari	2022/09/001860	Secondary school	Rural	Primi Gravida	40+1	10.8	32.8	2.73	26.9	32.9	56.5	16.1	5890	4510	12.6	47.6	2.76	3
114	27	Sapana bhansali	2022/07/016611	Graduate	Urban	Primi Gravida	30+0	11.5	34.7	3.98	29.3	33.1	49.3	16.4	14180	11210	16.4	49.5	2.43	3
115	27	Rupali chetriya	2022/08/017591	Middle school	Rural	Primi Gravida	38+0	11.9	37.2	3.24	28.2	32	64.7	16.2	10090	6790	16.5	48.2	2.65	3
116	22	Sharda	2022/04/007283	Middle school	Rural	G2P2001	38+3	12.9	39.7	2.18	28.1	32.6	87.3	16.1	10130	8400	13.7	48.3	2.65	3
117	19	Kamla kanwar	2022/04/018433	Middle school	Rural	Primi Gravida	39+1	12.9	39.7	2.18	28.1	32.6	87.3	16.1	13200	9860	12.5	47.3	2.54	3
118	31	Deepika nehra	2022/03/002125	Secondary school	Urban	G2P1001	38+1	12.1	36	2.72	31.5	33.5	50.4	15.5	6050	3810	15.3	53.7	3.13	3
119	24	Nandini vaishnav	2019/01/030292	Higher secondary	Urban	G2P1001	39	13.1	39.3	2.37	28.5	33.3	43.3	16.5	5070	1900	21.5	64.6	3.45	3
120	19	Pooja kanwar	2022/07/015514	Secondary school	Urban	G4P1021	38+4	11	33.9	1.32	26.4	32.6	50.4	16.5	9310	6830	15.6	48.9	3.65	3