Addis Ababa University

College of health sciences

School of Medicine

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Preeclampsia treatment outcomes and associated factors among pregnant women with preeclampsia at All Africa Leprosy, TB and rehabilitation training (A.L.E.R.T) Specialized hospital, Addis Ababa, Ethiopia.

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ABSTRACT

Background: The best way to characterize preeclampsia is as a syndrome particular to pregnancy that can impact almost all organ systems. Globally it contributes to 76,000 maternal deaths and 500,000 infant deaths annually.The second most common cause of maternal fatalities is preeclampsia. It is also a significant contributor to maternal and neonatal mortality as well as morbidity, particularly in low- and middle-income nations.

Objective: To assess preeclampsia treatment outcomes and associated factors among pregnant women with preeclampsia at ALERT specialized hospital, Addis Ababa Ethiopia.

Method: Institution based prospective cohort study was carried out among pregnant mothers with preeclampsia attending inpatient, emergency and delivery services of ALERT specialized hospital from July 25 to December 31, 2023. Descriptive statistics was presented with frequency tables and charts. Binary logistic regression model was employed to evaluate the relationship between the independent variable and treatment outcomes. All statistical tests will be significant at P-value less than 0.05.

Result: In this study a total of 203 mothers with preeclampsia were participated. Majority of them 125 (61.6%)were between the ages of 25 and 34. The average age was 27.42 years with a standard deviation of 4.68. There was 23.6% NICU admission and 4(2%) neonatal deaths. Though 43 (21.2%) maternal complications had registered; there was no maternal death.

Maternal age greater than 35 [AOR=4.66, 95%CI,(1.71-12.74)].Birth weight less than 2000g [AOR=5.66, 95%CI, (2.16-14.81)], BP at admission >=140/90 [AOR=3.05, 95%CI, (1.09-8.55)] and gestational age <37 weeks [AOR=7.44, 95% CI, (3.48-1..89)] were statistically significant to treatment outcomes.

Conclusion and recommendation: Although the prognosis for preeclamptic and eclamptic women has improved, several maternal complications continue to be major issues. We suggest continuous awareness creation to the public and frequent ANC follow ups in order to effectively prevent and treat preeclampsia as well as eclampsia in pregnancy. Optimizing prenatal care and implementing screening protocols are key.

Key words: Preeclampsia treatment outcomes, ALERT, prospective cohort

Contents

List of table

List of Figures

ACRONYMS

AKI: Acute kidney injury

ANC: Antenatal Care

ALERT: All Africa tuberculosis, leprosy and rehabilitation training

AOR: Adjusted Odds ratio

BMI: Body Mass Index

BP: Blood pressure

COR: Crude Odds Ratio

CI: Confidence interval

DIC: Disseminated intravascular coagulation

ETB: Ethiopian Birr

HDP: Hypertensive disorder of pregnancy

HEELP: Hemolysis Elevated liver enzymes, Low platelet

IUFD: Intrauterine fetal death

NICU: Neonatal intensive care unit

PE: Preeclampsia

PI: Principal Investigator

PPH: Postpartum Hemorrhage

LBW: Low birth weight

RDS: Respiratory distress syndrome

SSA: Sub Saharan Africa

WHO: World Health Organization

1 INTRODUCTION

1.1 Background

Four types of hypertension are recognized by the American College of Obstetricians and Gynecologists: preeclampsia and eclampsia syndrome, chronic hypertension of any cause, gestational hypertension, which occurs when there is no clear sign of preeclampsia syndrome and the hypertension goes away by 12 weeks after delivery, and preeclampsia on top of chronic hypertension [3].

Preeclampsia is diagnosed when a previously normotensive woman develops blood pressure readings that are higher than 140 mm Hg at the systolic and 90 mm Hg at the diastolic phases after 20 weeks of pregnancy, respectively, besides proteinuria (> or =300 mg/24hr or dipstick +1 persistent), thrombocytopenia, renal insufficiency, liver involvement, or cerebral symptoms. Eclampsia is defined as a generalized seizure, plus conditions which fulfill preeclampsia criteria [4].

Preeclampsia is a complex illness with a wide range of phenotypes. It results from the interaction of hereditary and environmental variables. Preeclampsia's cause is unknown despite intensive research, and while several hypotheses have been proposed, none of them fully explains all of the disease's symptoms [5].

A number of risk factors have been studied by various researchers, including age, race, use of analgesics, contraceptive use, and cesarean sections. Other risk factors include nulliparity, multi fetal gestation, and the amount of time since the previous birth, a history of preeclampsia, obesity, and physical inactivity. Antihypertensive medicines, magnesium sulfate, and corticosteroids will be administered according to protocol. Preventing preterm preeclampsia with low-dose aspirin is possible [6-8].

According to the WHO, pregnancy-related hypertension diseases account for around 25% of maternal deaths in Latin America and 10% of maternal deaths in Asia and Africa. However, the majority of preeclampsia and eclampsia deaths may be averted If women provided timely and adequate care based on evidence-based guidelines [11].

Hypertensive disorders are one of three lethal triads that significantly contribute to maternal morbidity. In Ethiopia, pregnancy-related hypertension accounts for 19% of maternal fatalities. The most serious condition is preeclampsia, either by itself or in combination with persistent hypertension. [1, 2]

1.2 Problem Statement

Preeclampsia is best described as a pregnancy-related syndrome that can impact almost every organ system. Every year, it causes 76,000 maternal fatalities and 500,000 newborn deaths worldwide. Preeclampsia is the second leading cause of maternal mortality. It is also a significant source of maternal and perinatal death and morbidity, particularly in poor and middle-income nations [1, 12].

Although the prevalence of PE has decreased globally, the issue extends beyond health concerns. Approximately 10% of African women get HDP at some point during pregnancy or puerperium. Among the numerous clinical kinds of HDP, PE (5.3%) was shown to be the most common in Africa, whether superimposed (0.9%) or not (4.4%), and independent of severity [13].

Estimates also varied widely by subregion, with Sub-Saharan Africa having a significantly greater frequency of HDP than Northern Africa.The pooled prevalence of preeclampsia in SSA was 4.1%, which is comparable to the prevalence of preeclampsia in Africa (5.3%), the United States (3%-5%), and the global estimate (1.8%-4.4%) [14] .

According to this analysis, the pooled prevalence of eclampsia was 1.5%, which is comparable to a review conducted in Africa (1.47%) and worldwide estimates (0.2%-9.2%), but somewhat higher than a survey conducted in China (0.9%) and the WHO multicountry survey prevalence of 0.3%. Because this study focused on Sub-Saharan African nations, the discrepancy might be related to racial disparities [15].

The total pooled prevalence of hypertensive disorders of pregnancy in Ethiopia was 6.07% [16]. Similarly, the pooled prevalence of hypertensive disorders of pregnancy and preeclampsia in Ethiopia was 6.82% and 4.74%, respectively [8]. The largest number of preeclampsia/eclampsia cases were recorded in Addis Ababa and the Harari region, with 32 and 24 instances per 1000 births, respectively[7].

Patients with preeclampsia and eclampsia have poor fetal-maternal outcomes. Aspiration pneumonia, severe anemia, HEELP syndrome, Puerperal sepsis, pulmonary edema, AKI, DIC, prolonged hospital stay, magnesium sulfate toxicity, instrumental and cesarean section births were among the maternal problems noted. Prematurity, LBW, RDS, low APGAR in the first and fifth minutes, and stillbirth are the most prevalent neonatal problems [7, 9, 10].

Preeclampsia is one of the major diseases which contribute to burden in the obstetrics ward in ALERT specialized hospital. This study primarily orientates the readers about disease outcome and related factors and elaborates how it is being dealt with in a typical tertiary hospital in Ethiopia and its repercussions.

1.3 Justification of the study

One of the referral hospitals with the largest volume of obstetric patients was the site of this investigation. Yet there was no single study done there previously. Thus, it assisted us in identifying treatment outcomes peculiar to this country and might point us to possible shortcoming on how preeclampsia is treated. Extensive research has been done on preeclampsia globally to a lesser extent in this country but this research aims to access recent and more local information on this topic.

2 LITERATURE REVIEW

2.1 Preeclampsia treatment outcomes and associated factors

A retrospective study done on pregnant women with HDP in Haiti concluded that there were higher odds of LBW, stillbirth and a 5 fold increase in maternal death [17]. Likewise, a hospital-based prospective cross-sectional research conducted in northeast India showed maternal death was higher in those with blood pressure of greater than or comparable to 160/110 and proteinuria of +3, cause of death were cerebral hemorrhage and pulmonary edema[18].

A prospective study conducted in Multan district at three health care facilities showed maternal and fetal adverse results were connected to the blood pressure of the mother. Maternal complications were seen during the study period include kidney infection, lung edema,severe anemia and maternal mortality. Whereas neonatal Complications include respiratory problems, asphyxia, prematurity, growth retardation and neonatal mortality. In addition this study tells us that low educational as well as poor socioeconomic status is significantly associated with the disease [19].

A meta-analysis and comprehensive review done in Sub-Saharan Africa found that pregnancy-related hypertensive disorders were associated with higher preterm delivery, low birth weight, perinatal mortality, maternal death, and cesarean sections[7].

Eclampsia, lack of ANC follow-up, maternal leukocytosis, high serum creatinine, and maternal age of 20-35 years were identified as risk factors for maternal problems in a research done at selected tertiary hospitals in Ethiopia [20].

Unfavorable maternal outcomes were associated with blood pressure severity, place of residence, gestational age at delivery, and visual blurriness, while adverse perinatal results were associated with severity of blood pressure, residency, gravidity, and early gestational age at diagnosis. The most common adverse maternal outcomes were HEELP syndrome, renal complications, and low birth weight and premature birth[21].

Ethiopian research at Gandhi Memorial Hospital found that the most prevalent maternal consequence was HEELP syndrome, followed by magnesium sulfate toxicity and a longer hospital stay [10].

A research at Yekatit-12 Teaching Hospital revealed maternal outcomes HEELP syndrome, cesarean or instrumental births and fetal outcomes, preterm, low birth weight, and poor 1st and 5th minute APGAR scores were among them [9]. Similarly, a study conducted among women giving birth in Addis Ababa's selected government hospitals (TikurAnbessa Hospital, St. Paul Medical College, and Zewditu Memorial Hospital) revealed that the most common maternal complications were HEELP syndrome, aspiration pneumonia, pulmonary edema, and placental abruption, and the most typical problems among newborns were LBW, stillbirths, prematurity, and respiratory distress syndrome [22].Likewise a study done at Gandhi Memorial Hospital revealed that leading unfavorable outcomes for mothers included placental abruption, postpartum hemorrhage, and HEELP syndrome; stillbirths accounted for 22.1% of all pregnancies[23]. A retrospective study conducted in Mettu Karl Referral hospital showed preterm births and low apgar scores were statistically significant and linked to poor neonatal results [24].

Individualized care plans are essential for such patients. Pre-existing medical conditions and family history of preeclampsia increase the risk of complications and potentially influence treatment choices.Being primiparous, previous history of maternal preeclampsia/eclampsia, family history of preeclampsia/eclampsia, high maternal BMI, chronic hypertension, anemia during pregnancy, and lack of antenatal care visits were identified as factors associated with preeclampsia and eclampsia in a systematic and meta-analysis done across Sub-Saharan Africa[7].

Similarly A comprehensive analysis of observational studies done in Sub-Saharan Africa found that cardiovascular risk factors such as chronic hypertension, obesity, diabetes, and alcohol were strongly related with an increased incidence of preeclampsia [6].

A systematic review and meta-analysis conducted in Ethiopia identified the following risk factors for hypertensive disorder of pregnancy: maternal age 35 or older, pregnant women with twins, a history of preeclampsia in the past, a family history of diabetes or hypertension, a body mass index of 25 or higher, alcohol use, a urinary tract infection, and a diet deficient in fruits and vegetables during pregnancy[8].

Similarly, a study on dietary factors associated with preeclampsia or eclampsia among women receiving delivery care services in Addis Ababa, Ethiopia (Gandhi and Zewditu

Memorial hospitals) discovered that consuming fruits as well as vegetables while expecting a baby and receiving nutritional support during antenatal care follow up are protective [25].

2.3. Conceptual framework

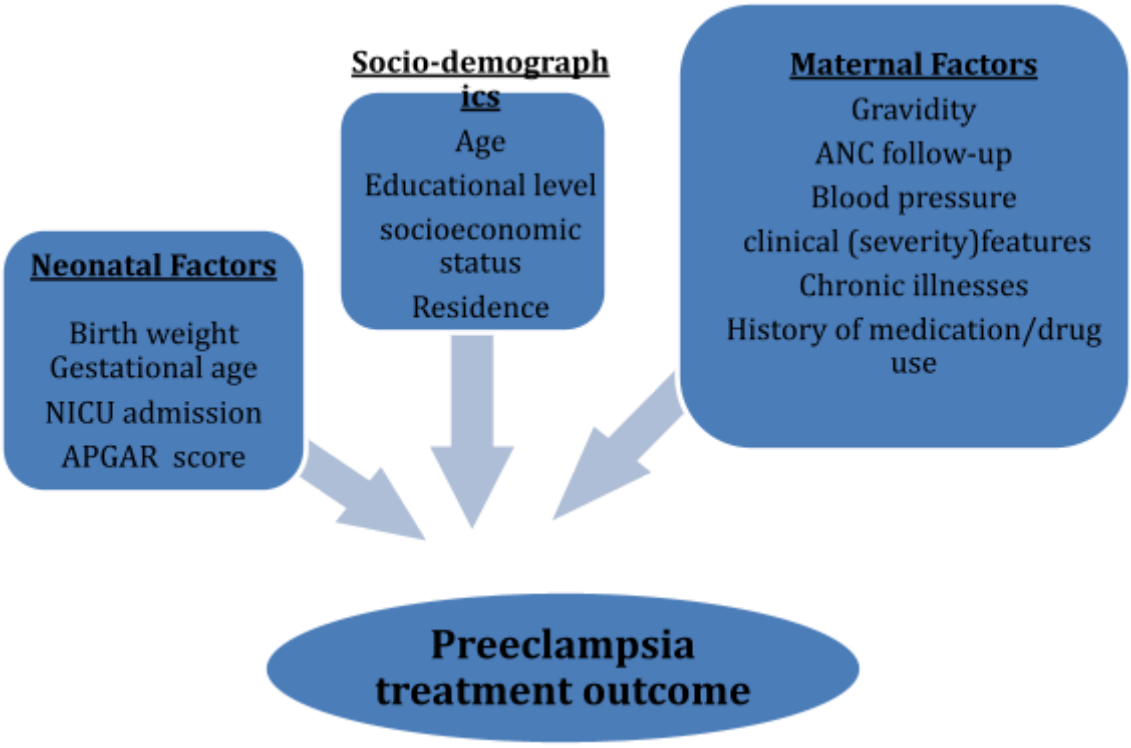

Figure 1 Conceptual framework

3 STUDY OBJECTIVES

3.1 General objectives

- To assess preeclampsia treatment outcomes and associated factors among pregnant women with preeclampsia at ALERT specialized hospital, Addis Ababa Ethiopia, from July 25 to December 31, 2023.

3.2 Specific objectives

- To identify preeclampsia treatment outcome among pregnant women with preeclampsia at ALERT specialized hospital.
- To identify factors associated with preeclampsia treatment outcomes among pregnant women with preeclampsia at ALERT specialized hospital.

4 METHODOLOGY

4.1 Study area

The research was carried out in ALERT specialized hospital department of Obstetrics and gynecology, Addis Ababa Ethiopia. The leprosy hospital that was first constructed in 1922 is being expanded and refurbished as the ALERT specialized hospital. It has several departments of which obstetrics and gynecology is the one with highest patient flow. It has labor wards, postnatal ward,high risk ward,OR, recovery unit, EOPD, GRC and ANC follow up clinics. In the department there are 9 obstetricians, 1 fetomaternal subspecialist,13 general practitioners and more than 90 midwives. Around more than 31,000 patients get outpatient obstetric and gynecologic services yearly. The total deliveries are estimated to be 8000 per year. The catchment areas for the department includes from Sebeta, Lemon, kolfe keranio sub city, and Nifas silk LaftoWoreda 4 primary health facilities.

4.2 Study Design

Prospective cohort study was carried out to evaluate preeclampsia treatment outcomes and associated factors in ALERT specialized hospital. Data was gathered using interviewer administered questionnaires and patient medical records (charts).

4.3 Study Period

The study was carried out from July 25, 2023-December 31, 2023.

4.3.1 Source Population

All pregnant women with HDP admitted to ALERT Specialized hospital Obstetric and gynecologic EOPD, High risk ward and labor ward from July 25, 2023-December 31, 2023.

4.3.2 Study Population

All chosen pregnant women with preeclampsia admitted to ALERT Specialized hospital Obstetric and gynecologic EOPD, High risk ward and labor ward from July 25, 2023-December 31, 2023.

4.4 Eligibility Criteria

4.4.1 Inclusion Criteria

Every pregnant mother with preeclampsia, eclampsia or superimposed preeclampsia.

4.4.2 Exclusion Criteria

Every pregnant mother with gestational hypertension, chronic hypertension, seizure disorder or other medical cause for seizure, chronic kidney disease and pregnant women who are mentally unfit were not included in the study.

4.5 Sample size determination

The single population proportion formula was used to estimate the sample size, and the P-value was derived from a prior study that revealed a 14.3% prevalence of hypertensive condition of pregnancy[12]. The following formula was used to calculate the sample size.

$$n = \frac{(Z\alpha/2)^2 P(1-P)}{d^2}$$

$$n = \frac{(1.96)^2 0.143(1-0.143)}{0.05^2}$$

$$n = 291$$

Where,

n = Sample size

CI = Confidence Interval = 95%

d = Margin of error = 5%

Zα/2 = 1.96

A reduction formula was used because the number of pregnant women admitted to the maternity ward, labor ward, and EOPD is fewer than 10,000. After taking 10% of non-respondents into account, the total sample size is **206**.

4.6 Sampling procedure

All pregnant women with preeclampsia/eclampsia who gave consent and met the eligibility requirements were added to the research.

4.7 Data collection Methods

From individuals who satisfied the eligibility requirements, data was gathered using an interviewer-administered, structured, coded and pre-tested questionnaire by trained data collectors. The data was gathered using a questionnaire from a related study with some modifications.Furthermore, a tool for gathering information was used to obtain test results and previous obstetric history from the medical file of a patient (charts). Each participant was informed about the study's objectives before providing their written consent. The level of participation was depending on the individuals' willingness.

4.8 Data quality assurance

The data collectors and supervisors received one day of training to ensure the quality of the data. 5% of the total sample size was used for a pretest. Before administering the questions to the actual study participants, some modifications were made to the unclear questions based on the results of the pretest. The principal investigator and supervisors were also daily review and check the obtained data for accuracy and consistency.

4.9 Study Variables

4.9.1 DEPENDENT VARIABLES

Preeclampsia treatment outcome (good /poor)

4.9.2 INDEPENDENT VARIABLES

Socio-demographic variables: Age, Educational level, socioeconomic status, Residence

Maternal variables: Gravidity, mode of delivery, ANC follow up, Hx of chronic disease, Blood pressure, Medication/drug use, clinical(severity) feature

Neonatal Variables: Birth Weight, Gestational age, NICU admission, APGAR score

Table 1 List and definition of variables

Variable	Classification	Definition
Age	Continuous: numerical (years)	Mother's age at presentation
Gravidity	Discrete: numerical (1, 2, 3…)	The number of pregnancies a participant has had in their lifetime.
Parity	Discrete: numerical (1, 2, 3…)	The number of times the mother gave birth after 28 weeks of gestation, regardless of live birth or stillbirth
GA	Continuous: numerical(Weeks)	Duration of pregnancy before birth
Antenatal care	Categorical: binary (yes/no)	Whether or not participant presented for antenatal testing before delivery

4.9.3 Outcome variables

Maternal and **Neonatal Outcome** (**Good, /Poor**)

Good outcome- A preeclamptic/ eclamptic mother and a neonate born from a preeclamptic/eclamptic mother who do not have any complications[22].

Poor Outcome-A preeclamptic/ eclamptic mother and a neonate born from preeclamptic/eclamptic mother who has at least one or more complications[22].

4.10 Operational Definition

Preeclampsia is diagnosed when systolic and diastolic blood pressures exceed 140 mm Hg and 90 mm Hg after 20 weeks of gestation in a previously normotensive women plus proteinuria (> or =300 mg/24hr or dipstick +1 persistent) or thrombocytopenia, renal insufficiency, liver involvement or cerebral symptoms.

Early onset, <34 weeks; late onset, ≥34 weeks; **preterm onset**, <37 weeks; and **term onset**, ≥37 weeks[26].

Preeclampsia superimposed on chronic hypertension: Development of new signs and/or symptoms associated with preeclampsia after gestational week 20, as above, in a woman with chronic hypertension [27].

Eclampsia is defined as a generalized seizure/ excluding epilepsy, in addition to preeclampsia criteria.

Clinical/severity Features-Severe headache,Visual abnormalities, Upper abdominal,retrosternal or epigastric pain, altered mental status, new onset dyspnea,orthopnea, upper body swelling

Maternal outcomes:

Maternal Mortality: Passing away of a pregnant woman or within six weeks of ending the pregnancy due to factors connected to or made worse by the pregnancy or its management, but not incidental or unintentional causes.

Maternal Complications: A minimum of one of theses events such as **HEELP** (hemolysis, elevated liver enzymes and low platelets syndrome), **puerperal sepsis**, **aspiration pneumonia**, **severe anemia** (Hemoglobin of less than 7 g/dL), **acute renal injury**(Cr raised above 1.1 &/doubling),**disseminated intravascular coagulation**(disruption of homeostasis), **lung edema**(excessive fluid in the alveoli), **placental abruption**(separation of placenta from the uterus prior to delivery of the fetus),**cesarean section**, **thrombocytopenia**(platelet less than 100,000), **postpartum hemorrhage** and **stroke** [28].

puerperal sepsis:At any moment between the time of labor or the rupture of the membranes and the six-week postpartum period, an infection of the genital tract that manifests as two or more of the following symptoms: pelvic aches, fever (≥38.5°C), unusual

vaginal odour or unpleasant vaginal discharge, and a delay in the uterus's pace of shrinkage (<2 cm per day during the first eight days) [20].

Abruptio Placentae: The separation of the placenta from the uterine wall prior to delivery of the baby. [20].

Postpartum hemorrhage (PPH): Excessive bleeding following delivery (>500ml in vaginal delivery or >1000 ml in cesarean delivery) or bleeding resulting in derangement of vital signs or a drop in hematocrit >10% from baseline [29].

Neonatal Outcomes:

Perinatal mortality:(Death of a fetus with weight of > 1000 gm(28 completed weeks of gestation) to the end of the 7th completed day)

Induced abortion:(termination of pregnancy due to complications of preeclampsia/eclampsia), **Low birth weight** (the live birth of a newborn weighing less than 2,500 grammes),**Low 1st and 5th minute APGAR** score(less than 7), **RDS**(respiratory distress syndrome), and **preterm delivery**(birth before 37 completed weeks) [30].

4.11 Data Management and Analysis

The collected data was coded and entered into Epi info 7, cleaned, stored and exported into SPSS. The data was analyzed using version 27 of SPSS software. Descriptive statistics were provided using frequency tables, graphs, as well as charts. Binary logistic regression model was used to assess the association between the independent variable and preeclampsia treatment outcome. Variables with P-value of < 0.25 included in the multivariate logistic regression to test their association with the outcome. All statistical tests were significant at P-value less than 0.05.

4.12 Ethical considerations

The study was conducted after obtaining a letter from AAU department of Family medicine and Academic and Research Directorate of ALERT Specialized hospital. Consent was received in writing and with full knowledge from pregnant women with preeclampsia. Medical record number was used for the identification. The names of respondents were not kept on file in order to maintain confidentiality. Access to the collected data is limited to the PI and confidentiality is maintained.

4.13 Dissemination of the result

The final research paper will be submitted to Addis Ababa University family medicine department and ALERT Specialized hospital.

5 Result

5.1 Socio-demographic characteristics

In this research, 203 mothers with preeclampsia participated at ALERT hospital over the trial period, with a response rate of 98.5%. The average age of the study participants was 27.42 years with a standard deviation of 4.68. As shown in Table-2 below the majority, 102 (62.6%) were in the age group of 25-34 years with the minimum age of 18 and the highest age 41 years. Eighteen (11%) were not married. The number of twin pregnancies in the study population was 18(8.9%).

Table 2 socio-demographic characteristics of pregnant women admitted with the diagnosis of preeclampsia (n=203), ALERT, Addis Ababa.

Variables	Group	N	%
Age	15-24	53	26.1
	25-34	125	61.6
	>=35	25	12.3
Educational level	Primary	92	45.3
	Secondary	82	40.4
	Diploma and above	29	14.3
Residency	Addis Ababa	179	88.2
	Out of Addis Ababa	24	11.8
Family monthly income	<=5000	142	70.0
	>5000	61	30.0
Marital status	Single	20	9.9
	Married	183	90.1
Patient referred from	Hospital	3	1.5
	Health center	196	96.5
	Intra-facility	4	2.0
Gravidity	First	68	33.5
	Second	46	22.7

	Third	46	22.7
	Other	43	21.3
Current pregnancy	singleton	185	91.1
	Twin	18	8.9

5.2 Background Characteristics

As it is shown in Table 3 below only 6(3.0%) of the study participants had no antenatal follow up. More than half (58.6%) of the preeclamptic mothers have admitted at a gestational age of <37 weeks. Most of them 155(76.4%) had no previous history of abortion. One hundred and ninety-eight (97.5%) of the preeclamptic mothers had no prior history of hypertension.

Table 3 Background characteristics of pregnant women admitted with the diagnosis of preeclampsia (n=203), ALERT, Addis Ababa.

Variables	**Group**	**N**	**%**
ANC follow up	Yes	197	97.0
	No	6	3.0
Previous history of abortion	Yes	48	23.6
	No	155	76.4
Current pregnancy	singleton	185	91.1
	Twin	18	8.9
Inter pregnancy interval	first pregnancy	71	35
	18-59	43	21.2
	<18	64	31.5
	>59	25	12.3
GA at admission	<37	119	58.6
	>=37	84	41.4
BP at admission	<140/90mmHg	30	14.8
	>=140/90mmHg	173	85.2
Chronic hypertension	Yes	5	2.5
	No	198	97.5

RVI Status	NR	189	93.1
	R	6	3
	UK	8	3.9
History of stillbirth	Yes	15	7.4
	No	188	92.6

GA: Gestational Age, BP: Blood Pressure,NR: Non reactive,R: Reactive, UK: Unknown

5.3 Clinical features and medication

Headache 56(27.6%), headache, visual abnormalities 41(20.2%), headache, visual abnormalities, upper abdominal, retrosternal, or epigastric pain, new dyspnea, orthopnea and body swelling 39 (19.2%) and body swelling 31 (15.3%) were the most common clinical features seen on the pre-eclamptic clients admitted to the hospital Fig2. Whereas the medications most commonly administered were Magnesium sulfate, Methyldopa and Nifedipine 65(32%), Magnesium Sulfate and Dexamethasone or Nifedipine 43(21.2%), Magnesium sulfate only 37(18.2%) and Magnesium sulfate Dexamethasone, Ampicillin, Diclofenac, Nifedipine, ceftriaxone and Hydralazine 35(17.2%).

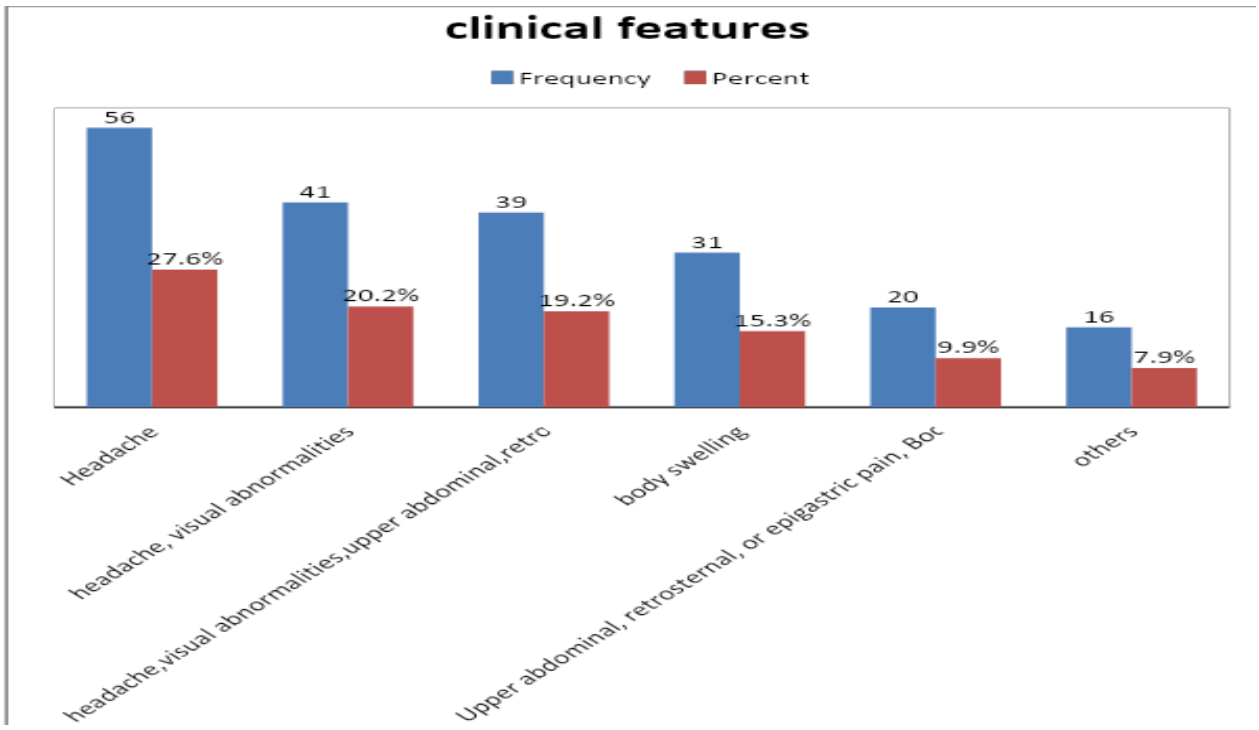

Figure 2 Clinical Features

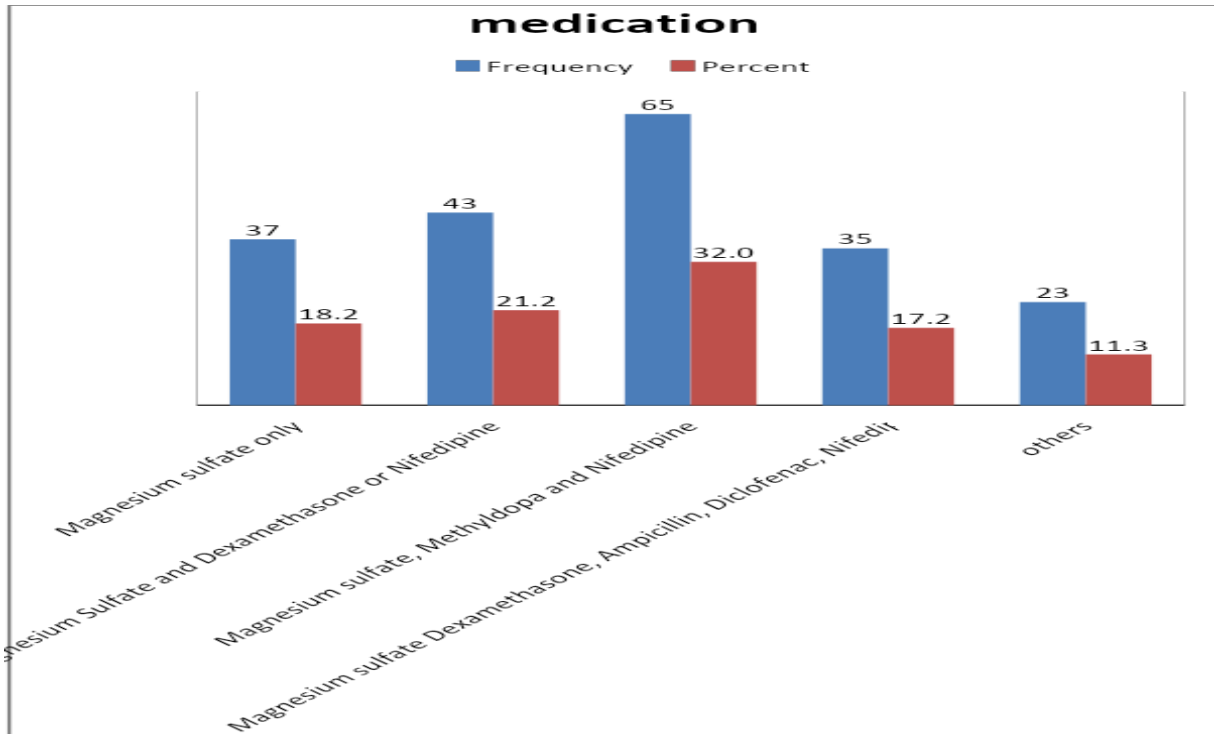

Figure 3 Medication Given

5.4 Maternal and neonatal outcomes

As shown below Seventy two (35%) of the mode of delivery was normal full term which is followed by cesarean full term delivery (30%). Normal preterm delivery was 30(14.8%).Fig 4

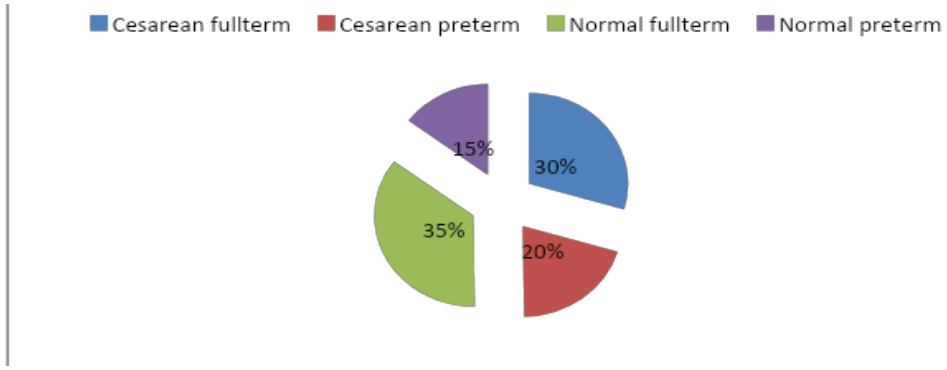

Figure 4 Type of delivery

Majority of the mothers (78.8%) had no maternal complications. There was no maternal death, but 4(2%) neonatal death was registered. As indicated in Table 3 below about 43(21.2%) of the women developed complications with 48(23.6%) NICU admission. About 192(94.6%) of the total birth was alive 5(2.5%) induced abortion and 6(3.0%) dead/IUFD deliveries. Majority of the neonates 142 (70%) had a normal range of APGAR score.

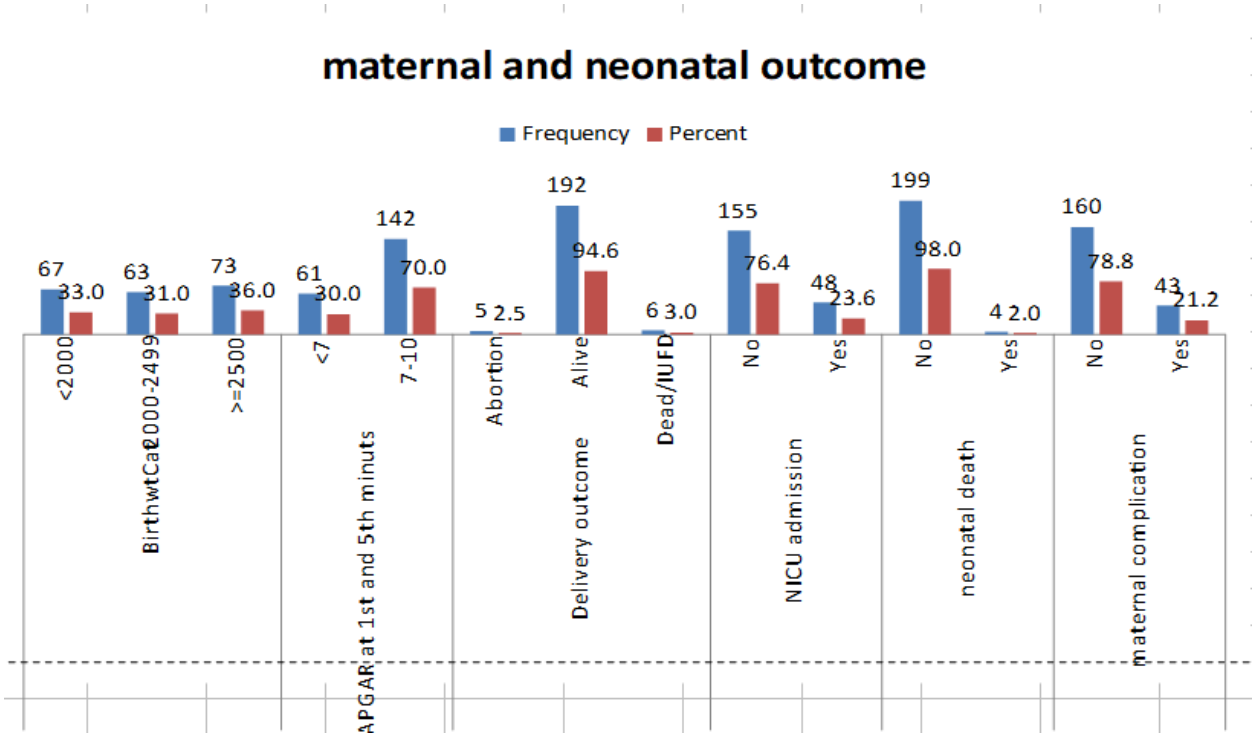

Figure 5 Maternal and neonatal outcomes

5.5 Factors associated with maternal and neonatal outcomes

In this work, the binary logistic regression model analysis revealed that Maternal age, birth weight, BP at admission, gestational age and APGAR at 1st and 5th minute were statistically significant associated to maternal complication ($p<0.25$).Whereas history of abortion, Current pregnancy condition and gravidity were not significantly associated in the analysis.In order to avoid an excessive number of variables and unstable estimates, variables with P value <0.25 were taken to multivariable logistic regression analysis.

After correcting for confounders in the multivariable binary logistic regression analysis, variables which include, maternal age, BP at admission ,birth weight and gestational age were statistically significant and associated with the treatment outcome, Table 4.

As multivariable binary logistic regression analysis maternal age >=35 years were 4.66 times more likely statistically significant to maternal treatment outcome [AOR=4.28,95%CI,(1.57-11.67)] birth weight less than 2000g were 6.79 times more likely statistically associated with maternal complication treatment outcomes than those 2500g and more birth weight [AOR= 6.79, 95% CI, (2.50-18.41)]. Similarly BP >= 140/90 at admission [AOR 3.05, 95%CI, (1.09-8.55),APGAR at 1^{st} and 5^{th} minute[AOR=7.18, 95%CI(3.32-15.53)] and gestational age <37 weeks [AOR=11.45, 95% CI, (5.37-24.15)] were statistically significant to treatment outcomes. But the rest variables were not statistically significantly associated (Table 4).

Table 4 Binary and multi variable logistic regression analysis of factors associated with treatment outcome of preeclamptic women (n=203)

Variables	**treatment outcome**		**COR**	**P-value**	**AOR**	**P-value**
	Good	**poor**				
Maternal age						
<35	85	81	1.00		1.00	
>=35	10	27	2.83(1.29-6.22)	**0.009***	4.28(1.57-11.67)	**0.004***
Current pregnancy						
Singleton	84	101	1.00		1.00	
Twin	11	7	1.89(0.70-5.09)	0.21	1.19(0.37-3.81)	0.78
Birth weight						
<2000	14	53	7.12(3.32-15.27)	**0.000***	6.79(2.50-18.41)	**0.000***
2000-2499	34	30	1.66(0.82-3.31)	0.15	2.20(0.96-5.09)	0.06
>=2500	47	25	1.00		1.00	
BP at admission						

<140/90	20	10	1.00		1.00	
>=140/90	75	98	2.61(1.16-5.91)	**0.021***	3.05(1.09-8.55)	**0.034***
History of abortion						
Yes	27	21	1.65(0.86-3.16)	0.14	1.39(0.59-3.27)	0.44
No	68	87	1.00		1.00	
Gestational age						
>=37	78	43	1.00		1.00	
<37	17	65	6.94(3.62-13.30)	**0.000***	7.18(3.32-15.53)	**0.000***
APGAR at 1st and 5th minute						
<7	14	47	4.46(2.25-8.83)	**0.000***	2.28(0.97-5.37)	0.060
7-10	81	61	1.00		1.00	
Gravidity						
First	26	42	1.00		1.00	
Second	20	25	1.93(1.02-3.67)	0.2	1.80(0.74-4.78)	0.19
Third and above	49	41	1.49(0.73-3.07)	0.14	1.17(0.44-3.11)	0.76

1.00=reference, COR=Crude Odds Ratio, CI= confidence interval, BP= blood pressure

6 Discussion

In our study thirty (14.8%) of the study participants had admission systolic to diastolic blood pressure of < 140/90 mmHg while 173(85.2%) had more than 140/90 mmHg which is similar with a retrospective study done in Yekatit-12 teaching hospital as well as a research conducted among women giving birth in Addis Ababa's selected government hospitals (TikurAnbessa Hospital, St. Paul Medical College, and Zewditu Memorial Hospital). In the later study the mothers' average systolic blood pressure was 157±16.1 mmHg, and the average diastolic blood pressure was 103±10.85 mmHg[9][22] which might be due to similar study populations.

This finding indicates that 48 (23.6%) study participants had previously had an abortion. but greater than another finding that only seven people, or 7.8%, had previously had an abortion [19]. However, in contrast, compared to a retrospective cross-sectional research carried out at Gandhi Hospital, which accounts for about 53.6% of delivered babies, approximately 95% of this study resulted in a live birth [23]. The variation may arise from the fact that, in a research carried out at Gandhi Hospital, eclampsia was detected in every mother.

In this study there was no maternal death which is similar to other previous studies [19] and is a very positive outcome compared to other studies[17,18] and 21.2% had at least one maternal complication.These were APH,pulmonary edema, seizure,HEELP syndrome,PPH,cesarean section,thrombocytopenia,and infection. It is similar to a study conducted in TikurAnbessa Hospital, St. Paul Medical College, and Zewditu Memorial Hospital[22].

This study also showed that neonatal mortality 4(2%) and stillbirths 6(3.0%) had occurred during the study period, however, it is less than those of other research that were done in Ethiopia(21).In addition low birth weight accounted for 131(64.5%) and Preterm delivery 72(35%) were seen. On the other hand 48(23.6%) of neonates were admitted to NICU which is higher than previous study (18.4%) [23] and the most frequent causes were LBW,

prematurity and RDS. This might be due to almost all the study participants being those with complicated cases and referred for better treatment from other health facilities.

In this study low birth weight was significantly associated with poor fetomaternal outcome. Birth weight <2000 gm is more likely for neonatal complications compared to those with >=2500g [AOR=5.66 95% CI, (2.16-14.81)]. Meta analysis study done focusing on sub-Saharan Africa had similar findings. It also disclosed that low birth weight has a higher chance of premature birth and cesarean sections for mothers[15].

The current study also revealed that pregnant women >= 35 were statistically significantly linked to worse maternal outcomes [AOR = 4.66, 95% CI, (1.71-12.74)]. Similarly, a systematic review and Meta analysis conducted in Ethiopia demonstrated that Eclampsia was greater in teenagers and older women aged >35 [8]. Pregnant women aged 35 years and more were more likely to acquire maternal complications like pregnancy-related hypertensive disorders [16].

Admission BP was another variable which is significantly associated with the treatment outcome of the investigation at hand. Mothers with a BP of >=140/90 mmHg were 3.05 times more likely to develop complications compared to those with a BP of less than 140/90 mmHg (AOR= 3.05, 95%CI, (1.09-8.55)]. This was very supportive of a previous study which explained that premature delivery rates were impacted by elevated blood pressure levels. [30].

During the study period, out of the total deliveries, 203 women were diagnosed with preeclampsia. About 119(58.6%) patients with preeclampsia who were admitted at a gestational age of <37 were highly likely to develop maternal complications [AOR=7.44, 95%CI, (3.48-15.89)]. Similarly, a study in Debre Markos Comprehensive Specialized Hospital also indicated that individuals with early onset of preeclampsia without severe features were more prone to develop maternal and perinatal complications [21].

In our study low APGAR was not significantly associated with poor neonatal outcome. On the contrary, a retrospective study done in Mettu Karl Referral hospital showed a low apgar

score was statistically significant and associated with poor neonatal outcomes[24]. This might be due to an improvement of the study area in the management of neonates because of a fully equipped NICU set up.

Gravidity is not statistically significant in this study. However, Unfavorable maternal outcomes were associated with gravidity according to the research done in Debre Markos Comprehensive Specialized Hospital[21].

7 Strength and Limitations

The research was a prospective cohort study which followed preeclamptic mothers from the time of admission of pre-eclamptic mother until postnatal care and the newborn from delivery to discharge from ward/NICU. The data was collected by a pretested and interview based and patient record review approach.

The research addressed preeclamptic pregnant mothers who visited ALERT Specialized hospital during the study period. Only women who attend hospitals are included in this hospital-based strategy; It cannot be generalized because it was conducted in a specialized hospital; the finding might not accurately reflect the maternity outcomes of preeclamptic women in non-hospital environments.

While reviewing patient charts there were incomplete laboratory values, specifically urine analysis and organ function tests. The reasons being unavailability of investigations in the institution and time restraint in emergency patients. Shortage of time was another major limitation in this study.

8 Conclusion and Recommendations

Adverse feto-maternal outcomes are encountered in patients with preeclampsia even though the majority of neonatal fatalities associated with preeclampsia and eclampsia might be prevented if women received treatment that was prompt, efficient, and compliant with evidence-based guidelines.

We recommend the MOH and higher officials to advocate preconception care and early ANC follow-up to the public in order to screen and detect the disease early.

We recommend the health care institutions to work closely with the referring health facilities and to give refresher training in order to screen, diagnose and refer mothers with preeclampsia/eclampsia early, So as to deliver timely intervention and standardized management.

In addition we recommend health care professionals to undergo opportunistic screening, preventive management to high risks and to create awareness about the disease.

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APPENDIX

Informed consent form

Title of the research: Preeclampsia treatment outcomes and associated factors at ALERT Specialized Hospital, Addis Ababa, Ethiopia.

Principal Investigator: TsionDesalegn(MD,Final year family medicine resident)

Advisor: Elnathan Kibebew(MD,MPH, Family Medicine Specialist)

Purpose of the Study:To evaluate preeclampsia treatment results and related factors in pregnant preeclampsia patients. Knowing these will enable us to develop a preventative strategy and will highlight any treatment gaps, allowing us to develop a more effective management strategy.

Benefits: There is no direct benefit provided for being a participant. However the study will be a positive influence on our follow up and management strategy in the future.

Dangers: There aren't many risks involved in taking part. When asked questions about themselves, participants may feel typical nervousness.

Safeguards: The given information will only be used for this study and will be treated with the utmost confidentiality. An encrypted data file containing your information will be kept safe. Being a part of this study is entirely optional, and you can leave at any moment without incurring any fees or losing any advantages to which you might otherwise be eligible.

I am aware of the goals, advantages, and dangers associated with taking part in this research. I accept to take part in this study after being given the chance to ask questions and receive satisfactory answers.

Signature of the research participant: .....

Date: …….....

Questionnaire

Part I: Personal Details: **MRN**: …….

1. Place of referral……

2. Date of admission: ----------

3. District/city/Sub city.……

4. Residency: Rural/Urban

5. Age (in years): .....

6. Pregnancy week: …….

7. Education Level:

Primary/Middle/secondary school level/Above

8. Occupation:

Housewife/Private Job/Govt. Job

9. Marital Status:

Single/Married/Divorced/widowed

10. Husband education level:

Primary/Middle/secondary school level/Above

11. Husband Job:

Labor/Private Job/Govt. Job

12. per month family earning: (value in Birr) …….

13. Pregnancy:

1st/2nd/3rd/other

Abortion (yes/No)

Still birth (yes/ No)

Singleton/Multifetal (Twins, triplets, higher order)

GA at Admission: …….

Interpregnancy interval (in months)……

14. Siblings no: ……..

15. Weight: …… Height: …….. BMI= …….

16. Admission BP: ……..

17. Clinical Features: ……

18. Diabetes: Yes/No Type: ……

19. Chronic hypertension: Yes No

20. Any cardiac disease: Yes No

One multiple (mention all)

21. Any surgery in past: Yes No

Abdominal cardiac other

22. Any other disease (RVI status):

23. ANC follow up in current pregnancy (yes/No)

24. Family history of DM/HTN/None

25. Any history of medication (contraception) or drug (alcohol) use during current pregnancy:

……

Part II: Maternal and neonatal outcomes

26. Medication given after admission:

……..

27. Date of delivery: ……..

28. Type of delivery:

1, Normal 2, Cesarean 3, Preterm 4, full term

29. In the case of preterm gestational week……..

30. Maternal complication/s after delivery:

…….

31. Maternal death: Yes No

Reason……

……

……

…

32. Fetal birth weight (gm): ……..

33. Sex (M/F)

34. APGAR (1st and 5th minute): …….

35. NICU admission: Yes No

36. NICU admission reason (complication/s): (specify)

1…….....

2.……

…….

37. Neonatal death: Yes No

Reason……

……

……

….....

Questionnaire-2

Part I:

Introduction:

My name is Dr. TsionDesalegn. I am a final year resident at Addis Ababa University-School of Medicine. For the fulfillment of my Speciality program in Family Medicine; I am required to undertake a research study. My research study topic is: Preeclampsia treatment outcomes and associated factors.

Part-II:

Laboratory Values:

LABORATORY VALUES	TEST	RESULT
CBC	WBC	
	Hgb	
	PLT	
LFT	AST	
	ALT	
	ALP	
RFT	Cr	
	BUN	
LDH	LDH	
UAA	PROTEIN	
	LEUKOCYTE	
	NITRITE	
	BLOOD	